



Mobile Health Quality among National Health Insurance Participants in South Sumatra

Haerawati Idris[✉], Misnaniarti, Dian Safriantini

Department of health policy & Administration, Faculty of Public Health, Sriwijaya University

Article Info

Article History:
Submitted Oktober 2019
Accepted June 2020
Published November 2020

Keywords:
Mobile health, quality,
national health insurance

DOI
<https://doi.org/10.15294/kemas.v16i2.21357>

Abstract

The development of information technology and telecommunications has penetrated into various sectors including health. With Mobile JKN, community administrative activities in managing JKN are easier. The study aims to analyze the perception of mobile health among participants JKN in South Sumatra Province. This research is a quantitative study with a cross-sectional design. The research sample was JKN participants stay in South Sumatra aged > 18 years who use the Mobile JKN app amount 400 participants. The sampling technique used purposive sampling. Data collection using online questionnaires and distributed through social media. Results of the study showed that the perception of the quality system has optimal results (50,50%). The problem encountered was in the network stability indicator from JKN mobile application users. On the quality of information has optimal results (67.50%). Problems encountered are in the indicator of limited service information, display updates. Then, the quality of service has optimal results (63,50%). The problem encountered was in the service integration indicator from the JKN mobile application. Quality of the JKN Mobile application seen from the System Quality, Information Quality and Service Quality has optimal results. BPJS Health suggested to increase network stability, improve service information, display updates and information in the JKN Mobile application, conduct application socialization, and develop service integration.

Introduction

The development of information technology and telecommunications has penetrated into various sectors including the health sector (Habib, 2016; Tangcharoensathien; 2017). This has the potential to change the face of health services throughout the world (Yuan, 2017; Gaudette, 2018). The role of technology in the world of health is very important, especially in improving the quality and quality of health services (Mustika, 2015).

In Every year, the number of people who have participated in the National Health Insurance (JKN) continues to grow. 157.7 million in 2015, to 188.7 million in 2016, to 223 million in 2017, to 235.1 million in 2018 and to reach 257.5 million or the entire population of

Indonesia in 2019 (BPJS of Health, 2017)

The number of participants in the National Health Insurance in South Sumatra does not cover the whole community (Rahmaliyah, 2018). This shows that there are still significant challenges for the South Sumatra of social insurance administration organization or known as BPJS of Health and the South Sumatra Government to realize *Universal Health Coverage* in South Sumatra.

Considering the increasing number of people who use *mobile* technology, BPJS Health as the Indonesian Social Security Organizing Agency is not behind the idea. At the *launching* of the JKN Mobile application in Jakarta, the Director of the Health BPJS said that in order to improve services for participants in the

[✉] Correspondence Address:
Jl. Palembang Raya KM. 32 Ogan Ilir, South Sumatra
Email: haera@fkm.unsri.ac.id

National Health Insurance-Healthy Indonesia Card (JKN-KIS) the Health BPJS made the JKN *Mobile* application (Health, 2017).

This JKN *Mobile* Application is a form of digital transformation of the business model created by BPJS Health. From the beginning in the form of administrative activities in the Branch Office or Health Facility then converted into the form of a *mobile* application. With this transformation, JKN participants can carry out administrative activities anywhere and anytime without time limit (*self service*). In 2017 registered users Application *Mobile* JKN in Indonesian Andorid version of > 1 million *users* and applications *Mobile* JKN iOS version of > 2,000 *users* (BPJS Kesehatan, 2017)

One study of health applications in Japan that is used *mobile* named *iHeart*. This application is based on location and heart rate. The *iHeart* system allows patients to send blood pressure and heart rate information to hospitals and emergency care units. Location-based services in this application can be used in the world of health so that the patient's location is accurately known. The conclusion from this study states that *iHeart* can reduce the critical possibility of a patient in an emergency. This proves the use of *mobile* health applications can save more lives (Keikhosrokiani, 2013).

In another study conducted by Yu, *et al.* (2006) in China explain that there are many adoption challenges in implementing *mobile health*. According to him the application must be fully integrated into the flow of clinical performance and assessment in patient care while offering easy administration and facilitating communication between health services. Another study, DeLone and McLean (2003) proposed a model for measuring the success of information systems. In the DeLone and McLean modification model the most common challenge for *mobile health* solutions is acceptance of quality consisting of three components: system quality, information quality and service quality. Each must be separate because it affects user satisfaction that supports the successful implementation of the information system used. Saptonoadi, *et al.* (2018) also conducted research on the quality and success of a health information system named Homedika. Homedika exists as

a technology-based social entrepreneur that connects health workers and health facilities with the community to provide various health services (Hafner, 2017, Alesane, 2018). The results of the analysis obtained in this study is said that the assessment of quality by respondents included in the enough category (Braun, 2017; Roman, 2018).

As one of the efforts in improving health services in Indonesia, especially in South Sumatra, *Mobile* JKN is expected to be a priority application by the community. With *Mobile* JKN, the public can find all information related to JKN participant data including medical history, billing information and availability of health care facilities (Handayani, *et al*, 2018). The facilities offered by *Mobile* JKN can facilitate community administrative activities in managing JKN problems. This research aims to investigate of JKN participants' perceptions about the quality of *Mobile* JKN applications in South Sumatra as measured by: the level of system quality, quality, information and service quality.

Method

The design of this study uses quantitative cross-sectional. The sampling method used in this study was purposive sampling with human inclusion criteria of at least 18 years and had used the JKN *Mobile* application. The number of samples obtained was 400. The type of collection used in this study was primary data obtained through an online questionnaire to JKN Participants in South Sumatra. The online questionnaire was created using Google Form. The collection method used in this research is to use an online questionnaire distributed via social media such as WhatsApp, LINE, Facebook, Instagram and others. The researcher distributed questionnaire links on the researchers' private social media. With the aforementioned criteria, prospective respondents who feel that they meet the criteria can fill out the questionnaire by pressing the questionnaire link listed.

Data processing obtained from the results of an online questionnaire with respondents was carried out with the following stages: 1). Gather all data obtained from respondents through an online questionnaire using Google Forms. 2). Compile data online questionnaire results that

have been categorized using a Likert scale with a value of 1 (strongly disagree), 2 (disagree), 3 (normal), 4 (agree) and 5 (strongly agree).3). Categorizing the value if \leq mean / median is the “Not optimal” category and the value if $>$ mean / median is the “optimal” category then a percentage is calculated to analyze the difference in proportions between the optimal or not optimal categories. This study refers to a standardized questionnaire from the research of Handayani, *et al.* (2018) with the title “Critical Success Factors for Mobile Health Implementation in Indonesia”.

Results and Discussion

Subjects in this study were JKN participants domiciled in South Sumatra, aged at least 18 years and had used the JKN *Mobile* application. Based on the research sample obtained by the description of

research subjects by sex, domicile, frequency of use of the *Mobile* JKN application, selected primary health facilities, features often used in the *Mobile* JKN application, and problems that are often experienced when using the *Mobile* JKN application.

Based on the picture 1, it appears that the most respondents are Age 36-45 Years (31,75 %). Based on the picture 2, it appears that the most respondents are Women (61%). Based on the picture 3, it appears that the most respondents are with a bachelor’s degree (48%). Based on the picture 4, it appears that the most respondents are civil servant/Indonesian National Army/Indonesian Police/SOE (37,75 %). Based on the picture 5, it appears that the most respondents are staying the city of Palembang (37,5 %). Based on the picture 6, it appears that the most respondents using

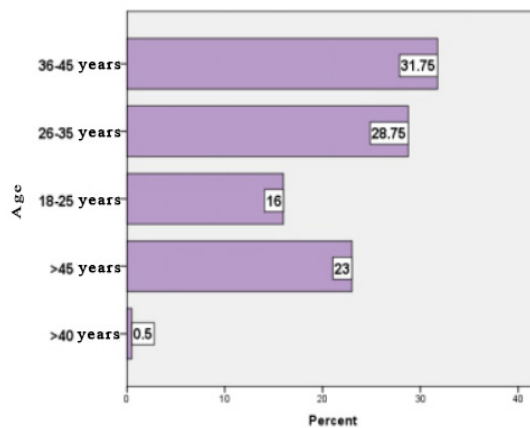


Figure 1. Diagram of Research Respondents by Age

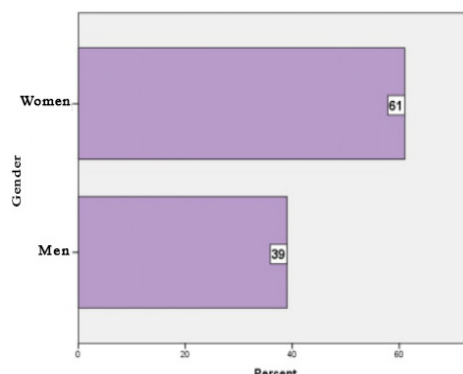


Figure 2 Diagram of Research Respondents by Gender

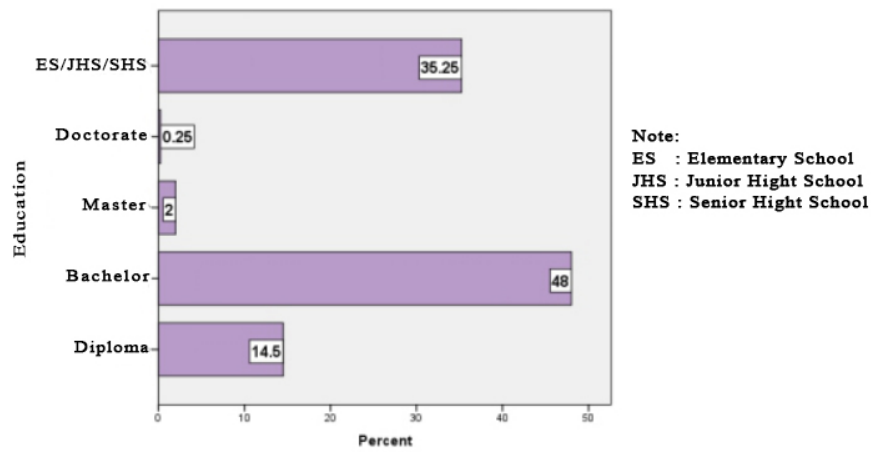


Figure 3 Diagram of Research Respondents based on Recent Education

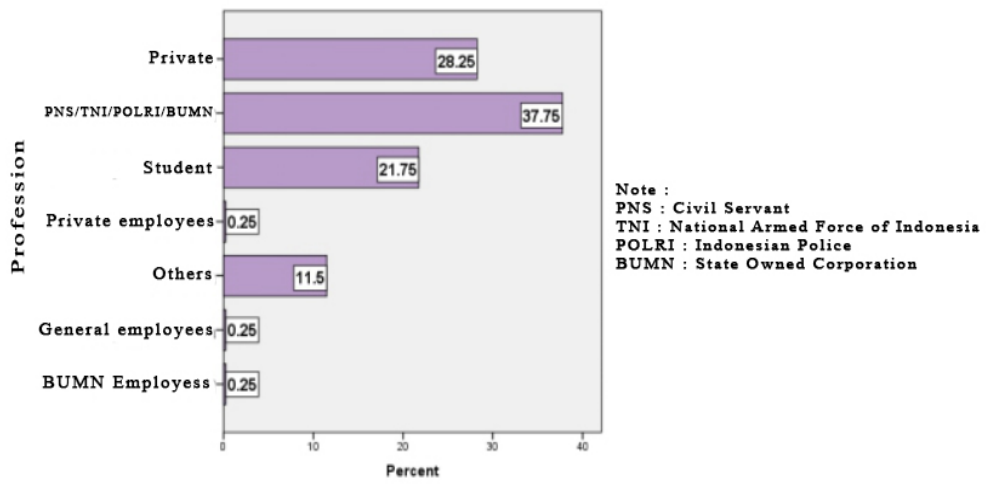


Figure 4 Diagram of Research Respondents based on Employment

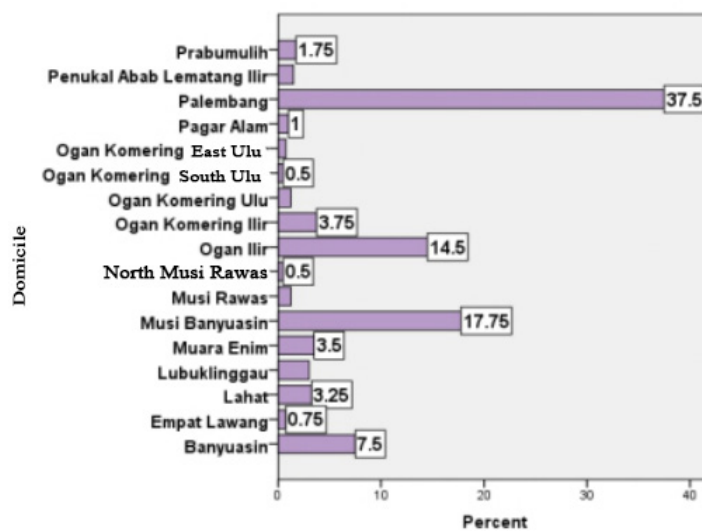


Figure 5 Diagram of Research Respondents based on living

the *Mobile* JKN application in the last 3 months are 1-5 times (97.25%). Based on the picture 7, it can be seen that the most respondents are participants with primary health facilities Clinic / Practitioner (52%).

Based on the results of responses that have been collected, the following is the respondent's assessment of the quality of the system: Based on the total question "Quality of the System" on the research subjects, it was found that the Quality of the System has optimal results (50.50%).

Respondents who fill out an *online* questionnaire can fill out suggestions or comments about the *Mobile* JKN application in the column that has been provided in the *online* questionnaire link. Below are the

sentences written by respondents regarding the quality of the JKN *Mobile* application system:

- "If the network becomes unstable the response will be slow"
- "Application response please accelerate"
- "The need for internet data to access Mobile JKN is not too big please"

Based on the above sentence, it can be concluded that the outline of suggestions or comments from respondents is about network stability from using the JKN Mobile application.

Based on the results of responses that have been collected, the following is the respondent's assessment of the quality of information. Based on the total question "Information Quality"

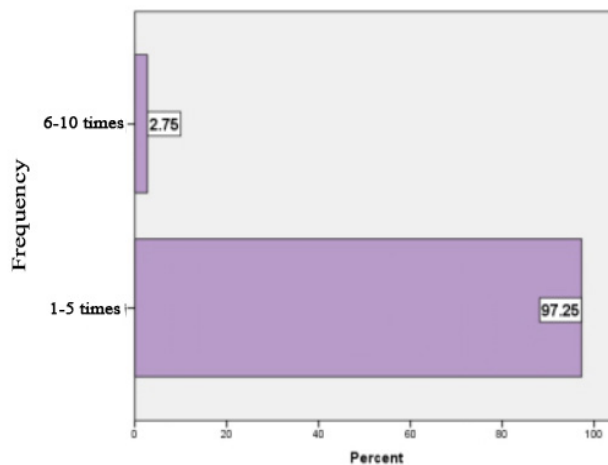


Figure 6 Diagram of Research Respondents Based on Frequency of Use of JKN *Mobile* Application

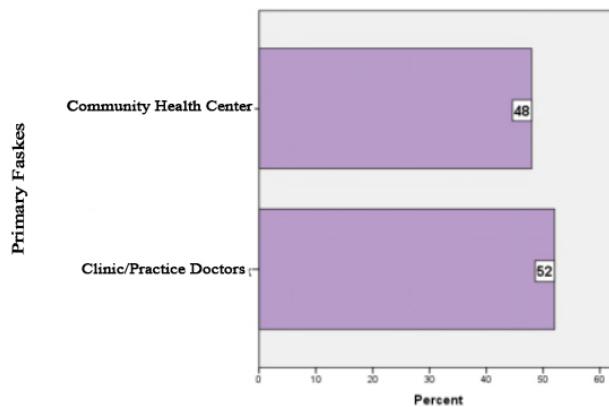


Figure 7 Diagram of Research Respondents Based on Primary Health Facilities

on the research subjects, it was found that Information Quality has Optimal results (67,50 %).

Respondents who fill out an *online* questionnaire can fill out suggestions or comments about the *Mobile* JKN application in the column that has been provided in the *online* questionnaire *link*. Below are sentences written by respondents regarding the quality of information on the JKN Mobile application:

“Please enter information about health services that are covered and not covered by JKN”

“In order to list the types of medicines that can be obtained from the use of JKN-KIS”

“Update the appearance of the JKN Mobile application”

“The need to update data and information on JKN membership regularly”

“Data updates are sometimes late”

“Update mapping of health facility locations”

“Provide socialization so that use can be wider”

“There needs to be more outreach to the community”

“The existence of Mobile JKN must be increased”

“Please carry out ongoing promotions related to services within the application”

Based on the sentences above, it can be concluded an outline of suggestions or comments from respondents is about service information, display *updates* and information as well as organizing the socialization of the *Mobile* JKN application. Based on the total “Service Quality” questions on the research subjects, it was found that the Quality of the System had Optimal results (63,50 %).

Respondents who fill out an *online* questionnaire can fill out suggestions or comments about the *Mobile* JKN application in the column that has been provided in the *online* questionnaire *link*. Below are sentences written by respondents regarding the quality of *Mobile* JKN application services:

“Please add Mobile JKN features

to register online for referrals to hospitals”

Based on the above sentence, it can be concluded that the outline of suggestions or comments from respondents is about developing service integration from the *Mobile* JKN application.

The quality of information systems is a characteristic of inherent information about the system itself (DeLone and McLean, 1992). The quality of information systems is also defined by Davis et al. (1989) as perceived ease of use that is the level of how great technologist i computer felt relatively easy to understand and use. This shows that if information system users feel that using the system is easy, they don't need much effort to use it, so there will be more time to do other things.

Based on the results of the total System Quality questions, the System Quality has an Optimal result (50,50 %). The results of this study are different from the results of research Saptoadi, *et al.* (2018) and Saragih, *et al.* (2014) who also said that the quality of the application system under study had suboptimal results.

After analyzing the system quality questions from the respondents' assessment scores, the most chose Very Disagree as many as 3 people found in question 1 (I find it easy to monitor activities related to BPJS Health using *Mobile* JKN). That is, some respondents still have difficulty in monitoring activities related to the Health BPJS through the *Mobile* JKN application. Respondents who chose the most Disagree as many as 5 people are in question 5 (*Mobile* JKN provides a fast system response time in its use). That is, some respondents felt that the response time of the *Mobile* JKN system was still slow. Then, the 33 people who chose the Strongest Agree as many as there are in question 6 (*Mobile* JKN gives me ease in making decisions in its application, for example to replace primary health facilities). That is, some respondents have felt the *Mobile* JKN application makes it easy to make decisions in their application such as changing primary health facilities.

Based on the results obtained, it was concluded that the quality of

the *Mobile* JKN application system was not optimally assessed from the perspective of students who used the *Mobile* JKN application. Problems encountered were in the indicators “ease of monitoring activities” and “system response time”. In this case, BPJS Health needs to improve application performance in making it easier for users to monitor activities related to BPJS Health and the application system response time.

Information quality is the quality of output in the form of information produced by the information system used (Istianingsih, 2009). The better the quality of information, would be more appropriate decisions anyway. If the information produced is not quality, it will negatively affect user satisfaction which determines the optimization of the information system.

Based on the results of the total information questions Quality Information, obtained Information Quality has optimal results (67, 50 %). The results of this study are different from the results of research Saptonoadi, *et al.* (2018) and Saragih, *et al.* (2014) who also said that the quality of the application system under study had suboptimal results.

After analyzing the information quality questions from the respondent's assessment score, the most chose Disagree as many as 7 people found in question 6 (*Mobile* JKN provides information that is always *updated*) and 5 people in question 2 (Information in *Mobile* JKN matches the physical documents that I have possess (for example BPJS identity card number) This means that some respondents still feel that the *Mobile* JKN application has not provided information that is always *updated* and some respondents still feel that the information in *Mobile* JKN does not match the physical documents that the respondent has. Strongly Agree as many as 34 people are in question 2 (Information in *Mobile* JKN is in accordance with the physical documents that I have, for example BPJS identity card number), meaning that some respondents have felt that the information in *Mobile* JKN is in accordance with the physical documents that the respondent has.

Based on the results obtained,

it was concluded that the quality of the *Mobile* JKN application information was not optimally assessed from the perspective

JKN *Mobile* application user students. The problems encountered are on the indicators “information that is always *updated*” and “sufficient and relevant information”. In this case, BPJS Health needs to improve application performance in terms of periodic updating of information contained in JKN *Mobile*.

Service quality is the user's perception of the services provided by the accounting application program package provider. Initially this service quality measure was designed to measure customer satisfaction by Parasuraman, Zeithaml and Berry (1988). They define service quality as a comparison between customer expectations and their perception of the quality of customer service provided.

Based on the results of the total question data, it is obtained that the Quality of Service has optimal results (63.50 %). The results of this study are different from the results of research Saptonoadi, *et al.* (2018) and Saragih, *et al.* (2014) who also said that the quality of the application system under study had suboptimal results .

After analyzing the service quality questions from the respondents' score, most of them choose Disagree 4 people to question 6 (*Mobile* JKN provides consistent services without problems or obstacles). That is, some respondents feel *Mobile* JKN still has obstacles in providing its services. Then, the most voted Very Agree as many as 25 people is in question 3 (*Mobile* JKN offers continuous improvements to the provision of services). That is, some respondents were satisfied with the offer of improvements in the JKN *Mobile* application.

Based on the results obtained, it was concluded that the service quality of the *Mobile* JKN application was not optimally assessed from the perspective of students who used the *Mobile* JKN application. The problems encountered are on the indicator “consistent service availability”. In this case, BPJS Health needs to improve application performance in providing consistent services by minimizing obstacles in the service of officers and users through the JKN *Mobile* application.

Conclusion

Based on a survey of users of the *Mobile* JKN application on National Health Insurance participants in South Sumatra, it is known that: Characteristics of the respondents of this study are the majority of women (60%), domiciled in Palembang (41.2%), with a frequency of application usage 1-5 times in the last 3 months (87.7%), with public health center as the primary health facility selected (51.3%), with the feature most frequently used in the application was about JKN information (50.4%), and the most frequently experienced problems when using an application is not knowing the functions and services provided (70.6%). System Quality has optimal results (57, 46 %). Based on data from the results of the *online* questionnaire, problems encountered were found in the indicators of the ease of monitoring activities and system response time. Information Quality has Optimal results (60,53 %). Based on data from the results of the *online* questionnaire, the problem found is in the information indicator that is always *updated* and sufficient and relevant information. Service Quality has optimal results (58, 77 %). Based on data from the results of the *online* questionnaire, the problems encountered are in the indicators of consistent service availability. It is expected to BPJS South Sumatra to consider doing: doing development between BPJS service integration with health facilities for the sake of application utilization *Mobile* JKN much better.

References

- Alesane, A., & Anang, B. T. (2018). Uptake of health insurance by the rural poor in Ghana: determinants and implications for policy. *The Pan African medical journal*, 31, 124. <https://doi.org/10.11604/pamj.2018.31.124.16265>
- BPJS Kesehatan. (2017). Akses Pelayanan dalam Genggaman : BPJS Kesehatan Luncurkan Aplikasi Mobile JKN.
- Braun, R. T., Hanoch, Y., & Barnes, A. J. (2017). Tobacco use and health insurance literacy among vulnerable populations: implications for health reform. *BMC health services research*, 17(1), 729. <https://doi.org/10.1186/s12913-017-2680-7>
- Critical Success Factors for Mobile Health Implementation in Indonesia. *Heliyon* 2018;4(11):e00981 Published 2018 Nov 27. doi:10.1016/j.heliyon.2018.e00981
- Davis, Gardon. B. (1992). Sistem Informasi Manajemen. Jakarta: Pustaka Bianaman Pressindo.
- DeLone, W., McLean, E. 2003. The Delone And Mclean Model of Information Systems Success: A Ten-Year Update, *J. Manag. Inf. Syst.* 19 (4) (2003) 9e30.
- Gaudette, É., Pauley, G. C., & Zissimopoulos, J. M. (2018). Lifetime Consequences of Early-Life and Midlife Access to Health Insurance: A Review. *Medical care research and review : MCRR*, 75(6), 655–720. <https://doi.org/10.1177/1077558717740444>
- Habib SS, Perveen S, Khuwaja HM. The role of micro health insurance in providing financial risk protection in developing countries- a systematic review. *BMC Public Health*. 2016 Mar 22;16:281. doi: 10.1186/s12889-016-2937-9. PMID: 27004824; PMCID: PMC4802630.
- Hafner Z. (2017). The Health Insurance Conundrum: Crossing the Divide. *Managed care (Langhorne, Pa.)*, 26(10), 31.
- Istianingsih & Utami W. (2009). Pengaruh Kepuasan Pengguna Sistem Informasi Terhadap Kinerja Individu. Simposium Nasional Akuntansi XII, 1-70
- Keikhosrokiani. P, N. Mustafa, N. Zakaria, M. Sarwar. (2013). Wireless positioning techniques and location-based services: a literature review: J. Park, J.Y. Ng, H.Y. Jeong, B. Waluyo (Eds.). *Multimedia and Ubiquitous Engineering. Lecture Notes in Electrical Engineering*, 240, Springer, Dordrech
- Mustika, Meryl. (2015). Perkembangan Teknologi Informasi dalam Aspek Kesehatan. Yogyakarta: UGM Press
- Parasuraman, A., V.A. Zeithaml & L.L. Berry. 1988. Servqual: A Multiple- Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of Retailing*, 64(1): 12-40
- Rahmaliyah, 2018 Survey Peserta JKN-KIS.
- Roman-Urrestarazu, A., Yang, J. C., Ettl, S., Thalmann, I., Seguel Ravest, V., & Brayne, C. (2018). Private health insurance in Germany and Chile: two stories of co-existence, segmentation and conflict. *International journal for equity in health*, 17(1), 112. <https://doi.org/10.1186/s12939-018-0831-z>
- Saptonoadi, C., Herlambang, A., & Wijoyo, S. 2018. Kualitas dan Kesuksesan Implementasi Sistem Informasi Kesehatan dengan Menggunakan Model Unified Theory of Acceptance and Use of Technology dan Model Delone and Mclean. *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, vol. 2, no. 12, p. 6386-6390, agu. 2018. ISSN 2548-964X.

- Saragih, Hoga & Safariana, Siti. 2014. Analisis Kualitas Aplikasi Online Berbasis Web pada Perum Perumnas. *Journal of Information System* Vol. 10.
- Tangcharoensathien, V., Thwin, A. A., & Patcharanarumol, W. (2017). Implementing health insurance for migrants, Thailand. *Bulletin of the World Health Organization*, 95(2), 146–151. <https://doi.org/10.2471/BLT.16.179606>
- Yu, P., M. Wu, H. Yu, G. Xiao. 2006. The Challenges for The Adoption Of M- Health. In: 2006 IEEE International Conference on Service Operations and Logistics, and Informatics, Shanghai, 2006, pp. 181e186.
- Yuan, B., Jian, W., He, L., Wang, B., & Balabanova, D. (2017). The role of health system governance in strengthening the rural health insurance system in China. *International journal for equity in health*, 16(1), 44. <https://doi.org/10.1186/s12939-017-0542-x>



SBAR (Situation, Background, Assessment, Recommendation) Communication on Attitude And Nursing Behavior in Improving Patient Safety

Sukesih[✉], Umi Faridah

Universitas Muhammadiyah Kudus, Kudus, Indonesia

Article Info

Article History:
Submitted September 2018
Accepted April 2020
Published November 2020

Keywords:
SBAR; Behavioral
Attitudes, Patient Safety

DOI
<https://doi.org/10.15294/kemas.v16i2.15954>

Abstract

SBAR (Situation, Background, Assessment, Recommendation) communication is an information tool that provides a structured or systematic method that facilitates communication between health workers. SBAR communication is easy because communication has been systematically structured to report the condition of patients to other health workers so as to improve patient safety by reducing errors that occur during the action. The purpose of this study was to determine the effect of SBAR communication on nurses' attitudes and behavior in improving patient safety. The type of research used was quasi experiment with pre-posttest with control group design, the results of the study were processed by paired sample t test and independent samples t test, SBAR communication instruments using observation, attitude and behavior instruments of nurses using questionnaires. The population in the study of all nurses who served in the inpatient room is ivory 1, ivory 2, flamboyant, dahliah RAA Soewondo Pati Hospital as many as 48 nurses, the sampling technique in the study was a total sampling of 48 nurses. There was a significant difference in nurses' attitudes after being given SBAR communication training in the intervention group with a p value of 0,000 compared to the control group with a p value of 0.103. There was a significant difference in the nurses' behavior after being given SBAR communication training in the intervention group with a p value of 0,000 compared to the control group with a p value of 0.198.

Introduction

Patient safety is the spirit of hospital services around the world, not only in developed countries implement it to ensure good service quality, but also in developing countries like Indonesia (Field et al., 2011). The WHO Collaborating Center for Patient Safety on May 2 2007 officially published the "Nine Life Saving Patient Safety Solution". This guide was developed in 2005 by patient safety experts and more than 100 countries by identifying and studying various patient safety problems. With the publication of Nine Life Saving Patient Safety by WHO, the Hospital Patient Safety Committee (KKP-RS) encourages hospitals in Indonesia to implement Nine "Life-Saving" Solutions for hospital patient safety, directly

or gradually according to the capabilities and conditions of the hospital. respectively, one of the nine solutions is to implement communication effectively during patient handover (Istanti, 2015).

Communication of hand-over of patients between nurses and among health care workers sometimes does not include important information or the information provided is inaccurate and difficult to understand, resulting in gaps in communication that can cause misinterpretation or misunderstanding other than that it can result in disconnection of continuity of service, inappropriate treatment and can potentially result in injury to the patient, so an approach is needed to facilitate systematic patient handover (Merten,

[✉] Correspondence Address:
Universitas Muhammadiyah Kudus, Kudus, Indonesia
Email: sukesih@umkudus.ac.id

Lubberding, Wagtendonk, Johannesma, & Wagner, 2011). This is aimed at improving the attitudes and behavior of nurses during patient handover, including the use of procedures in communicating critical information, providing opportunities for nurses to ask and submit questions during handover and involve patients and families in the handover process (Care et al., 2010).

Attitudes and behavior of nurses in providing nursing care to patients must implement patient safety, nurses must involve cognitive, affective, and actions that prioritize patient safety (Sudiharti, 2012). Attitudes and behaviors of nurses who do not maintain patient safety contribute to patient safety incidents. One solution to improve patient safety is by effective communication on nurses' attitudes and behavior (Kesrianti, Bahry, & Maidin, 2015).

Proper communication with read back has become one of the goals of patient safety programs, namely increasing effective communication during handover, one of the effective communication methods during handover is SBAR communication (Chaharsoughi, Ahrari, & Alikhah, 2014). SBAR communication (Situation, Background, Assessment, Recommendation) is an information tool that provides a structured and formal method of communication between staff, communication methods that originate in the aviation and military industries and have been adapted for use in health care, in clinical settings SBAR has the potential to improve staff's ability to compile and convey critical information, increase staff's ability to receive and interpret critical information and improve patient safety by reducing errors that occur during actions (Susan M. Renz, DNP, RN et al., 2014).

Research conducted by Wahyuni (2014) shows S-BAR communication training is effective in improving the quality of over shift in Wardah ward Unit II PKU Muhammadiyah Hospital Yogyakarta, this shows that effective SBAR communication involves health workers, patients and families according to their conditions can help in communication, both individuals and teams who can ultimately influence changes in improving the quality of

shift operations and improving patient safety, so that there is a positive impact and there is an apparent improvement in the reporting of patient safety incidents (Wahyuni.R, 2014).

Another study on SBAR communication is one conducted by Fitria (2013) regarding SBAR communication training in increasing nurses' motivation and psychomotor. The research objective is to analyze the effectiveness of SBAR communication training in increasing motivation and psychomotor nurses in medical surgical treatment rooms. In this study, it was reported that there were new findings that SBAR communication could increase the motivation and psychomotor of nurses, this could affect the performance of nurses and could improve the work culture of nurses in carrying out nursing care so that it could improve patient safety (Fitria, C., 2013)

According to Cunningham, (2012) SBAR communication can improve telephone communication between nurses and doctors by using the SBAR tool that is structured and accurate so that problems can be evaluated and communicated clearly and well, also improve patient safety. The research objective was to determine the effect of SBAR communication on nurses' attitudes and behavior in improving patient safety. (Cunningham et al., 2012) Background, Assessment, Recommendation (SBAR).

Method

This research is a quasi experimental study with a pretest-posttest design with control group design, the results of the research were processed by using paired sample t test for related samples and independent samples t test for unrelated samples to analyze nurses' attitudes and behavior in improving patient safety. after being given the SBAR communication intervention, the over shift time was morning shift, afternoon shift, night shift. The population in this study were all nurses who served in the inpatient room class 3, namely the ivory room 1, the ivory room 2, the flamboyant room, the dahlia room at RAA Soewondo Pati Hospital as many as 48 nurses, the sampling technique in this study was the total sampling, the number of samples was 48 nurses divided into the intervention group in the ivory room 1 and the ivory room 2 were

24 nurses, the control group in the flamboyant room and the dahlia room were 24 nurses with inclusion criteria: D3 education, treatment nurses, not on leave, willing to be respondents, exclusion criteria: S1 education, head of the room / nurse coordinator, intern nurse, student nurse, research was conducted from April to May 2018

The data collection of this research uses a checklist of observation sheets to assess the ability of nurses to communicate SBAR, attitudes and behavior of nurses using a questionnaire. SBAR communication steps between nurses in reporting the patient's condition at each change of duty (over shift) include:

S (Situation): I will inform you about the patient: Name: Mrs. S Age: 70 years Sex: female RM No: 123456 Medical diagnosis: hypertension

B (Background) Main complaints: dizziness, history of current illness: for 2 days the patient complained of dizziness then bought medicine at the pharmacy but there was no change after that the patient was taken to the emergency room of the hospital, the results of blood pressure checks were 190/100 mmHg, temperature 36°C pulse 88x / minute breaths 22x / minute, the patient is given an injection and is put in an infusion then entered the inpatient room. Past medical history: the patient does not have a hereditary disease such as diabetes mellitus, heart disease family history: the family does not have hereditary diseases such as diabetes, heart disease history of allergies: the patient does not have allergies to medications, food, drinks and others

A (Assessment) The general condition of the patient: limp, blood pressure 190/100 mmHg temperature 36°C pulse 88x / minute breath 22x / minute GCS: 15, Patient not using oxygen IV fluid: RL 20 drops / minute.

R (Recommendation) Actions that have been taken: administration of anti-hypertensive drugs Discontinued action: no action is stopped Actions that are continued: administration of anti-hypertensive medicines.

The checklist for SBAR communication skills uses an observation sheet about nurses' abilities during the implementation of SBAR communication. The observation sheet is in the form of a checklist containing a list of

statements about the attitudes and behavior of nurses during the implementation of the SBAR communication which is compiled based on the SBAR communication tool with the choice of answers being made and not carried out with 15 statement items consisting of situation, background, assessment, and recommendation. The statement has 2 answers, namely the value of 1 is carried out and the value of 0 is not carried out. The lowest score is 0 and the highest score is 15. The score of nurses' attitudes and behavior is measured from the response to 10 items using a 5 point likert scale, namely a score of 1 (strongly disagree), a score of 2 (disagree), a score of 3 (neutral), a score of 4 (agree), and a score of 5 (strongly agree) The SBAR communication instrument uses the content validity test by asking for expert opinion and reliability by using the Cohen's kappa coefficient test to assess the consistency of the observation sheet in this study. The results of the kappa test show an agreement between observer 1 and observer 2 which is indicated by a p value of $0.0025 < 0.05$ with a kappa value of 1.0 which means special (unanimous agreement). The attitude and behavior instrument of nurses used the validity test with r count attitude (0.812-0.960), r count behavior (0.809-0.980) while r table (0.631) which means that the attitude and behavior questionnaire was declared valid because $r \text{ count} > r \text{ table}$. While the attitude reliability test (0.560-0.645), the value of Cronbach's alpha is 0.555, which means that all attitude statement items are declared reliable, while the behavior questionnaire has a value (0.583-0.673), the value of Cronbach's alpha is 0.512, which means that all behavior statement items are declared reliable.

Result and Discussion

The results of the study obtained data on the characteristics of participants, namely age, gender, and years of service. The number of samples in the study were 48 nurses consisting of 24 nurses as the intervention group and 24 nurses as the control group.

Comparison of nurses' attitudes before and after being given SBAR training in the intervention group and the control group Comparison of the behavior of nurses before and after being given SBAR training in the intervention group and the control group.

Table 1. Comparison of researched sample characteristics between intervention group and control group

No	Variable	Average \pm SD		Total (n = 48)	P value
		Intervention	Control		
1	Age				
	Mean	29,58 \pm 5,85	28,08 \pm 5,37	-	0,446
	Min - Max	24-42	23-41	-	
2	Year of service				
	Mean	3,54 \pm 2,91	3,38 \pm 2,81	-	0,218
	Min - Max	1-11	1- 11	-	
3	Gender				
	Male	8	9	17	0,201
	Female	16	15	31	

Table 2. Comparison of nurse attitude before and after SBAR training on intervention group and control group

Nurse Attitude	Average \pm SD		P value (*)
	Intervention (n=24)	Control (n=24)	
Before training	18,16 \pm 5,52	18,12 \pm 5,51	0,979
After training	29,12 \pm 6,73	20,08 \pm 5,66	0,000*
P value (**)	0,000**	0,103	

*independent t-test, **paired t-test

Table 3. Comparison of nurse behavior before and after SBAR training on the intervention group and the control group

Nurse Behavior	Average \pm SD		P value (*)
	Intervention (n=24)	Control (n=24)	
Before training	18,41 \pm 5,23	18,12 \pm 5,51	0,979
After Training	27,91 \pm 6,31	20,08 \pm 5,66	0,000*
P value (**)	0,000**	0,103	

*independent t-test, **paired t-test

The results showed that before being given SBAR communication training in the intervention group and the control group there was no significant difference in the mean attitude of nurses 18.16 \pm 5.52, there was a significant difference in the attitudes of nurses after being given SBAR communication training in the intervention group compared to the control group. This is indicated by the results of statistical tests with a p value of 0.000. There was no significant difference in the initial and final measurements of nurses' attitudes in the control group. This is indicated by the p value > 0.05.

The results showed that there were significant differences in the attitudes of nurses in the intervention group before and after being given SBAR communication training as indicated by p value < 0.05. The results of measuring the mean value of the intervention group increased from 18.16 to 30.12 after being given the SBAR training intervention.

Attitude is a reaction or response that is still covered from someone to a stimulus or object. Attitude manifestations cannot be immediately seen, but can only be directly interpreted in advance of closed behavior (Meutia, Yulianti, & Info, 2019). Behavior is

a person's response or reaction to a stimulus (external stimuli), thus human behavior occurs through a stimulus-organism-response process. Health behavior is a person's (organism) response to stimuli or objects related to illness or disease, the health service system, food and beverages, and the environment. (Rasyid, Thoyib, & Indyanty WL, 2015).

This is aligned with the research conducted (Meester, Verspuy, Monsieurs, & Bogaert, 2013) which states that SBAR communication is one example of collaboration between nurses and doctors where nurses and doctors have the same role, the use of standard SBAR communication frameworks in handover of patients can improve the nurse's ability to communicate. Meanwhile, Nazri's research stated that the role of doctors in receiving information and the willingness to respond to nurse communication is an important factor and can become an obstacle to the SBAR communication application if it is not achieved properly. (Meutia et al., 2019).

In line with research conducted by (Diniyah, 2017) stated that SBAR is a better model because it can be applied to every situation, as well as at patient handover. SBAR facilitates the formation of communication patterns in the system, and through recommendations or through final action will build the formation of collaboration in groups. Kasten also mentioned that SBAR training with the role play method for nursing students has benefits and changes their knowledge and communication skills for the better. (Sanitation, 2019).

Conclusion

Based on the statistical test, there were significant differences in the attitudes of nurses in the intervention group before and after being given SBAR communication training as indicated by p value <0.05. The results of measuring the mean value of the intervention group increased from 18.16 to 30.12 after being given the SBAR training intervention. Further research is needed to assess the determinants of nurses' attitudes and behavior with different variables or interventions with a larger sample size. The research results are expected to be a reference for improving patient safety so as to improve the quality of good service in the hospital.

References

- Care, I., Boaro, N., Fancott, C., Baker, R., Velji, K., & Andreoli, A. (2010). Using SBAR to improve communication in interprofessional rehabilitation teams, *24*(January), 111–114. <https://doi.org/10.3109/13561820902881601>
- Chaharsoughi, N. T., Ahrari, S., & Alikhah, S. (2014). Comparison the Effect of Teaching of SBAR Technique with Role Play and Lecturing on Communication Skill of Nurses, *3*(2), 141–147. <https://doi.org/10.5681/jcs.2014.015>
- Cunningham, N. J., Weiland, T. J., van Dijk, J., Paddle, P., Shilkofski, N., & Cunningham, N. Y. (2012). Telephone referrals by junior doctors: A randomised controlled trial assessing the impact of SBAR in a simulated setting. *Postgraduate Medical Journal*, *88*(1045), 619–626. <https://doi.org/10.1136/postgradmedj-2011-130719>
- Diniyah, K. (2017). Pengaruh Pelatihan SBAR Role-Play terhadap Skill Komunikasi Handover Mahasiswa Kebidanan, *6*(1), 35–44. <https://doi.org/10.18196/jmmr.6125>. Pengaruh
- Field, T. S., Tjia, J., Mazor, K. M., Donovan, J. L., Kanaan, A. O., Harrold, L. R., ... Gurwitz, J. H. (2011). Randomized Trial of a Warfarin Communication Protocol for Nursing Homes : an SBAR-based Approach. *AJM*, *124*(2), 179.e1-179.e7. <https://doi.org/10.1016/j.amjmed.2010.09.017>
- Fitria, C., N. (2013). Efektifitas Pelatihan Komunikasi SBAR dalam Meningkatkan Motivasi dan Psikomotor Perawat di Ruang Medikal Bedah RS PKU Muhammadiyah Surakarta. *Proceeding Seminar Dan Presentasi Poster Ilmiah Keperawatan "Adult Nursing Practiice: Using Evidence In Care" PSIK Fakultas Kedokteran Universitas Diponegoro*, 135.
- Kesrianti, A. M., Bahry, N., & Maidin, A. (2015). Faktor-Faktor yang Mempengaruhi Komunikasi pada Saat Handover di Ruang Rawat Inap Rumah Sakit Universitas Hasanuddin, 13.
- Meester, K. De, Verspuy, M., Monsieurs, K. G., & Bogaert, P. Van. (2013). SBAR improves nurse-physician communication and reduces unexpected death: A pre and post intervention study. *Resuscitation*. <https://doi.org/10.1016/j.resuscitation.2013.03.016>
- Merten, H., Lubberding, S., Wagtendonk, I. Van, Johannesma, P. C., & Wagner, C. (2011). Patient safety in elderly hip fracture patients : design of a randomised controlled trial. *BMC Health Services Research*, *11*(1), 59. <https://doi.org/10.1186/1472-6963-11-59>
- Meutia, I. F., Yulianti, D., & Info, A. (2019). Jurnal

- Kesehatan Masyarakat, *15*(2), 187–195.
- Rasyid, H. Al, Thoyib, A., & Indyanty WL, E. (2015). Pengaruh Pengetahuan, Sikap, dan Perilaku Perawat tentang Flebotomi terhadap Kualitas Spesimen Laboratorium The Influence of Nurses' Knowledge, Attitude, and Behavior over Phlebotomy on Laboratory, *28*(3), 258–262.
- Sanitation, E. (2019). *Jurnal Kesehatan Masyarakat*, *15*(2), 171–178.
- Sudiharti, S. (2012). Hubungan pengetahuan dan sikap dengan perilaku perawat dalam pembuangan sampah medis di rumah sakit pku muhammadiyah yogyakarta. *Jurnal Kesehatan Masyarakat*, *6*(1), 49–59.
- Susan M. Renz, DNP, RN, G.-B., A, Marie P. Boltz, PhD, RN, G.-B., B, Wagner, Laura M. PhD, R., C, ... Thomas E. Lawrence, M. (2014). NIH Public Access, *34*(4), 295–301. <https://doi.org/10.1016/j.gerinurse.2013.04.010>. Examining
- Wahyuni.R. (2014). Efektifitas pelatihan komunikasi S-BAR dalam meningkatkan mutu operan jaga (handover) di bangsal wardah RS PKU Muhammadiyah Yogyakarta Unit II. *Universitas Muhammadiyah Yogyakarta*.



Parenting and Family Conflict with Dating Violence among youth in Yogyakarta

Suci Musvita Ayu[✉], Lisa Triyani

Public Health Science Program, Public Health Faculty, Ahmad Dahlan University, Yogyakarta, Indonesia

Article Info

Article History:

Submitted November 2019

Accepted January 2020

Published November 2020

Keywords:

Violence in Dating,
Conflict in Family, Parenting

DOI

<https://doi.org/10.15294/kemas.v16i2.22072>

Abstract

Violence in dating is classified as a form of behavior disorder of teenagers whose cases are common in the surrounding environment but are sometimes not realized either by the victim or even by the perpetrators themselves. Violence in dating can have a negative impact on the victim. Based on the facts in the field conducted in 2019, it is known that majority parenting is permissive and tends not to have problems or conflicts in the family. This research is intended to look at the relationship between parenting and conflict in the family with acts of violence in dating. This research used a cross sectional design with chi square analysis. The research sample of 147 people was obtained by proportional random sampling technique. The instrument used was a questionnaire to measure parenting and family conflict. The results showed that there is a relation between parenting ($p = 0.014$; $RP = 0.691$) with the incidence of violence in courtship. And there is no relation between conflict in the family ($p = 0.102$; $RP = 1.789$) with the incidence of violence in dating. Parenting can contribute to the mindset of children, so that what they see can cause children to do things that are not much different as in violence in dating. Attention, guidance, motivation and taking time with children is a way of approaching children that can make the relationship between parent and child harmoniously established.

Introduction

Teenage is a transition from childhood to adulthood in all aspects of development (Santrock, 2003). Dating relationships are considered to be a means of establishing friendship, emotional support, affection, pleasure, and sexual exploration. Dating can make people feel no longer lonely, giving awareness that there is someone who always gives attention and becomes an encouragement in doing all activities (Nurhasanah, 2017).

In Indonesia, acts of violence both individually and in groups are daily news that are almost always presented by the mass media, both print and electronic (Aisyah, 2010). Violence in dating is an act of violence against a partner who is not bound by marriage which includes physical, psychological and economic violence. Most of the victims are women, this is

caused by several factors ranging from fear, guilt, nausea and feeling lack of social and individual support (Komnas Perempuan, 2016). Women are more vulnerable to psychological abuse than men (Vagi dkk, 2018). Spouse violence is a crime against women committed by known people and occurs in places that are considered safe such as home or work (Lawson, 2012).

The Indonesian Family Planning Association (PKBI) Yogyakarta released data explaining that of 125 teenagers respondents, consisting of 75 female and 50 male, 84 percent had experienced violence. A survey conducted by PKBI Yogyakarta in February 2017 proved that most teenagers in Yogyakarta had experienced violence. The forms of violence experienced were 64% psychological, 43.2% sexual and 33.6% physical violence. The survey also found that the average teenagers experienced two

[✉] Correspondence Address:

Public Health Faculty, Ahmad Dahlan University, Yogyakarta, Indonesia, Indonesia
Email: suci.ayu@ikm.uad.ac.id

to three types of violence at once. As many as 12% of respondents experienced psychological, sexual and physical violence. While around 34.4% of respondents experienced two types of violence from their partners, namely sexual and physical violence as much as 4%, physical and psychological violence as much as 11.2%, and sexual and psychological violence as much as 19.3% (PKBI, 2017). Russell et al. (2014) reported that as many as 78.5% of students had had a dating partner in the last three months and during that period, they reported a high level of violence on partners in which more than 10% of male teenagers reported forcing partners to have sex, and 39% female teenagers reported experiencing physical violence by their partners (Russell, Jewkes, & Mathews, 2014). Recent research conducted in Indonesia stated that 59.2% of teenagers have committed violence against their partners (Ayu, Sofiana, & Jayanti, 2019).

The results of observations and interviews with one of the teachers at SMK Piri 1 Yogyakarta stated that in previous years that the students were often involved in brawl with other schools. Although SMK Piri I students' have long school hours that lasting from morning to evening and continued with extracurricular activities. The problem that often occurs in SMK Piri 1 Yogyakarta is at breaking hours many students are outside the school, students often skip school and smoke in the school area. In December 2017 there had been violence between students of class XI and class XII because the class XI student took the class XII student's girlfriend, so the problem was brought on a trial and at the end of 2017 there was a case that one of the SMK Piri I student was in a boarding room with dating partner and they were secured by local residents and residents reported the students to the police and the school. Based on the background that has been described previously, researcher was interested to examine the "Relationship between Parenting And Family Conflict With The Occurrence Of Violence Incident in Dating among Teenagers at SMK Piri 1 Yogyakarta".

Method

This type of research is a quantitative observational cross-sectional design. This research was conducted at SMK Piri

1 Yogyakarta. Sampling was done with proportional random sampling and obtained 147 students. Sampling techniques that pay attention to consideration of elements or categories in the study population (Sugiyono, 2003). The population of this research is all students of class XI SMK Piri 1 Yogyakarta with a total of 189, consisting of 10 classes with 5 majors namely Electric Power Installation Techniques (TITL) of 27 students, Audio Visual Engineering (TAV) of 5 students, Machining Engineering (TP) as many as 26 students, Light Vehicle Engineering (TKR) as many as 44 students and Business and Motorcycle Engineering (TSM) as many as 35 students. The inclusion criteria of this study was all students of class XI aged 16-17 years, teenagers who had had dating partner and were willing to be respondents. The exclusion criteria were teenagers who refused to become respondents and did not complete the questionnaire.

Result and Discussion

Based on Table 1, most respondents were male gender namely 93.9%. Respondents were dominated by teenagers aged 16 years (53.7%). The majority of respondents' parent's education was senior high school (61.2%).

Based on Table 2 of the univariate analysis of conflicts in the family are categorized into two namely conflict and not conflict. Respondents who experienced conflict in the family numbered 125 students (85%) while respondents who did not experience conflict in the family were smaller, numbered 22 students (15%). Parenting was categorized into three, namely Democratic, Permissive and Authoritarian. The highest parenting group was permissive, numbered 114 students (77.6%), while democratic and authoritarian parenting is very low with a democratic number of 19 students (12.9%) and an authoritarian 14 students (9.5%). Violence in dating was categorized into two, namely doing and not doing. The results showed that 87 respondents (59.2%) experienced violence in dating and those who never were 60 respondents (40.8%). The forms of violence experienced by respondents were physical and psychological one (10.9%) and economic violence (14.3%).

Based on Table 3 the bivariate analysis of parenting and dating violence showed that

Table 1. Distribution of respondent characteristics based on gender, age and parent education.

Respondents Characteristics		Σ	%
Gender	Male	138	93.9
	Female	9	6.1
Age (years)	16	79	53.7
	17	68	46.3
Parent Education	Graduate	19	12.9
	Elementary	8	5.4
	Junior High	18	12.2
	Senior High	90	61.2
	Unknown	12	8.2
Total		147	100

Source: Primary Data, 2018

Table 2. Univariate Analysis Based on Conflicts in the Family, Parenting and the Occurrence of Violence in Dating

1	Conflict in the Family		
	Conflict	125	85.0
	Not Conflict	22	15.0
2	Parenting		
	Democratic	19	12.9
	Permissive	114	77.6
	Authoritarian	14	9.5
3	Violence in Dating		
	Doing Violence in Dating	87	59.2
	Physical Violence	16	10.9
	Economical Violence	21	14.3
	Psychological Violence	16	10.9
	Not doing Violence	60	40.8
	Total	147	100

Source: Primary Data, 2018

there is a relation between parenting with dating violence. This is indicated by the value of p value 0.014 ($p < 0.05$). This factor is supported from research which stated that the factors causing violence in dating committed by teenagers consist of internal and external factors. Internal factor is the factor obtained from the experience of parenting on the past, the perpetrator had been a victim of violence or accustomed to acts of violence in the childhood. While external factor is obtained from environmental factor.

The causes of violence in dating

committed by teenagers include internal and external factors. In internal factor where this factor is derived from parenting experience, the perpetrator has been a victim of violence or accustomed to acts of violence in his childhood. While external factor obtained from the environment is peers who have a very big impact on the lives of teenagers (Mahmudah, Yaunin, & Lestari, 2016).

Parenting that can influence adolescent behavior to commit violence in dating one of which is authoritarian model. Authoritarian

Table 3. Bivariate Analysis Based on Conflicts in the Family, Parenting and the Occurrence of Violence in Dating

No	Variable	Violence in Dating				RP	CI 95%	p-value
		Doing		Not Doing				
		n	%	n	%			
1	Parenting							
	Not Democratic	33	47.8	36	52.2	0.691	0.518-0.921	0.014
	Democratic	54	46.2	24	31.8			
2	Conflict in the Family							
	Conflict	61	57.0	64	68.0	1.789	0.884-3.624	0.102
	Not Conflict	6	10.0	16	12.0			

Source: Primary Data, 2018

parents tend to use violence in giving punishments that result in children in daily life will behave more aggressively and imitate what parents do when they are outside the home (Sagala, 2008). Authoritarian parenting has tendency to affect the symptoms of aggressive behavior in teenagers (Dewi & Susilawati, 2016).

Parenting that is free and not too restrictive as long as it is within reasonable limits can also affect teenagers in committing violence in dating (Lestari, Nurjanah, & Martunis, 2018). Limited knowledge and education of parents will have difficulty in applying good parenting. Discrepancies obtained with the hope of causing children to be closed with parents. Emotional problems that are neglected by parents can lead to problems for teenagers (Mesra, Salmah, & Fauziah, 2014).

Educated mother is an indicator of one's success in educating children. The higher the education, a parent will mature how to think, how to educate and provide information to children. Children who are given the right information will have good knowledge (Mesra et al., 2014). Good parenting style will affect teenagers dating behavior (Dari & Ratnawati, 2015).

Based on the analysis result of conflict in the family and violence in dating showed that there is no relation between conflict in the family with violence in dating in SMK Piri 1 Yogyakarta. This is indicated by the p value of 0.102 ($p > 0.05$). Based on data collection in the field, most respondents do not have conflicts

or problems with their families. The violence act can be affected by other factors such as peers influence, parenting and the role of the teacher. Like previous research which stated that conformity with peers contributes to the emergence of violence in dating behavior in teenagers. Teenagers who gather with friends who are often victims of violence in dating, tend to receive such treatment from their partners because they do not want to lose the partner (Savitri et al., 2015). In teenage, teenagers are more likely to be closer with friends and more trust with their dating partners or friends.

This result is not in line with research which stated that there are factors that affect dating violence, namely parenting, conflict in family and peer relations (Savitri et al., 2015). The result of the study mentioned that the family is the first social environment that gives a very big effect on the growth and development of teenagers (Marshia Zefanya, 2016). Ideally the development of teenagers will be optimal if they are with a harmonious family. Lack of parental attention can cause the victim to seek outside attention in hopes of getting it from a dating partner or lover. Parents who rarely spend time with children, causing victims to be more comfortable hanging out outside the house hoping that they will get attention (Mesra et al., 2014).

Conflict in the family can be influenced by communication that occurs in the family. The better the quality of family communication, the better the communication process of an individual outside the family environment, this

will affect the way he behaves towards others. The more quality of family communication that takes place, the lower the violent behavior in dating (Astari & Santosa, 2017). Children involved in family conflicts are positively related to child developing issues (Jouriles, Rosenfield, McDonald, & Mueller, 2015).. Children who witness first hand the conflicts that occur to their parents will have an unfavorable experience, which can be carried by children into adulthood so as to have many types of violence (Telleria, 2019).

Parents who show violence, hostility, inconsistency, and lack of warmth are very dangerous to warmth and good protection when the child lives under threat. How much and what is shown by parents and families will form children in the future (Eltanamly, Leijten, Jak, & Overbeek, 2019). It can even affect the way they interact with fellow individuals (Alberto et al., 2018). Cases that cause children to abuse parents are not only caused by parenting or conflicts in the family, but a bad environment can also affect them in carrying out acts of violence. Intervention that can be suggested to avoid child violence against parents is by educating with strict discipline and parents can also ask for help from those who can be trusted if needed (Ibabe, 2019).

Ways to prevent violence in dating are, starting with the belief that our bodies are valuable, defining concretely the meaning of dating and how relationships will be fostered, daring to say “no”, learning to be yourself, seeking support, creating an anti-violence community, seeking parental assistance and also experts, fortify themselves with sufficient faith and religious knowledge and not dating (Ayu, Hayati, & Hakimi, 2013). Good communication pattern in the family is also needed, because poor or non-positive communication patterns can increase emotional abuse in teenagers (Pemayun & Widiasavitri, 2015). Emotional abuse can affect the incidence of violence in dating, because violence in dating also takes the form of verbal or symbolic aggression, namely in the form of harsh words, words that are not worth listening to, vilifying, demanding, threatening and limiting relationships with others (Khaninah & Widjanarko, 2016).

Conclusion

There is a relation between parenting with the incidence of violence in dating at SMK Piri I Yogyakarta with a p value of 0.014. There is no relation between conflict in the family with violence in dating at SMK Piri I Yogyakarta with a p value of 0.102. What can be highlighted from this research is attention, guidance, motivation and taking time with children are ways of approaching children that can make the relationship between parents and children harmoniously established. And it is important that parents can also ask for help from those who can be trusted if needed when experiencing difficulties in guiding children.

Reference

- Alberto, A., Cuervo, V., Quintana, J. T., Alonso, E., Martínez, C., & Rafael, T. (2018). Challenging Behavior , Parental Conflict and Community Violence in Students with Aggressive Behavior. *International Journal of Psychological Research*, 11(1), 50–57. <https://doi.org/10.21500/20112084.1777>
- Astari, C., & Santosa, H. P. (2017). Hubungan antara Kualitas Komunikasi Keluarga dan Persepsi tentang Abusive Relationship dengan Perilaku Kekerasan dalam PacaranKelompok Usia Dewasa Muda. *E-Journal Undip*, 7(2), 1–12.
- Ayu, S. M., Hayati, E. N., & Hakimi, M. (2013). Kekerasan dalam pacaran dan kecemasan remaja putri di kabupaten purworejo. *Journal KESMAS*, 6(1), 61–74. <https://doi.org/10.12928/kesmas.v6i1.1067>
- Ayu, S. M., Sofiana, L., & Jayanti, F. U. (2019). The correlation of teacher’s role, peers, and mass media with the incidence of dating violence in adolescents at SMK Piri 1 Yogyakarta. *International Journal Of Community Medicine And Public Health*, 6(6), 2325. <https://doi.org/10.18203/2394-6040.ijcmph20192292>
- Dari, T. S. U., & Ratnawati, D. (2015). Hubungan Pola Asuh Orang Tua Dengan Perilaku Berpacaran Pada Remaja Di Sman 6 Depok. *Jurnal Keperawatan Widya Gantari*, 2(2), 125–144.
- Dewi, N. P. A. R., & Susilawati, L. K. P. A. (2016). Hubungan Antara Kecenderungan Pola Asuh Otoriter (Authoritarian Parenting Style) dengan Gejala Perilaku Agresif Pada Remaja Ni Putu Ayu Resitha Dewi dan Luh Kadek Pande Ary Susilawati. *Jurnal Psikologi Udayana*, 3(1), 108–116.
- Eltanamly, H., Leijten, P., Jak, S., & Overbeek, G. (2019). *Parenting in Times of War : A*

- Meta-Analysis and Qualitative Synthesis of War Exposure , Parenting , and Child Adjustment. Journal SAGE Pub.* <https://doi.org/10.1177/1524838019833001>
- Ibabe, I. (2019). Adolescent-to-Parent Violence and Family Environment : The Perceptions of Same Reality? *International Journal of Environmental Research and Public Health*, 16(2215), 1–14.
- Jouriles, E. N., Rosenfield, D., Mcdonald, R., & Mueller, V. (2015). Child Involvement in Parental Conflict and Child Adjustment Problems:A Longitudinal Study of Violent Families. *J AbornM Child Psychol*, 42(5), 693–704. <https://doi.org/10.1007/s10802-013-9821-1>.Child
- Khaninah, A. N., & Widjanarko, M. (2016). PERILAKU AGRESIF YANG DIALAMI KORBAN KEKERASAN DALAM PACARAN. *Jurnal Psikologi Undip*, 15(2), 151–160.
- Komnas Perempuan. (2016). *Kasus Kekerasan Dalam Pacaran Selama 2016*. Jakarta: Komnas Perempuan. Retrieved from www.databoks.katadata.co.id
- Lawson, J. (2012). Sociological Theories of Intimate Partner Violence. *J Hum Behav Soc Environ.*, 22(5), 572–90.
- Lestari, W., Nurjanah, & Martunis. (2018). Dampak Pola Asuh Orang Tuan Terhadap Perilaku Berpacaran (Studi Kasus Di SMP Negeri 3 Banda Aceh). *Jurnal Ilmiah Mahasiswa Bimbingan Dan Konseling*, 3(2), 42–49.
- Mahmudah, Yaunin, & Lestari. (2016). Faktor-faktor yang Berhubungan Dengan Perilaku Seksual Remaja Di Kota Padang. *Jurnal Kesehatan Andalas*, 5(2), 1–11.
- Marshia Zefanya. (2016). Faktor Yang Berhubungan Dengan Praktik Seks Pranikah Di Kalangan Anak Jalanan Kota Semarang Tahun 2016. *Jurnal Kesehatan Masyarakat*, 4(3), 1029–1035.
- Mesra, E., Salmah, & Fauziah. (2014). Kekerasan Dalam Pacran Pada Remaja Putri Di Tangerang. *Jurnal Ilmu Teknologi Kesehatan*, 2(1), 1–8.
- Nurhasanah, L. A. (2017). Interpersonal Communication Strategy For Maintaining Post-Violence Relationship. *E-Journal Undip*, 5(3), 1–11.
- Pemayun, C. I. I., & Wideasavitri, P. N. (2015). Perbedaan Emotional Abuse pada Remaja Akhir yang Berpacaran Berdasarkan Pola Komunikasi dalam Keluarga. *Jurnal Psikologi Udayana*, 2(2), 300–310.
- PKBI. (2017). Survei Kekerasan Pada Remaja.
- Russell, M., Cupp, P. K., Jewkes, R. K., Gevers, A., Mathews, C., LeFleur-Bellerose, C., & Small, J. (2014). Intimate Partner Violence Among Adolescents in Cape Town, South Africa. *Prevention Science*, 15(3), 283–295. <https://doi.org/10.1007/s11121-013-0405-7>
- Russell, M., Jewkes, R. K., & Mathews, C. (2014). Intimate Partner Violence among Adolescents in Cape Town, South Africa. *Prev Sci*, 15(3), 283–295. <https://doi.org/10.1007/s11121-013-0405-7>.Intimate
- Sagala, R. (2008). *Kekerasan Dalam Pacran Pada Mahasiswa Ditinjau Dari Pola Asuh Otoriter Orang Tua*. Katolik Soegijapranata.
- Santrock, J. W. (2003). *Perkembangan Remaja* (6th ed.). Jakarta: Erlangga.
- Savitri, A. D., Psi, S., Si, M., Linyaningsih, F., Psi, S., & Psi, M. (2015). Kekerasan Dalam Pacaran Pada Siswa Sma Ditinjau Dari Konformitas Teman Sebaya Dan Efektivitas Komunikasi Dalam Keluarga. *J. Dinamika Sosbud*, 17(2), 41–47.
- Sugiyono. (2003). *Metode Penelitian Kombinasi (Mixed Method)*. Bandung: Alfabeta.
- Telleria, A. E. A. (2019). Descriptive study of the type of abuse suffered by minors evaluated in the Integral Forensic Evaluation. *Spanish Journal of Legal Medicine*, 45(1), 4–11.
- Vagi, K. J., Olsen, E. O. M., Basile, K. C., & Alana, M. (2018). Teen Dating Violence (Physical and Sexual) Among US High School Students: Finding From the 2013 National Youth Risk Behavior Survey, 169(5), 474–482. <https://doi.org/10.1001/jamapediatrics.2014.3577>. Teen



Energy Intake as the Dominant Factor Associated with Wasting among Children Aged 6-23 Months in Pagedangan, Tangerang District

Aprilya Roza Werdani¹✉, Diah Mulyawati Utari²

¹Nutrition Study Program, Institut Kesehatan Mitra Bunda, Batam, Indonesia

²Department of Nutrition, Faculty of Public Health, University of Indonesia, Depok, Indonesia

Article Info

Article History:

Submitted February 2020

Accepted May 2020

Published November 2020

Keywords:

Wasting, food intake, infectious diseases

DOI

<https://doi.org/10.15294/kemas.v16i2.23427>

Abstract

Wasting measured by weight-for-height indices is the malnutrition characterized by a rapid deterioration in nutritional status over a short time. Based on Basic Health Research Data 2018, the proportion of children under two years who were wasting in Indonesia and Banten was 11.7% dan 13.1%. This study aimed to determine the dominant factor associated with wasting among children aged 6-23 months in Pagedangan, Tangerang District. Cross-sectional designs were used to conduct this study. Data were collected in April-Mei 2019 using anthropometric measurements and questionnaire interviews. Data were analyzed using univariate, chi-square test, and multiple logistic regression. This study showed that the proportion of wasting was 17.0%. Of 153 children aged 6-23 months, 7.8% were born with low birth weight, 44.4% had a history of infectious disease, and 32.0% had a deficit of energy. The proportion of children who had un-met the minimum dietary diversity, the minimum meal frequency, the minimum acceptable diet was 43.1%, 15.7%, and 52.9%. The history of infectious disease (OR 2.930, 95% CI 1.173-7.323) and inadequate energy intake (OR 5.785, 95% CI 1.269-26.382) were significantly associated with wasting. Inadequate energy intake was the dominant factor of wasting among children aged 6-23 months in Pagedangan, Tangerang District.

Introduction

Wasting describes an acute malnutrition, usually due to insufficient food intake and / or infectious diseases (Ahmadi et al., 2018). Children are said to be Wasting if the measurement results of the indicator of weight / height or weight / body weight with a z-score < -2 SD of the child's growth standard according to WHO (World Health Organization, 2010). In 2017, the prevalence of wasting among toddlers at the global level was 9.9%. WHO estimates that more than two-thirds (69%) of wasted children live in Asia (UNICEF / WHO / World Bank, 2018). In Indonesia, Basic Health Research Data (Riskesdas) in 2018 shows that the prevalence of wasting in children under five is 10.2%, while in the under two years age group it is higher, namely 11.7%. Banten is one

of the provinces with the prevalence of wasting above the national figure, namely 10.5% in the toddlers group and 13.5% in the group of under two years old (Kementerian Kesehatan RI, 2018).

Wasting increases the risk of death in children, and is even considered a better predictor of child mortality than stunting (Saaka & Galaa, 2016). In 2018, the number of deaths of children under five years of age was 5.6 million cases, and 45% of them were caused by nutritional factors (World Health Organization, 2019). Wasting that occurs early in life can inhibit linear growth or increase the risk of stunting (Richard et al., 2012). In addition, losing is also associated with decreased cognitive abilities (Aguayo, Badgaiyan, & Dzed, 2017; Venables & Raine, 2016), decreased

✉ Correspondence Address:
Public Health Department, Universitas Negeri Semarang, Indonesia
Email: email email

motor and social skills (Mengistu, Alemu, & Destaw, 2013) decreased work productivity in adulthood, increased economic burden (Derso, Tariku, Biks, & Wassie, 2017), as well as decreased immunity which results in an increased risk of infectious diseases (Bourke, Berkley, & Prendergast, 2016). Wasting also increases the risk of degenerative diseases in adulthood (Matrins et al., 2011).

The high prevalence of Wasting and the many negative impacts it causes, it is necessary to carry out appropriate interventions to overcome Wasting. Therefore, this study aims to determine the factors associated with Wasting in children aged 6-23 months so that it can provide scientific-based information as a basis / reference in making intervention programs to overcome Wasting problems.

Method

This research is a quantitative study with a cross-sectional design, which was conducted in Pagedangan District, Tangerang Regency, Banten Province. The sample of this study was 153 children aged 6-23 months in five selected villages in Pagedangan District, which were selected using multistage random sampling technique. Data were collected through questionnaire interviews and anthropometric measurements (body length and weight).

The dependent variable studied was wasting which was measured using the BB / PB indicator. Children are said to be wasting if the z-score BB / PB is < -2 standard deviation. The independent variables studied were LBW history, infectious disease history, minimum dietary diversity (MDD), minimum meal frequency (MMF), and minimum acceptable diet (MAD), as well as energy, protein, fat and carbohydrate intake. LBW is defined as birth weight less than 2500 grams. Infectious disease history was measured based on the history of acute respiratory infections and / or diarrhea that the child had during the last 2 weeks. MDD is achieved when the child consumes at least 4 of the 7 food groups on the day before data collection. The seven food groups are grains, roots, tubers; nuts; dairy products; meat; egg; vitamin A rich fruits and vegetables; and other fruits and vegetables. MMF is consuming solid, semi-solid, or soft foods (including formula milk for children who are not breastfed) with a

minimum frequency or more on the day before data collection, namely as follows: ≥ 2 times for children aged 6-8 months who are still breastfed; ≥ 3 times for children 9-23 months who are still breastfed; ≥ 4 times for children 6-23 months who are not breastfed. MAD is a composite of MDD and MMF. MAD is achieved when MDD and MMF are achieved, and at least 2 times milk consumption for children who are not breastfed. Energy intake and macro nutrients (protein, fat and carbohydrates) were obtained through a 24-hour food recall.

The data were processed using statistical analysis software. Data analysis used the chi-square test. The significance of statistical tests used p value < 0.05 . This study also uses the odds ratio or OR as a measure of the association between the independent and dependent variables.

Results and Discussion

Table 1 shows that 17% of children 6-23 months experienced wasting, 11.8% of them were moderate wasting (malnutrition) and 5.2% severe wasting (malnutrition). Based on birth weight, 7.8% of children had a birth weight < 2500 grams (LBW). The proportion of children aged 6-23 months who did not achieve MDD was 43.1%, did not achieve MMF 15.7%, and did not achieve MAD 52.9%. The proportion of children with an energy deficit ($< 80\%$ RDA) was 32.0%, a protein deficit ($< 100\%$ RDA) was 52.9%, a fat deficit ($< 80\%$ RDA) was 32.0%, and a carbohydrate deficit was 32.0%. 39.2%.

Table 2 shows that a history of infectious disease was significantly associated with wasting (p value = 0.032). Children aged 6-23 months who had a history of infectious diseases had a 2.815 times higher risk of wasting than children without a history of infectious diseases (95% CI 1.165-6,803). In addition, energy intake was also significantly associated with wasting (p value = 0.017). Children who consumed inadequate energy ($< 80\%$ RDA) had a 3.067 higher risk of experiencing wasting than children who consumed sufficient energy ($\geq 80\%$ RDA) (95% CI 1.293-7,274). Other variables, namely LBW history, MDD, MMF, MAD, and intake of protein, fat, and carbohydrates were not significantly associated with wasting. However, there is a tendency that children who are LBW

Table 1. Distribution of Children Aged 6-23 Months based on Nutritional Status, Birth Weight, History of Infectious Diseases, Eating Practices, and Nutritional Intake

Variable	Percentage(%)
Nutritional status Weight / Body Length	
Wasting	17.0
Normal	83.0
Birth Weight	
LBW	7.8
Not LBW	92.2
Infectious Diseases	
Yes	44.4
No	55.6
Minimum Dietary Diversity (MDD)	
Not achieved	43.1
Achieved	56.9
Minimum Meal Frequency (MMF)	
Not achieved	15.7
Achieved	84.3
Minimum acceptable diet (MAD)	
Not achieved	52.9
Achieved	47.1
Energy intake	
<80% RDA	32.0
≥80% AKG	68.0
Protein Intake	
<100% RDA	52.9
≥100% RDA	47.1
Fat intake	
<80% RDA	32.0
≥80% RDA	68.0
Carbohydrate intake	
<80% RDA	39.2
≥80% RDA	60.8

Source: Primary Data, 2019

and protein intake <80% are at greater risk of losing.

Multivariate analysis showed that children who had a history of infection had a 2,930 times higher risk of losing (95% CI: 1,173-7,323) compared to children who had no history of infectious diseases. Children who experienced a deficit in energy intake had a 5.785 times higher risk of experiencing wasting (95% CI: 1.269-26,382) than children who had no deficit in energy intake.

Wasting is a form of malnutrition that describes acute malnutrition (Adeba, Garoma, Fekadu, & Garoma, 2014). In this study, it was found that 17.0% of children aged 6-23 months experienced wasting (11.8% moderate wasting and 5.2% severe wasting). A study conducted in North Jakarta in 2017 found that the prevalence of wasting in children aged 6-23 months was smaller than the results of this study, namely 9.2% (6.8% moderate wasting and 2.4% severe wasting).

In this study it was found that infectious diseases and inadequate energy intake were

Table 2. Relationship of Birth Weight, Infectious Disease History, Eating Practices, and Nutritional Intake with Wasting

Variable	Wasting				OR (95%CI)	P value
	Yes		No			
	n	%	n	%		
LBW						
Yes	3	25,0	9	75,0	1,710	0,430
To	23	16,3	118	83,7	(0,430-6,804)	
Infectious Diseases						
Yes	17	25	51	75	2,815	0,032*
No	9	10,6	76	89,4	(1,165-6,803)	
Minimum Dietary Diversity (MDD)						
No	13	19,7	53	80,3	1,396	0,577
Yes	13	14,9	74	85,1	(0,599-3,253)	
Minimum Meal Frequency (MMF)						
No	4	16,7	20	83,3	0,973	1,000
Yes	22	17,1	107	82,9	(0,303-3,126)	
Minimum Acceptable Diet (MAD)						
No	13	16,0	68	84,0	0,868	0,909
Yes	13	18,1	59	81,9	(0,373-2,018)	
Energy intake						
<80% RDA	14	28,6	35	71,4	3,067	0,017*
≥80% RDA	12	11,5	92	88,5	(1,293-7,274)	
Protein Intake						
<100% RDA	17	21,0	64	79,0	1,859	0,238
≥100% RDA	9	12,5	63	87,5	(0,772-4,481)	
Fat intake						
<80% RDA	9	18,4	40	81,6	1,151	0,936
≥80% RDA	17	16,3	87	83,7	(0,473-2,805)	
Carbohydrate intake						
<80% RDA	13	21,7	47	78,3	1,702	0,310
≥80% RDA	13	14,0	80	86,0	(0,728-3,978)	

Source: Primary Data, 2019

Table 3. Analysis of Multivariate Logistic Regression for Wasting Risk Factors

Variable	B	p-value	OR	95%CI
Infectious Diseases	1,075	0,021	2,930	1,173-7,323
Energy intake	1,755	0,023	5,785	1,269-26,382
Fat intake	-0,406	0,426	0,666	0,245-1,810
Carbohydrate intake	-0,627	0,401	0,534	0,123-2,310

Source: Primary Data, 2019

significantly associated with wasting. The most common infectious diseases in this study were ARI 41.8%, while diarrhea was found to be less, namely 12.4%. The study of Fekadu, Mesfin, Haile, & Stoecker (2015) shows that children who experience diarrhea have a 2.13 times risk of experiencing wasting. Inflammation that occurs due to infection will increase the need for nutrients and decrease the availability of nutrients which then lead to malnutrition (Walson & Berkley, 2018). In addition, malnutrition occurs due to chronic inflammation that triggers a decrease in IGF-1 production which can lead to changes in body composition (Bourke, Berkley, & Prendergast, 2016). Infection triggers an increase in the metabolic rate, increased nutritional needs, decreased appetite, and vomiting (Aryastami et al., 2017). Gastrointestinal infections cause damage to the mucosal barrier and intestinal villi atrophy. This causes malabsorption of nutrients so that the absorption of nutrients is inadequate (Altare, Delbiso, & Sapir, 2016; Rodríguez, Delbiso, & Sapir, 2011).

Apart from infectious diseases, nutritional intake is a direct factor affecting nutritional status. Manary, Callaghan, Signh, & Bried (2016), stated that protein and amino acid intake is needed for growth and infection response. In this study it was found that children who consumed less energy (<80% RDA) had a 3.067 times higher risk of experiencing wasting than children who consumed sufficient energy ($\geq 80\%$ RDA). Mwaniki & Makokha (2013), also found that inadequate energy intake increases the risk of losing. The body needs a constant supply of energy, meaning that the energy expended must be the same as the energy obtained from food. When the amount of ATP is less, the body will activate the catabolic pathways of carbohydrates, fats and proteins. If the intake is inadequate, the body will provide ATP from glycogen reserves through glycogenolysis and from fat reserves through lipolysis, and when needed, the body will produce ATP from cellular proteins. Increased lipolysis causes body fat reserves to decrease so that subcutaneous fat is thinning and there is damage to skin integrity (Gropper & Smith, 2013).

Low birth weight (LBW) also increases

the risk of losing (Habyarimana, Zewotir, & Ramroop, 2016). LBW is a consequence of inadequate dietary practices during pregnancy which can then cause growth disorders in children (Abubakari & Jahn, 2016). In addition, LBW is also associated with wasting through the susceptibility pathway to infectious diseases. Children born with low weight are prone to infectious diseases, such as diarrhea, acute respiratory infections (ARI), as well as an increased risk of complications in low birth weight children such as anemia, chronic lung disorders, and decreased appetite (Rahman, Howlader, Masud, & Rahman, 2016). However, in this study LBW there was no significant relationship between LBW and wasting.

In 2008, WHO published Infant and Young Child Feeding (IYCF) which is an indicator to assess the feeding practices of infants and children aged 6-23 months. Minimum Dietary Diversity (MDD), Minimum Meal Frequency (MMF), Minimum Acceptable Diet (MAD) are indicators used to assess complementary feeding practices (World Health Organization, 2008). MDD describes the diversity of foods consumed by infants and children. The more types of food consumed, the fulfillment of energy and nutritional needs so as to improve the nutritional status of children (Bandoh & Kenu, 2017). A study shows that MDD contributes to nutritional adequacy with an OR of 11.1 (Khor, Tan, Tan, Chan & Amarra, 2016). Previous research has shown that children who do not achieve MDD have a 2.08 times higher risk of losing than children who do (Tariku, Bikis, Woldie, Wassie, Worku, 2017). However, in this study there was no significant relationship between MDD and wasting. This can be explained by the results of the analysis that the food groups that are mostly consumed by children are grains, roots, and tubers (98%) and fruits and vegetables rich in vitamin A (73.9%), while the group's consumption food sources of lower protein. Only 25.5% of children consumed nuts, 35.3% of children consumed eggs, 51.6% of children consumed milk and their processed products, and 54.9% of children consumed meat, chicken, fish and their processed products. The meat and chicken groups are mostly consumed in processed

form, such as meatballs, sausages, and nuggets or mixtures and sprinkles of chicken porridge.

Similar to MDD, the MMF indicator also did not statistically have a significant relationship with losing. MMF is defined as the minimum frequency of consumption of solid, semi-solid, or soft foods for children aged 6-23 months, including formula milk for children who are not breastfed (World Health Organization, 2008). The fulfillment of the MMF indicator allows children to meet their energy and nutritional needs so that they can optimize their nutritional status and health. The absence of a significant relationship between MMF and wasting could be due to the inability of this indicator to assess food consumption in quantity, so it is possible that the frequency of consumption has reached the minimum limit but the quantity is inadequate. This is indicated by the results of this study that the average percentage of energy, protein, and carbohydrate adequacy rates was higher in the group of children who did not reach MMF compared to children who achieved MMF.

MAD is a composite indicator between MDD and MMF which represents the balance of quality and quantity of children's diets (Werdani & Utari, 2019). However, in this study, there was no statistically significant relationship between MAD and wasting. This is because the assessment of food consumption using the MDD and MMF indicators does not take into account the minimum amount consumed (except that very small amounts such as only one or two small bites are not included in the calculation) (World Health Organization, 2008), so that children may eat food varies with the frequency reaches the recommended minimum but in numbers may not be appropriate.

Conclusions

In this study, we found that the proportion of children aged 6-23 months who experienced wasting was 17%, 44.4% had a history of infectious diseases, and 32% of children consumed inadequate energy (<80% RDA), and 52.9% of children consuming inadequate protein (<100% RDA). The results of the analysis show that energy intake is the dominant factor associated with wasting in children aged 6-23 months in Pagedangan

District, Tangerang Regency. Prevention of infectious diseases in children can be done by feeding properly and adopting clean living habits.

References

- Abubakari, A., & Jahn, A., 2016. Maternal Dietary Patterns and Practices and Birth Weight in Northern Ghana. *PLoS ONE*, 11(9),pp.1-17.
- Adeba, A., Garoma, S., Fekadu, H., & Garoma, W., 2014. Prevalence's of Wasting and its Associated Factors of Children among Months Age in Guto Gida District, Oromia Regional State, Ethiopia. *Journal of Food Processing & Technology*, 5(1).
- Aguayo, V.M., Badgaiyan, N., & Dzed, L., 2017. Determinants of Child Wasting in Bhutan. Insights from Nationally Representative Data. *Public Health Nutrition*, 20(2),pp.315-324.
- Ahmadi, D., Amarnani, E., Sen, A., Ebadi, N., Cortbaoui, P., & Melgar-Quiñonez, H., 2018. Determinants of Child Anthropometric Indicators in Ethiopia. *BMC Public Health*, 18,pp.626.
- Altare, C., Delbiso, T.D., & Guha-Sapir, D., 2016. Child Wasting in Emergency Pockets: A Meta-analysis of Small-Scale Surveys from Ethiopia. *International Journal of Environmental Research and Public Health*, 13,pp.178.
- Aryastami, N.K., Shankar, A., Kusumawardani, N., Besral, B., Jahari, A.B., & Achadi, E., 2017. Low Birth Weight was the Most Dominant Predictor Associated with Stunting Among Children Aged 12-23 Months in Indonesia. *BMC Nutrition*, 3(1),pp.1-6.
- Bandoh, D. A., & Kenu, E., 2017. Dietary Diversity and Nutritional Adequacy of Under-fives in a Fishing Community in the Central Region of Ghana. *BMC Nutrition*, 3(2).
- Bourke, C.D., Berkley, J.A., & Prendergast, A.J., 2016. Immune Dysfunction as a Cause and Consequence of Malnutrition. *Trends in Immunology*, 37(6),pp.386-398.
- Derso, T., Tariku, A., Biks, G.A., & Wassie, M.M., 2017. Stunting, Wasting and Associated Factors Among Children Aged 6-24 Months in Dabat Health and Demographic Surveillance System Site: A Community Based Cross-sectional Study in Ethiopia. *BMC Pediatrics*, 17(96).
- Fekadu, Y., Mesfin, A., Haile, D., & Stoecker, B.J., 2015. Factors Associated with Nutritional Status of Infants and Young Children in Somali Region, Ethiopia: A Cross- sectional

- Study Global Health. *BMC Public Health*, 15,pp.846.
- Gropper, S.S., & Smith, J.L., 2013. Advanced Nutrition and Human Metabolism. In *Advanced Nutrition in Human* (Sixth Edit). Wadsworth, Cengage Learning.
- Habyarimana, F., Zewotir, T., & Ramroop, S., 2016. Key Determinants of Malnutrition of Children Under Five Years of Age in Rwanda: Simultaneous Measurement of Three Anthropometric Indices. *African Population Studies*, 30(2),pp.2328–2340.
- Kementerian Kesehatan RI., 2018. *Laporan Nasional Riskesdas 2018*. Kementerian Kesehatan RI.
- Khor, G.L., Tan, S.Y., Tan, K.L., Chan, P.S., & Amarra, M.S.V., 2016. Compliance with Who IYCF Indicators and Dietary Intake Adequacy in a Sample of Malaysian Infants Aged 6-23 Months. *Nutrients*, 8,pp.778.
- Manary, M., Callaghan, M., Singh, L., & Briend, A., 2016. Protein Quality and Growth in Malnourished Children. *Food and Nutrition Bulletin*, 37(Supplement 1),pp.S29–S36.
- Matrins, V.J.B., Toledo-Florêncio, T.M.M., Grillo, L.P., Franco, M.do. C.P., Martins, P.A., Clemente, A.P.G., Santos, C.D.L., Viera, M.de.F.A., & Sawaya, A.L., 2011. Long-lasting Effects of Undernutrition. *International Journal of Environmental Research and Public Health*, 8,pp.1817–1846.
- Mengistu, K., Almu, K., & Destaw, B., 2013. Prevalence of Malnutrition and Associated Factors Among Children Aged 6-59 Months at Hidabu Abote District, North Shewa, Oromia Regional State. *Journal of Nutritional Disorders & Therapy*. 2013.
- Mwaniki, E.W., & Makokha, A.N., 2013. Nutrition Status and Associated Factors Among Children in Public Primary Schools in Dagoretti, Nairobi, Kenya Nairobi, Kenya. *African Health Sciences*, 13(1),pp.39–46.
- Rahman, M.S., Howlader, T., Masud, M.S., & Rahman, M.L., 2016. Association of Low-birth Weight with Malnutrition in Children Under Five Years in Bangladesh: Do Mother's Education, Socio-economic Status, and Birth Interval Matter? *PLoS ONE*, 11(6),pp.1–16.
- Richard, S.A., Black, R.E., Gilman, R.H., Guerrant, R.L., Kang, G., Rasmussen, Z.A., Sack, R.B., Valentiner-branth, P., & Lanata, C.F., 2012. Wasting Is Associated with Stunting in Early Childhood. *The Journal of Nutrition*, 142,pp.1291–1296.
- Rodríguez, L., Cervantes, E., & Ortiz, R., 2011. Malnutrition and Gastrointestinal and Respiratory Infections in Children: A Public Health Problem. *International Journal of Environmental Research and Public Health*, 8,pp.1174–1205.
- Saaka, M., & Galaa, S.Z., 2016. Relationships between Wasting and Stunting and Their Concurrent Occurrence in Ghanaian Preschool Children. *Journal of Nutrition and Metabolism*, 11.
- Tariku, A., Bikis, G.A., Woldie, H., Wassie, M.M., & Worku, A.G., 2017. Child Wasting is a Severe Public Health Problem in the Predominantly Rural Population of Ethiopia: A Community Based Cross-sectional Study. *Archives of Public Health*, 75,pp.26.
- UNICEF/WHO/World Bank., 2018. Global Overview Child Malnutrition Regional Trends. In *UNICEF/WHO/World Bank*.
- Venables, P.H., & Raine, A., 2016. The Impact of Malnutrition on Intelligence at 3 and 11 Years of Age: The Mediating Role of Temperament. *Developmental Psychology*, 52(2),pp.205–220.
- Walson, J.L., & Berkley, J.A., 2018. The Impact of Malnutrition on Childhood Infections. *Current Opinion in Infectious Diseases*, 31(3),pp.231–236.
- Werdani, A.R., & Utari, D.M., 2019. Association of Infant and Young Child Feeding Practices with Linear Growth of Children under 24 Months in Asia and Africa. *Pakistan Journal of Nutrition*, 18(7),pp.665–670.
- World Health Organization., 2008. *Indicators for Assessing Infant and Young Child Feeding Practices*.
- World Health Organization., 2010. *Nutrition Landscape Information System (NLIS) Country Profil Indicators: Interpretation Guide*. WHO Press.
- World Health Organization., 2019. *Children: Reducing Mortality*.



The Implementation of Healthy Food Diet for High-Risk Pregnant Woman (AMARIS) Class on the Level of Knowledge and Attitude of Pregnant Woman

Diyah Alva Rina[✉], Linda Meliati

¹Department of Midwifery, Poltekkes Kemenkes Mataram, Indonesia

Article Info

Article History:
Submitted December 2019
Accepted Oktober 2020
Published November 2020

Keywords:
Amaris Class;
Knowledge; Attitude;
high-risk Pregnant Woman

DOI
<https://doi.org/10.15294/kemas.v16i2.22579>

Abstract

High-risk pregnant women is a period where pregnant women can experience a variety of risks that are influenced by various factors. If a pregnant woman has more knowledge about the high risk of pregnancy then it is likely that mothers will think of overcoming the problem of risk of pregnancy. Healthy Food Diet for High Risk Pregnant Women (AMARIS) class. is one of the means to increase mothers' knowledge and attitudes about pregnancy care. The purpose of this study was to determine the effect of high-risk classes of pregnant women on the level of knowledge and attitudes of mothers about pregnancy care. This study used a pre-experimental research design with one group pretest-posttest, with a total sample of 30 people. The results of the study showed an increase in the average score of knowledge and attitudes after being given a class of resting pregnant women. The average knowledge score before resti pregnant women class was 71.77, while thereafter increased to 88.22. The average score before resting pregnant women for attitude was 72.66, while after that it increased to 77.83. There is an influence of AMARIS class on the level of knowledge and attitudes of high risk pregnant women with p value = 0,000. There is an influence of the Amaris class on the level of knowledge and attitudes of high-risk pregnant women.

Introduction

Maternal mortality according to the World Health Organization (WHO) is death during pregnancy or within a period of 42 days after childbirth or the end of pregnancy, due to all causes related to or aggravated by pregnancy or its handling, but not caused by an accident. Based on data from the World Health Organization (WHO) in 2015, the maternal mortality rate (MMR) in ASEAN countries is still much higher, namely Indonesia 98%, Vietnam 62%, Thailand 227%, Brunei 166% and Malaysia 256%. The MMR in Indonesia is still high when compared to neighboring countries.

Based on the goals in the Sustainable Development Goals (SDGs), maternal and child health are the 3rd GOAL target, namely good health where there are 13 targets including maternal and child health. In the MCH priority

to reduce the maternal mortality rate to below 70 per 100,000 live births (LB) by 2030, reduce the Neonatal Mortality Rate to 12 per 1,000 LB and the under-five mortality rate to 25 per 1,000 LB (Hoelman et al., 2016).

There are still quite a lot of high risk conditions for pregnant women. This could have the potential to have quite a serious impact on both the mother, such as anemia and CED as well as the fetus that will be born, such as low birth weight, birth defects, stunting, and even death. Prevention efforts are needed to reduce maternal mortality. Early detection of pregnancy can be used as an effort to increase woman's knowledge about her pregnancy. Many factors contribute to high-risk pregnancy. Lack of knowledge and awareness of woman about the importance of healthy pregnancy and nutrition during pregnancy is one of the them

[✉] Correspondence Address:
Public Health Departement, Universitas Negeri Semarang, Indonesia
Email: dalvarina96@gmail.com

(Asmawati, 2018).

Knowledge is one component of an important predisposing factor for health behavior. If a pregnant woman has more knowledge about the high risk of pregnancy, it is likely that the mother will think about preventing, avoiding or overcoming the problem of pregnancy risk and she has the awareness to have her pregnancy checked, so that if there is a risk during pregnancy it can be handled early and appropriately. by health care personnel. But if pregnant women have less knowledge, the mother will be more at risk in their pregnancy. It is also intended to help reduce the high maternal mortality rate in Indonesia.

The factors causing the high maternal mortality rate in Indonesia are hemorrhage, eclampsia, unsafe abortion, prolonged labor, infection and others. Meanwhile, the indirect causes of maternal mortality are the low level of maternal education, low socio-economic conditions, unsupportive socio-culture, besides that it is due to the limited access of mothers living in rural areas to health services (Aeni, 2013). Often death occurs at the time of delivery, due to bleeding, too young, too old, too close and too much. This condition is then supported by being late in recognizing the signs, being late in reaching the service place and being late in getting help (Puti et al., 2015). Optimal efforts to prevent or reduce the frequency of high-risk pregnant women and their handling need to be done immediately to reduce maternal and child mortality. According to research (Qudriani & Hidayah, 2017) the perceptions of pregnant woman about high-risk pregnancy that is good will be able to change the mindset, behavior and attitude for pregnant woman to comply with ANC.

Based on monthly MCH data (maternal and child health) in the working area of the Karang Pule Community Health Center there are still many pregnant women with high risk conditions, including CED pregnant women, young pregnant women (less than 20 years), old pregnant women (more than 35 years old)) as well as pregnant women with comorbidities such as hypertension, diabetes, hyperthyroidism. According to data, pregnant women in CED (Chronic Energy Deficiency) in

2016 were 86 cases (29%) and in 2017 increased to 100 cases (40%). The increasing number is worrying because it increases the risk of birth of LBW (Low Birth Weight) and defects. The condition of LBW babies is more susceptible to disease so that it increases the risk of becoming malnutrition and even death. The handling of LBW babies is also different from babies born normally, so mothers need more time and attention in caring. The number of LBW at Puskesmas Karang Pule in 2016 was 25 cases, increasing in 2017 by 40 (Puskesmas Karang Pule & Mataram, 2018).

Several factors causing the high number of CED and LBW are the mothers' lack of knowledge about nutrition and health during pregnancy. There are still taboos and food restrictions in the community. The priority of distribution of food in the family has also not benefited pregnant women. Pregnant women and toddlers need to get complete nutrition because in the first 1000 days of life is a golden growth phase, meaning that if there is malnutrition in this phase there will be a disturbance in brain growth and other tissues that can't be restored or permanent. CED pregnant woman is at risk of giving birth to LBW. LBW children are vulnerable to malnutrition. If they grow up and become prospective mothers, they potentially have LBW children too. The cycle will continue as long as it improves in terms of nutrition and health (Asmawati, 2018).

Based on research (Baroroh et al., 2017), there is a significant relation between the knowledge variable and participation in the class of pregnant woman. This is also the same as other research (Ni Nyoman Sasnitiari, Elin Supliyani, Yohana Wulan Rosaria, 2017) that pregnant women who take pregnancy class will have better knowledge and positive attitudes in recognizing pregnancy risks.

Based on the results of interview with the Karang Pule Public Health Center midwife coordinator, it was found that the class of high-risk pregnant woman had been carried out in the Geguntur, of the 11 high-risk pregnant women who participated in AMARIS class, two (2) gave birth to LBW babies and the rest delivered normal weight babies. Handling needs to be done for pregnant women at high risk.

This AMARIS class activity is expected to be a forum for increasing knowledge and awareness through counseling and improving nutrition by utilizing the capabilities of local materials owned. This study objective is to determine the effect of implementation of AMARIS class on the level of knowledge and attitudes of high-risk pregnant women about pregnancy care.

Method

This research is an analytical research with experimental design (quasi experimental) with one group pretest and posttest design and a time series design with a prospective data collection time approach. The study design had no comparison group (control). In this study, observations were made 2 times, namely pre test / before treatment and post test / after treatment to determine the effect of AMARIS class intervention for high-risk pregnant woman on changes in knowledge and attitudes in the work area of Karang Pule Public Health Center. The study population was high-risk pregnant women who were in the working area of the Karang Pule Public Health Center (Karang Seme, Karang Pule and Jempong Barat) during the data collection period from April to June 2019 and a sample of 30 high-risk pregnant women using the purposive sampling method, according to the inclusion criteria.

Data collection is conducted by giving a questionnaire. The questionnaire was administered to each of the high-risk pregnant woman and returned after filling in the pre-test or before the intervention was carried out. The questionnaire was filled out by them with guidance of one extension worker at the front of the class who read out one by one the questions in the questionnaire and supervised by the researcher, the midwife coordinator was assisted by a village midwife. Research data collection regarding the knowledge and attitudes of high-risk pregnant women was carried out twice, namely before and after the AMARIS class intervention.

Data analysis was performed using a computer statistical program and univariate analysis to see the frequency distribution of respondent characteristics and knowledge scores before and after the intervention. The attitude score of high-risk pregnant woman before and after the intervention and bivariate

analysis were used to analyze the effect of the implementation of the AMARIS class on the knowledge and attitudes of the women about pregnancy care.

The implementation of AMARIS class was adopted from the habits in the community, especially women who like social gathering. *Arisan* in the form of money collection and given to one in the *arisan* group selected by lottery system is replaced with a daily diet. The menu is carried out in the evaluation by the participants regarding the quality and quantity of nutrition. Together, pregnant women select, process and serve healthy, fully nutritious and varied foods to meet the nutritional needs of them and their families. The implementation steps are: (1) Nutrition officer and midwives determine environmental priorities for AMARIS activities. (2) Officer contact cadres to collect data on pregnant women in their environment who have high risk. (3) Cadres together with pregnant women make an agreement about the time and place of the *arisan* meeting. (4) During AMARIS activities, officer facilitate discussions among participants about the topics discussed.

Topics discussed in this AMARIS class are four star nutritious food, food portions for pregnant woman, exclusive breastfeeding, taboos and dietary restrictions for pregnant woman, precautions in pregnancy, the dangers of drugs in pregnancy, personal hygiene and health and the environment. The implementation method used in the AMARIS class is discussion, brainstorming, demonstration and eating together. With this method, it is hoped that pregnant women will not get bored quickly because the meeting was held for 6 meetings with different topic.

The data taken from the research questionnaire were the characteristics of high-risk pregnant woman, knowledge about pregnancy care (four-star nutritious food, food portions for pregnant woman, exclusive breastfeeding, taboo and dietary restrictions, precautions in pregnancy, dangers drugs on pregnancy, personal hygiene and health as well as the environment) and the attitudes of high-risk pregnant woman about pregnancy care. To prove the effect of the implementation of the Amaris class for high-risk pregnant

woman on knowledge about pregnancy care, the Wilcoxon test was used and the effect of the implementation of the AMARIS class for high-risk pregnant woman on attitudes about pregnancy care the Paired Sample T Test was used.

Result and Discussion

Based on the results of the study, it was found that the characteristics of high-risk pregnant women, knowledge and attitudes about pregnancy care, the effect of the implementation of the food menu in Amatis class on the level of knowledge and attitudes of pregnant women are as table 1.

Based on Table 1, it shows that the characteristics of respondents based on age, most were 20 - 35 years old namely 20 respondents (66.6%), based on education most of the respondents had basic education namely 15 respondents (50%), based on occupation most of the respondents were not working

(housewives) namely 29 respondents (96.7%) and distribution based on parity, most were multipara namely 21 respondents (70%).

Table 2 shows that the implementation of AMARIS class in high-risk pregnant woman was carried out in 3 working areas of the Karang Pule Public Health Center, namely the Karang Seme Environment, the Karang Pule Environment and the Jempong Barat Environment The implementation was held in each ward 6 times with different topic on each meeting.

Based on Table 3, it was found that the average knowledge of high risk pregnant woman before the AMARIS class intervention was 71.83 (95% CI: 66.04 - 77.63), the standard deviation was 15.523, the lowest was 33.00 and the highest was 100. The mean value of the knowledge after AMARIS class intervention was 88.22, (95% CI: 83.92-92.48), standard deviation 11.451, the lowest was 53.00 and the

Table 1. Frequency Distribution of Characteristics of High Risk Pregnant Women in the Work Area of the Karang Pule Public Health Center in 2019

Characteristics	N	%
Age		
< 20 years	5	16,7
20 – 35 years	20	66,6
> 35 years	5	16,7
Total	30	100
Education		
N/A	1	3,3
Elementary (SD/SMP/Equal)	15	50
High School (SMA/Sederajat)	13	43,4
Graduate	1	3,3
Total	30	100
Occupation		
Not Working	29	96,7
Working	1	3,3
Total	30	100
Parity		
Primipara	7	23,3
Multipara	21	70
Grande Multipara	2	6,7
Total	30	100

Source: Primary Data, 2019

Table 2. Schedule of AMARIS Class Implementation in the Karang Pule Public Health Center

Class	Location			Learning Material
	Karang Seme	Karang Pule	Jempong Barat	
I	10 April 2019	17 Mei 2019	14 Juni /2019	Four star nutrition meal, pregnant woman meal portion
II	11 April 2019	18 Mei 2019	15 Juni 2019	Exclusive breastfeeding
III	12 April 2019	20 Mei 2019	17 Juni 2019	Meal prohibition for pregnant woman
IV	13 April 2019	21 Mei 2019	18 Juni 2019	Pregnancy alert
V	15 April 2019	22 Mei 2019	24 Juni 2019	Medical precaution on pregnancy
VI	16 April 2019	23 Mei 2019	25 Juni 2019	Personal health and hygiene and environmental health

Source: Primary Data, 2019

Table 3. Distribution of before and after the implementation of the AMARIS class on the knowledge and attitudes of high risk pregnant women about pregnancy care in the working area of Karang Pule Public Health Center in 2019

Variable	Mean	Median	SD	Minimum -Maximum	95% CI
Before Intervention					
Knowledge	71,83	73.00	15.523	33.00 - 100	66.04-77.63
Attitude	72,70	73.00	5.873	60,00-88.00	70.51-74.89
After Intervention					
Knowledge	88,22	90.00	11.451	53.00-100	83.92-92.48
Attitude	77,87	78.00	6.235	65,00-92.00	75.54-80.19

Source: Primary Data, 2019

Table 4. The Effect of the Implementation of AMARIS Class on the Knowledge of High-Risk Pregnant Woman About Pregnancy Care

Variable	N	Mean Rank	P Value
Knowledge Before	30	.00	
Knowledge After	30	14,50	.000

Remark: Wilcoxon test

Table 5. The Effect of AMARIS Class on Attitude of High Risk Pregnant Woman About Pregnancy Care

Variable	N	Mean	SD	SE	P Value
Attitude Before	30	72,66	5,92	1,08	.000
Attitude After	30	77,83	6,25	1,14	

Remark: Paired Sample T Test

highest was 100. While for the attitude before the AMARIS class intervention was 72.70 (95% CI: 70.51-74.89), standard deviation 5,873, The lowest was 60.00 and the highest was 88. After AMARIS class intervention the attitude score was 77.87 (95% CI: 75.54-80.19), standard deviation was 6.235, the lowest was 65.00 and the highest was 92.00.

The results shows that there is an increase in the knowledge score before and after the intervention with the average value of knowledge increasing by 16,398 points. Increased knowledge of high-risk pregnant woman after AMARIS class is caused by several factors, including activities carried out with the *arisan* approach, the materials given changes every day, the mother's attention to the material that is delivered every day, the material given is new and rarely heard so that they feels interested, the methods used are discussion, brainstorming, demonstrations, eating together, various media used and the experience that the women had given birth before.

Menurut penelitian (Sorongan Lucia, Atik Purwandari, 2015), didapatkan nilai rerata berdasarkan sebelum pelaksanaan kelas ibu hamil adalah 43.83 dan setelah pelaksanaan kelas 9ibu hamil didapatkan adalah 48,47. Penelitian, terdapat peningkatan kemampuan ibu hamil dalam deteksi dini tanda bahaya kehamilan sebelum mengikuti kelas hamil mayoritas berada pada tingkatan (56%-75%) sebanyak 13 responden (43,3%), diikuti (\leq 55%) sebanyak 11 responden (36,7%), serta (76% - 100%) sebanyak 6 responden (20%) dan sesudahnya mayoritas berada pada tingkatan (76% - 100%) sebanyak 16 responden (53,3%), diikuti (56%-75%) sebanyak 9 responden (30%), serta (\leq 55%) sebanyak 5 responden.

According to a research (Sorongan Lucia, Atik Purwandari, 2015), the mean value obtained before the implementation of the class for pregnant woman was 43.83 and after the implementation was 48.47. Other research said there is an increase in the ability of pregnant woman in early detection of pregnancy cautions before joining the pregnancy class, the majority are at the level (56% -75%) of 13 respondents (43.3%), followed (\leq 55%)) as many as 11 respondents (36.7%), and (76% - 100%) as

many as 6 respondents (20%) and after that the majority are at the level (76% - 100%) as many as 16 respondents (53.3%), followed (56% -75%) as many as 9 respondents (30%), and (\leq 55%) as many as 5 respondents.

The results showed that there was an increase in attitude scores between before and after the intervention. After the intervention of the AMARIS class, pregnant women had an average score of 5.17 points. It can be influenced by the media used, namely booklets. This research is in line with research (Liska & Ruhayati, 2018), there is an increase in the average attitude of pregnant women by 4.24 after the class of pregnant woman. Research conducted (Hanum & Nehe, 2018) majority of high risk pregnant women have positive attitude (71,4%) as many as 15 persons and minority as many as 6 persons (28,6%)

The attitude of high-risk pregnant woman in the AMARIS class is not affected by the characteristics, the positive attitude is affected by the participation in the AMARIS class which increases the woman's knowledge. The good knowledge of the women in the AMARIS class, bring more positive attitude about pregnancy care. Good knowledge about pregnancy care and a positive attitude towards antenatal care are needed so that pregnant women can improve their health and reduce maternal and infant mortality rates. In this study, the expected output of health centers with the presence of AMARIS class in high-risk pregnant women reduces the incidence of LBW. This is expected to reduce MMR and IMR.

The theory states that attitudes will have a direct effect on behavior. The direct influence is more of a predisposition of behavior that will only be realized if the conditions and situations allow. Attitudes will change with obtaining information about an object through persuasion or pressure from social groups. Attitudes are not the same as behavior, and behavior does not always reflect someone's attitude because someone often shows actions that are contrary to their attitudes. Attitude is a closed response whose manifestation cannot be seen directly and is a predisposing factor for behavior.

Based on Table 4, it shows the result of the Wilcoxon Signed Rank Test, the effect of AMARIS class implementation on the

knowledge of pregnant women, the value of $p = 0.000$ is obtained. This means that at 5% alpha, it can be seen that there is an effect of the implementation of the AMARIS class on the level of knowledge of high-risk pregnant women about pregnancy care in the Karang Pule Public Health Center in 2019 which is very significant between the knowledge of high-risk pregnant women before and after participating in the AMARIS class for high-risk pregnant woman.

The results of this study are in accordance with the government's expectations in the implementation of the class of pregnant women, namely increasing knowledge, changing attitudes and behavior in order to understand about pregnancy checks so that mothers and babies are healthy, safe delivery, comfortable postpartum mothers are safe, healthy babies, prevention of physical and mental illness, disorders. nutrition and complications of pregnancy, childbirth and childbirth so that mothers and babies are healthy, newborn care for optimal growth and development and physical activity for pregnant women (Kementrian Kesehatan RI, 2014).

The AMARIS class for high-risk pregnant women, which aims to increase the knowledge of high-risk pregnant women about nutrition and health so that they have a healthy pregnancy and give birth to a healthy baby and reduce the incidence of LBW. The implementation of the AMARIS class at the Karang Pule Health Center was carried out for 6 meetings with different materials every day so that the participants did not get bored. The topics discussed in this AMARIS Class were four star nutritious food, food portions for pregnant women, exclusive breastfeeding, taboos and dietary restrictions for pregnant women, precautions in pregnancy, the dangers of drugs in pregnancy, environmental hygiene and personal health.

The results of a research (Puspitasari, 2012), found that there was a change in the knowledge of pregnant women or an increase in the level of maternal knowledge after being given pregnancy material with a p value of $0.000 < 0.05$, the results of this study are in line with other research (Baroroh

et al., 2017) mentioned there is a significant relation between the knowledge variable and participation in the class of pregnant woman. A research (Retnaningtyas, 2017) showed that there is an effect of knowledge about the class of pregnant woman on pregnancy care behavior in pregnant women in the working area of Puskesmas Nganjuk and there is a strong correlation between class participation of pregnant woman and primigravida anxiety (Naharani et al., 2018) This is also in accordance with a research (Indah & Julyarni, 2014), husband's support, woman's motivation and interest have a significant effect on class visits for pregnant woman in Dadaprejo Village, Sengkaling Malang.

According to a research (Septiani, 2013), at the Puskesmas Metro Lampung City, there is a relation between knowledge, attitude of pregnant woman about the class of pregnant woman and husband's support with the participation in the class of pregnant woman. Likewise with research (Syafriani & Indrawati, 2017), it was found that the lecture and slide methods had an effect on the knowledge of pregnant women in the prenatal class. This is in line with other research (Novadela & Supriatiningsih, 2012), it was found that there is an effect of the implementation of the mother class program on the knowledge of pregnant women about pregnancy and childbirth in the Banjarsari Public Health Center work area in 2012. Likewise, the results of the study (R Risneni & Yenie, 2017) said that there is a significant relation between knowledge and presence, distance of residence, occupation, husband's support, ownership of MCH books, and parity of pregnant woman in the mother class. But this study is different from a research (Chikmah et al., 2016), indicating that increased knowledge, the attitudes and behavior of mothers in parenting through Mother's SMS Program are more effective than those in the Mother's Toddler Class Program.

Research conducted (Hillier & Slade, 1989) found of 60 women who attended a class of pregnant woman showed a significant increase in knowledge after it. This shows

that the mother's knowledge of high caution signs is not due to age, education, gravida, family support, or sources of information. Women have good knowledge about the caution signs of pregnancy because of their participation in pregnant woman classes in which they gain knowledge. This is in accordance with a research (Nuryawati & Budiasih, 2017) mentioned there is a relation between the class of pregnant woman and the knowledge of mothers about the caution signs of pregnancy. Align with a research (Desmariyenti & Hartati, 2019) found that the factors related to the participation of pregnant women in the mother's class are knowledge, parity, and family support. The results of this study are different from another one (Mulyati & Djamilus, 2017), there is no significant relation between participation in the class of pregnant woman, but there is a significant relation between husband's support and infant care behavior.

Table 5 shows the results of the Paired Sample T Test. The value of $p = 0.000$, which means that at 5% alpha, there is an effect of the implementation of the AMARIS class on the attitudes of high-risk pregnant woman about pregnancy care in the Work Area of the Karang Pule Public Health Center in 2019 which is very significant between the attitude before and after attending the AMARIS class. The results of this study are in accordance with the results of other study (Meliati & Ekayani, 2018) mentioned there is an effect of the implementation of the toddler mother class program on the knowledge and attitudes of the mothers in the detection of children's growth and development and there is an effect of the implementation of the mother's class program on maternal attitudes. This research is also in line with other research (R Sihsilya et al., 2016) said the class of pregnant women had an effect on the knowledge and attitudes of mothers practicing IMD.

Based on a research conducted (Hati & Aryani, 2018), there is an effect of providing education with the class of pregnant woman on the attitudes and knowledge of pregnant women in preventing post partum blues. Research

(Hitatami et al., 2014), showed that health education with short message services can improve the attitudes of pregnant women about high-risk pregnancies, as well as research results (Hanum & Nehe, 2018) mentioned there is a relation between the attitudes of pregnant woman and high-risk incident pregnancy at the Sunggal Medan Primary Clinic in 2018.

Conclusion

The results showed an increase in the average score of knowledge and attitudes after being given a class of high-risk pregnant woman. The mean score of knowledge before the class of high-risk pregnant woman was 71.77, while after that it increased to 88.22. The mean score before the high-risk class of pregnant women for attitude was 72.66, while after that it increased to 77.83. The implementation of the AMARIS class has an effect on increasing the knowledge and attitudes of high-risk pregnant women with a significant increase.

Acknowledgement

We would like to acknowledge the Director of Poltekkes Kemenkes Mataram, the Mataram City Health Office, the Head of the Karang Pule Public Health Center for all the assistance, support and permission that had been given so that researchers can carry out research as well as all parties who had participated in this research.

References

- Aeni, N., 2013. Faktor Risiko Kematian Ibu. *Jurnal Kesmas Jurnal Kesehatan Masyarakat Nasional*, 7(10),pp.453-459.
- Asmawati, Y., 2018. *AMARIS (Arisan Menu Makanan Ibu hamil Resiko Tinggi)*. Puskesmas Karang Pule Dinas Kesehatan Kota Mataram.
- Baroroh, I., Jannah, M., & Meikawati, P.R., 2017. Hubungan Pengetahuan Ibu Hamil Dengan Keikutsertaan Kelas Ibu Hamil di Wilayah Kerja Puskesmas Jenggot Kota Pekalongan. *Jurnal Siklus*, 6(2),pp.212-217.
- Chikmah, A.M., Laksono, B., & Yuniastuti, A., 2016. Efektivitas SMS Bunda Dibanding Kelas Ibu Balita Terhadap Peningkatan Pengetahuan, Sikap, Perilaku. *Public Health Perspective Journal*, 1(1),pp.21-28.
- Desmariyenti., & Hartati, S., 2019. Faktor Yang Berhubungan Dengan Keikutsertaan Ibu Hamil Dalam Kelas Ibu Hamil. *Jurnal Photon*, 9(2),pp.114-122.
- Hanum, P., & Nehe, K., 2018. Hubungan Pengetahuan dan Sikap Ibu Hamil Dengan

- Kejadian Risiko Tinggi Kehamilan di Klinik Pratama Sunggal Medan Tahun 2018. *Jurnal Maternitas Kebidanan*, 3(2),pp.81–90.
- Hati, F.S., & Aryani, F., 2018. Efektifitas Kelas Ibu Hamil sebagai Upaya Peningkatan Sikap dan Pengetahuan Ibu Tentang Post Partum Blues. *Prosiding Seminar Nasional Vokasi Indonesia*, 1,pp.40–46.
- Hillier, C. A., & Slade, P., 1989. The Impact of Antenatal Classes on Knowledge, Anxiety and Confidence in Primiparous Women. *Journal of Reproductive and Infant Psychology*, 7(1),pp.3–13.
- Hitatami, E., Lestari, B., Susanto, H., Hilmanto, D., Dewi, T., & Sunjaya, D.K., 2014. Pengaruh Pendidikan Kesehatan tentang Kehamilan Risiko Tinggi melalui Layanan Pesan Singkat terhadap Peningkatan Pengetahuan dan Sikap Ibu Hamil. *Jurnal IJEMC*, 1(21).
- Indah, S., & Julyarni, Y., 2014. Hubungan Dukungan Suami, Motivasi Ibu Dan Minat Terhadap Kunjungan Kelas Ibu Hamil Di Desa Dadaprejo Sengkaling Malang. *Jurnal Biomed Science*, 2(2),pp.40–48.
- Kementrian Kesehatan RI., 2014. Pedoman Pelaksanaan Kelas Ibu Hamil. In *Pedoman Pelaksanaan Kelas Ibu Hamil* (Edisi Revi). Kementrian Kesehatan RI.
- Liska, C., & Ruhayati, R., 2018. Pengaruh Pelaksanaan Kelas Ibu Hamil Terhadap Pengetahuan Tentang Tanda-Tanda Bahaya Kehamilan Dan Sikap Dalam Pemilihan Penolong Persalinan Di Wilayah Kerja UPTD Yankes Pacet Kabupaten Bandung. *Syntax Literate: Jurnal Ilmiah Indonesia*, 3(12),pp.27–36.
- Meliati, L., & Ekayani, N.P.K., 2018. Children Under Five Year Mother Class Program to Detect the Children Growth and Development. *Jurnal Kesehatan Masyarakat*, 14(1),pp.106–114.
- Mulyati, S., & Djamilus, F., 2017. Kelas Ibu Hamil dan Perilaku Perawatan Bayi. *Jurnal Pendidikan Kesehatan*, 6(1),pp.43–49.
- Naharani, A.R., Siswati., & Fatkhiyah, N., 2018. Hubungan Perilaku Keikutsertaan Kelas Ibu Hamil Dengan Tingkat Kecemasan Dalam Menghadapi Persalinan Pada Ibu Hamil Primigravida Trimester III Di Desa Kalisapu Kecamatan Slawi. *Jurnal Siklus*, 7(2),pp.300–306.
- Ni-Nyoman, S, Elin, S., & Yohana, WR.D.A.P., 2017. Hubungan Keikutsertaan Ibu Dalam Kelas Ibu Hamil Dengan Pengetahuan Dan Sikap Terhadap Tanda Bahaya Dalam Kehamilan Di Kota Bogor. *Jurnal Kesehatan Reproduksi*, 8(2),pp.175–185.
- Novadela, N.I.T., & Supriatiningsih., 2012. Pengaruh Program Kelas Ibu Terhadap Pengetahuan Ibu Hamil Trimester III Tentang Teknik Meneran. *Jurnal Kesehatan*, IV(2),pp.351–356.
- Nuryawati, L.S., & Budiasih, S., 2017. Hubungan Kelas Ibu Hamil Dengan Pengetahuan Ibu Hamil Tentang Tanda-Tanda Bahaya Kehamilan Di Desa Surawangi Wilayah Kerja Uptd Puskesmas Jatiwangi Kabupaten Majalengka Tahun 2016. *Jurnal Bidan Midwife Journal*, 3(01),pp.60–66.
- Puskesmas Karang Pule, & Mataram, D.K.K.M., 2018. *Laporan PWS KIA Puskesmas Karang Pule*. Puskesmas Kota Mataram.
- Puspitasari., 2012. Pelaksanaan Kelas Ibu Hamil Puskesmas 7 Bangetayu Kota Semarang. *Jurnal Kesehatan Masyarakat*, 1,pp.1054–1060.
- Puti, H.S, Dwi, H., Ika, D., & Nunik, K., 2015. Faktor-Faktor Yang Berpengaruh Terhadap Risiko Kehamilan “4 Terlalu (4-T)” Pada Wanita Usia 10-59 Tahun (Analisis Riskesdas 2010). *Media Penelitian Dan Pengembangan Kesehatan*, 24(3),pp.143–152.
- Qudriani, M., & Hidayah, S.N., 2017. *Persepsi Ibu Hamil Tentang Kehamilan Resiko Tinggi Dengan Kepatuhan Melakukan Antenatal Care Di Desa Begawat Kecamatan Bumijawa Kabupaten Tegal Tahun 2016*.pp.15–17.
- R-Risneni., & Yenie, H., 2017. Faktor-Faktor Yang Berhubungan Dengan Kehadiran Ibu hamil Pada Kelas Ibu di Satu Kecamatan Kabupaten Lampung Selatan. *Jurnal Keperawatan*, XIII(1),pp.19–30.
- R-Sihailya, B.E., Kuntoro., & Trijanto, B., 2016. Keikutsertaan Kelas Ibu Hamil Berpengaruh terhadap Pengetahuan dan Sikap Ibu dalam Praktik Inisiasi Menyusu Dini. *Majalah Obstetri Dan Ginekologi*, 24(1),pp.8–12.
- Retnaningtyas, E., 2017. Pengaruh Pengetahuan Tentang Kelas Ibu Hamil Terhadap Perilaku Perawatan Kehamilan Pada Ibu Hamil Di Wilayah Kerja Puskesmas Nganjuk. *Jurnal EDUMidwifery*, 1(1),pp.42–49.
- Septiani, R., 2013. Pengetahuan, Sikap Ibu Hamil dan Dukungan Suami Dengan Keikutsertaan Ibu Hamil Dalam Kelas Ibu Hamil di Puskesmas Kota Metro Lampung. *Jurnal Kesehatan*, IV(2),pp.408–415.
- Sorongan, L., Atik-Purwandari, E.P., 2015. Pengaruh Pelaksanaan Kelas Ibu Hamil Terhadap Pengetahuan Tentang Persiapan Persalinan. *Jurnal Ilmiah Bidan*, 3(1),pp.61–65.
- Syafriani., & Indrawati., 2017. Pengaruh Metode Penyuluhan Deteksi Dini Kehamilan

Risiko Tinggi Terhadap Pengetahuan Ibu Hamil Pada Kelas Prenatal di Puskesmas Bangkinang Kota Kabupaten Kampar.

Jurnal Doppler Universitas Pahlawan Tuanku Tambusai, 1(2),pp.77–86.



Peer Educator Method to Improve the Attitude of Junior High School Students in the Prevention of Watching Porn

Yuliani Winarti^{1✉}, Sri Sunarti², Thomas Ari Wibowo³

¹Study Program of Public Health, Faculty of Health and Pharmacy, Muhammadiyah University of East Kalimantan

Article Info

Article History:

Submitted October 2018

Accepted April 2020

Published November 2020

Keywords:

Peer educator, watching porn, pornography addiction

DOI

<https://doi.org/10.15294/kemas.v16i2.16610>

Abstract

Addiction to pornography in adolescents has permanent damage to an important part of the brain called the PFC (pre frontal cortex), as a result of which the ability to make decisions is reduced, the brain only seeks pleasure without consequences. Information about the dangers of watching porn addiction by adolescents to their peers or what is often called peer educators as an alternative to preventive efforts to overcome the effects of watching porn. This study aims to determine the effectiveness of the peer educator method in improving student attitudes about the prevention of watching porn. This type of research is a quasi experiment with a non-equivalent control group design with pre-test and post-test. Subjects in this study amounted to 76 students, divided into 2, namely the intervention group who received the peer educator method as many as 40 students at SMPN 4 Samarinda and the control group who received the module as independent reading material as many as 35 students at Junior high School 24 Samarinda who were selected purposively. Sampling with data analysis techniques using paired t-test and independent t-test. The decision to test the hypothesis of this study was based on a significance level of 5% or p value = 0.05. There was a statistically significant difference in attitude $p < 0.05$ in the two groups of $p = 0.003$. The mean change in attitude in the treatment group was higher than the control group. The peer educator method is more effective than the module in increasing the prevention attitude of watching porn.

Introduction

Watching porn is a drug through the eye, that is, pornography that is commonly accessed by humans through the eyes which has more destructive power on the brain than drug users. Watching porn damages 5 parts of the human brain at once while drug users only damage 3 parts of the user's brain, so Watching porn is very dangerous. Users of pornography can experience addiction twice as dangerous as drug addicts. Pornography addiction will damage a part of the brain called the PFC (Pre Frontal Cortex), which is the part of the brain that serves as the center for consideration and decision making. PFC only exists in humans

and does not exist in animals, this part of the brain will mature completely at the age of 25 years, PFC is easily damaged due to physical impact, chemicals, narcotics, drugs and pornography. The limbic system that regulates emotions, eating, drinking and sexual instincts in the brain activates a brain chemical called dopamine which provides a sense of pleasure, curiosity and addiction (Kastlemen 2012). permanent brain damage from narcolema also triggers various adultery, incest, sexual harassment, free sex rape and many other sexual behavior deviations including same-sex or LGBT sex, all of which will result in illness and disaster in the younger generation, due

✉ Correspondence Address:

Study Program of Public Health, Faculty of Health and Pharmacy, Muhammadiyah University of East Kalimantan, Samarinda, 75124, Indonesia
Email: yw399@umkt.ac.id

to moral damage so they cannot differentiate between right and wrong (Walker *et al*, 2015).

Pornography addiction according to Love *et al.* (2015), is the next effect that occurs due to dopamine filling the pre-frontal cortex in the brain. Someone who is often exposed to erotic images or videos will cause addiction regardless of one's age and background, escalation (increase), is an effect that occurs after addiction. As a result, a person will need more sexual material that is more explicit and more deviant. The addiction and escalation effects lead to an increase in demand for such pornographic material. As a result, the level of "pornographicness" and the explicitness of the product is also increasing, followed by desensitization (accumulation of sensitivity) where taboo, immoral, shocking, slowly becomes commonplace, this stage the picture of PFC damage is highly visible (Matthews, 2015). Pornography users even tend to be insensitive to victims of sexual violence that occur in their surrounding environment and act indifferently, even the most terrible thing is that they can also act or act out, the effect of acting out is the peak effect, namely having sex after being exposed to pornographic materials. Addiction to watching porn will experience sexual deviance, considering marriage as unimportant and other people only considered as sexual objects (Anisah, 2016).

The results of a pornographic survey conducted by Kaltim Pos in East Kalimantan in 2017 on 50 junior high school students in Samarinda with an age range of 11-16 years showed that 72% had seen pornographic films, 31% said they first saw a porn site at the age of 11 years and the youngest was 3% at the age of 9 years, 78% view pornographic films via cellphones, as many as 50% of students like to download pornographic films and from 72% who have watched pornographic films, 86% of students save their collection of porn movies on their cellphones, the rest save on computers / laptops.

Data from the Ministry of Communication and Information in 2013 was obtained, Indonesia was already in the first rank in accessing pornography activities, and as many as 68% of elementary school students had participated in accessing pornographic content.

KPAI data for 2015 stated that from a survey of 4500 adolescents, it was found that 97% of youth had watched pornography. Adolescents spend more time with their peers than interacting with their families, both with the opposite sex and the same sex, both at school age and at advanced levels (BKKBN, 2017). The peer educator program and the provision of modules constitute the process of delivering communication, education and information that helps improve student attitudes about prevention of watching porn. Effective methods in increasing positive attitudes, self-control, and belief values in order to prevent narcolema are needed to support government programs and reduce morbidity and mortality due to watching porn addiction.

Method

This research design is a quasi experimental design with a non-equivalent control group design with pre-test and post-test. The decision to test the hypothesis of this study was based on a significance level of 5% or p value = 0.05. This research was conducted at Junior high school 4 and Junior high school 24, previously a preliminary study had been carried out throughout all Junior high schools in Samarinda Ulu, namely Junior high school 3, 4, 8,10, and 24, then the research locations were selected in both these junior high schools, namely Junior high school 4 and 24, with the results of interviews with education counselor teachers and several students at these schools, it was found that many students saved pornographic videos on their cellphones. The results of interviews with several students found that they often download, share and watch pornographic videos and there are some who collect pornographic videos. And when asked if they knew what the impact of watching the film was, and on average their answer was they did not know, they said that they had watched pornographic films secretly at home through their cellphones and until now they often did, when they were asked again deeply. They have a desire to no longer watch the film, they just do not know where to start, they also reveal that sometimes after watching porn there is a feeling of guilt and sin, it is just that the desire to watch the film again is very strong. Even the results of the confession of

1 student said that he had started watching pornographic films starting one year ago. This study used 2 treatment groups, namely junior high school students 4 using the peer educator method of narcolema prevention and a control group, namely students of junior high school 24 Samarinda, by providing a prevention module of watching porn. The research design is described as follows:

Treatment group: 01.....X1.....02.....03

Control Group : 04.....X2.....05.....06

The subjects in this study were students of junior high school 4 and students of junior high school 24 Samarinda, 2017/2018 academic year. The research subjects of the treatment and control groups were selected by purposive sampling with the consideration that previous research had never been carried out on peer educators at the two junior high schools and peer educators who would choose their own subjects based on their close relationship (they know each other, are close and are still in the same school).

Selection of the subjects of the treatment group using purposive sampling technique. In this stage, the researcher first performs a recruitment peer educator who will be trained

before determining the research subjects in the treatment group. There were 8 peer educators who were selected together with the Principal of Junior High School 4 from grade 2 and were active in the student organization of junior high school 4 Samarinda, for the next stage each peer educator chose their respective peer group. Each group is at least 5 people so that the number of samples in this study is 40 people. The criteria for peer educators in selecting each peer group are based on a close relationship, that is, they know each other and are close. Selection of research subjects in the control group by means of matching. For more details, the recruitment process for research subjects can be seen in the chart below:

Data collection was carried out by interviewing techniques with a questionnaire tool consisting of 4 parts, part A contains demographic data, part B contains questions about student attitudes about prevention of narcolema totaling 16 statements. The instrument has passed the alidity test using the Pearson product moment (r) with a Table value $r > 0.361$ with $N = 30$, and reliability using Cronbach's Alpha = 0.910.

The data analysis used in this study

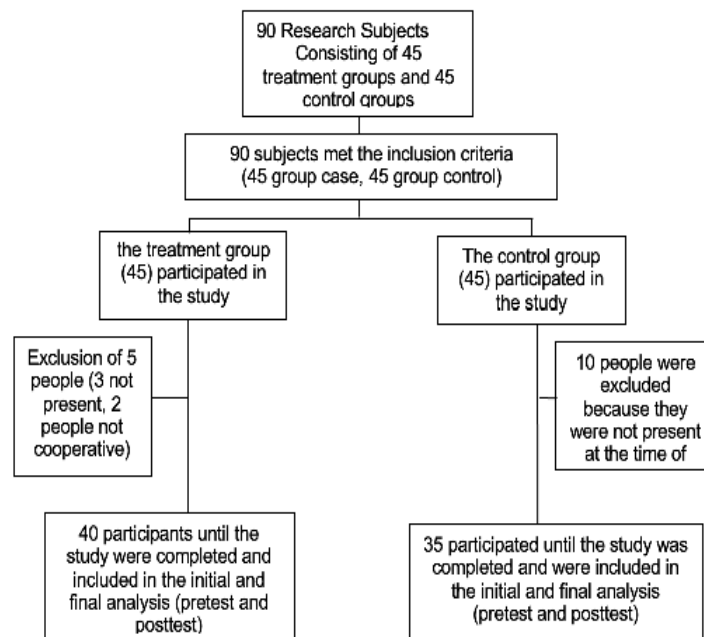


Figure 1. Model of participant recruitment

was the paired t-test and independent t-test. Paired t-test analysis was used to analyze the differences before and after being given peer educator method treatment to the case groups and administering narcolema prevention modules to the control group. To analyze the effectiveness of these two methods in both groups using the independent t-test with a significance level of 5% or $p = 0.05$.

Results and Discussion

Before the data were analyzed statistically, the normality and homogeneity tests were carried out. The normality test used the Shapiro Wilk test and the data were normally distributed ($p > 0.05$). Furthermore, the homogeneity test using the Levene test ($p > 0.05$) showed that the attitudes of the two groups were homogeneous, meaning that the data variants of the two groups were the same. Furthermore, to see whether there were differences in attitudes before and after treatment using paired t test, while to determine

differences in attitudes between the treatment group and the control group, the Independent t test was carried out with the difference considered significant if $p < 0.05$.

Table 1 shows that the average portion of the treatment and control groups is in early adolescence, namely the age of 13-14 years old, meanwhile the results of the homogeneity test using the Levene test obtained a p value of 0.163 ($p > 0.05$) meaning that between the treatment group and the group controls have the same variants for age or homogeneous categories. Gender characteristics in both groups (treatment and control) were dominated by female, both in the treatment group and in the control group, from the results of the homogeneity test, the result was 0.009 ($p < 0.05$), meaning that gender between the treatment group and the control group differed in variants or not homogeneous.

Table 2 shows the results of the test for differences in paired samples t-test, it is proven

Table 1. Distribution of Respondents According to Characteristics (N=75)

Characteristics	Groups				P value
	Treatment		Control		
	N = 40	%	N = 35	%	
Ages					
13 years old	23	57,5	12	34,3	0.163
14 years old	17	42,5	23	65,7	
Gender					
Male	18	45.0	10	28,6	0.009
Female	22	55.0	25	71,4	

Source: Primary data analysis, 2018

Table 2. Analysis of the Paired t-Test of the Attitude of Prevention of Watching Porn, Pre Test and Post Test

Attitude	Treatment				Control			
	Mean (SD)	Mean Differences (CI95%)	t	p	Mean (SD)	Mean Differences (CI95%)	t	p
<i>Post test 1</i>	54.20	-3.17	-2,418	0,02*	52.34	0.60	0,541	0,57
with	(4.5)	(-5.83 –			(5.1)	(-1.65- 2.85)		
<i>Pre test</i>	51.03	-0.51)			52.94			
	(6.4)				(4.5)			
						0.65	0,481	0.63
<i>Post test 2</i>	60.70	-9.67	-8,430	0.00*	52.29	(-2.11 –		
with	(2.7)	(-5.13 –			(6.8)	3.43)		
<i>Pre test</i>	51.03	-1.93)			52.94			
	(6.4)				(4.5)			

Source: Primary data analysis, 2018

Table 3. Independent t-Test Analysis of Attitudes about Prevention of Watching Porn

Attitude	Mean	Up to	Mean Difference	df	t	P
treatment group	51.03	6.4	6.31	73	4,685	0.00*
control group	44.71	4.9				

Source: Primary data analysis, 2018

that there are significant differences in attitudes before and after health education intervention through peer educators was given in the treatment group, with a value of $t = -2.418$; $p = 0.02$ ($p < 0.05$). The posttest data (Mean = 54.20; SD = 4.5) has an average which is greater than the average pretest score (Mean = 51.03; up to = 6.4). This means that treatment through peer educators is proven to be able to improve the attitude of preventing watching porn in the treatment group. Whereas in the control group, which received the module as independent reading material on the prevention of watching porn, the results of the test for differences in paired samples t-test were obtained, there was no significant difference in attitude before and after receiving the module, with a value of $t = 0.541$; $p = 0.57 > 0.05$.

Table 3 shows, through the difference test in independent t-test, it was proven that there was a significant difference in attitudes between the treatment group who received the peer educator method and the control group who received the narcolema prevention module, $t(73) = 4.685$; p value 0.00 ($p < 0.05$). The mean value of attitudes in the treatment group (Mean = 51.03; 6.4) was greater than the mean value of attitudes in the control group (Mean = 44.71; 4.9) that is, health education for the prevention of watching porn through the peer educator, proven to be able to increase positive attitudes in the treatment group compared to the control group. Education through the peer educator method is very helpful in changing adolescent attitudes towards avoiding risky behavior, namely watching porn, compared to other methods such as mass counseling conducted in schools or institutions, installing banners and many others which are less effective (Mahat, 2006).

In this study, the method used for the

treatment group was health education through trained peer educators, while the control group received a module for the prevention of transmission of watching porn which was read independently. Based on the results of this study, there was an increase in attitudes in the treatment group compared to the control group. This increased attitude is the result of the learning process that occurs as a result of peer educator education, so that the peer educator program can provide opportunities to improve communication skills, interact and increase the willingness to talk among peers about preventing watching porn, according to Jenings and Perotte. (2014), this program can support adolescent attitudes in the prevention of risky sexual behavior including pornography.

Based on the results of statistical analysis, health promotion through peer educators was proven to increase positive attitudes in the treatment group. The characteristics of the peer educator selection play an important role in the realization of changes in the attitude of the treatment group. According to Azizi et al. (2016), the success of peer educators in increasing positive attitudes in the treatment group is greatly supported in the peer educator recruitment process. According to Falace et al. (2018), the communication skills of peer educators who have been trained and their humble and pleasant demeanor also support the delivery of health messages, in addition to the communicative and informal speaking styles of peer educators that support changes in attitudes in peer groups, the existence of friendship, class and friends playing at home make peer groups feel free to ask questions and discuss. Attitude is a reflection of someone's pleasure or displeasure with something, attitudes can also come from experience or also come from the closest person. A person's attitude can change

by obtaining additional information through persuasion and pressure from his social group and the role of social media in it (Panuju, 2018).

In terms of positive role models, increasing attitudes in the treatment group was also supported by the selection of peer educators who were members of the school organization or Osis, they were real examples of active, communicative, accomplished students and liked by their peers, they were chosen because they were considered proficient and capable in terms of communication, and achievement. This is in accordance with the opinion of Wilson and Milburn (2000) who stated that positive role models can increase their self-confidence and also their peer groups in developing their ability to convey information to their peers with the end result of more positive attitude and behavior changes in preventing watching porn or phornograh. The success or failure of this peer educator program is also influenced by the situation and conditions in which this program is implemented, the academic atmosphere is influential and is the biggest support for the success of this program, including support from the school in facilitating these activities.

In terms of the material used, the media in the form of leaflets and flipcharts were made directly by the peer educators which were tailored to the objectives of this study, so that peer educators could easily convey them to their peer groups. According to the researcher, the suitability between the existing material and the delivery needs of watching porn prevention according to the researcher is appropriate, which is supported by Green and Kreuter (2000) who state that the information provided is the result of information obtained by someone after receiving intervention has an influence on someone's attitude and behavior. The material provided by peer educators is not only delivering information but emphasizes skills in carrying out narcolema prevention, starting from the exposure to the dangers and effects of narcolema which can damage the brains of adolescents who will watch it, then the peer educator exposes the peer group to be able to recognize the signs of watching porn addiction, most importantly the end of the peer educator provides exposure to the skills needed by a teenager to avoid watching

porn. This is in line with the opinion of Panuju (2018) that knowledge can switch to attitude if it has readiness in terms of messages conveyed through clear communication, is not wordy, does not offend and can arouse the enthusiasm and motivation of message recipients to act in accordance with the knowledge he has obtained, the role of peer age really supports a well-conveyed communication to the recipient of messages, including health messages.

The role of peer educators in making casual and informal communication greatly affects the improvement of one's attitude in reducing pornographic behavior situations. Effective communication carried out by peer educators in the intervention group was very supportive in increasing students' positive attitudes towards preventing pornography (Jenings and Perotte, 2014). This shows that the change in attitude that occurs is the effect of providing health promotion through peer educators. This is supported by Kamila and Siwiendrayanti (2010) in their research which states that the role of peer groups in increasing positive values in their peer group is very supportive for changing a person's values towards their healthy condition, strong beliefs and a support system that is formed to change someone's attitudes to ready to act in a more positive direction. In addition, the increase in attitudes in the treatment group was also influenced by the formation of groups through social media, namely WhatsApp which made it easier for peer educators to convey messages of prevention of pornography, through intense, private communication and led peer groups to have plenty of time to digest, compare, and choose positive facts from health education delivered by peer educators about the prevention of watching porn (Panuju, 2018).

Health behavior based on attitude then becomes an action taken by a person to maintain, achieve, or get optimal health in preventing disease. Through the peer educator method, health education delivered to the peer group gives an impression, is able to broaden horizons without feeling intimidated and inspires the peer group to better understand the importance of knowing about phornography, its dangers and how to prevent it. With the existence of health education through peer

educators really helps subjects in recognizing and taking appropriate action to avoid watching porn and its effects as early as possible, various obstacles are discussed and discussed by peer educators and peer groups so that subjects understand better the importance of preventive action of watching porn compared to before getting treatment through peer educators (Falace et al, 2019).

Based on the results of the analysis, the absence of an increase in the preventive attitude of watching porn in the control group occurred because there was no two-way communication that occurred during the transformation of health information about preventing the transmission of pornography, the control group subjects only received a module as independent reading material containing negative impact of watching porn and its prevention. In the process, the subject learns independently and is limited to reading only and there needs to be a high commitment to the subject to read, understand and repeat the contents of the module until it is understood (Menna et al. 2015). In addition, the control group experienced a decrease in the mean value of attitudes according to Falace et al. (2019) is due to the absence of two-way communication which allows the subject to be actively involved in the information exchange process, so that the information cannot be stored in the subject's memory for long. Active involvement between two or more people in the exchange of messages and information can be relatively long and relatively memorable. Limited knowledge will affect a person's attitude so as to create health action in accordance with the attitude stimulated by this limited knowledge. This is in accordance with Azizi et al. (2016) which states that the success of an education is influenced by the method of delivering messages and information, namely in the form of the characteristics of the subject receiving the message, the characteristics of the message giver and the characteristics of the message content delivered, all of which are strategies and methods to tools that support the success of the education activity. According to Sulidar (2017), the negative effects of social media used by students in communicating today include being negligent, wasting time, making friends who do not provide benefits

so this affects their mindset and attitude, anti-social and lazy to read. making health information difficult to open students' insights in preventing pornography addiction. In this study, there were several limitations so that the average subjective attitude in the control group did not change both before and after giving the module, from the subjects themselves who were reluctant to read the module until it was finished and there were some that they did not understand regarding the contents of the module, and also from Other subjects' information said that the length of the reading limit period for a week made them forget the contents of the module, this affected the results so that there was no change in attitude between before and after treatment in the control group. Teenagers who access social media in Indonesia have a higher percentage of interest in choosing books to read (Ibrahim et al, 2018).

Conclusion

Based on the theoretical basis and supported by data analysis of the research results, it can be concluded that there are significant differences in the mean statistically in the attitude of the treatment group who received the peer educator method compared to the control group by giving the module. The peer educator method is more effective than giving modules in improving the attitudes of junior high school students in Samarinda city in preventing pornography.

Based on the above conclusions, government institutions related to the health sector and junior secondary education institutions can improve health promotion in their institutions in delivering narcolema prevention through this peer educator method, by supporting and facilitating various peer educator activities, training and creating narcolema prevention volunteers in every educational institution. the first medium to support government programs in terms of comprehensive pornography prevention and in synergy with related parties and involving parents. This is expected to be the first and foremost milestone in terms of easy access to health information for young men and women. The more often they are exposed to information on the dangers of pornography through the role of peer educators, the easier it will be for

teenagers to improve their readiness and skills for pornography prevention in any situation and protect them from the harmful effects of pornography.

References

- Anisah N. (2016). *Efek Tayangan Pornografi di Internet Pada Perilaku Remaja di Desa Suka Maju Kecamatan Tenggarong Seberang*. eJournal Ilmu Komunikasi 4(1) : 115 – 124.
- Azizi,M., Gardeshi Z.H. and Hosseini Z.S. 2016. Influential Factors for the Improvement of Peer Educationin Adolescents ; A narrative Review. *Journal Pediatric Review : In Press (InPress): e7692*.
- Badan Kependudukan dan Keluarga Berencana (2017). Kurikulum dan modul pelatihan pemberian informasi KRR oleh pendidik sebaya
- Caron. F.,Godin. G.,Lambert. L.D.,Otis.J. 2013. Evaluation of a theoretically based AIDS/STD peer education program on postponing sexual intercourse and on condom use among adolescents attending high School. *Journal of Health Education Research*, Vol.19, 185-197.
- Falace,P., Aiese,P., Bianco. E., Bolognini. I., Costa.M.P., Esposito.R., Gallé,F., Liguori,G., Pandolfi,R., Pasquarella,C., Savino,G., Valeriani,F., Romano.S.V., and WDPP. 2019. Peer Education strategies for promoting prevention of doping in different populations. *Journals* Vol. 31, 556-575
- Green, LW., & Kreuter, MW. 2000. *Health Promotion Planning An Educational and Environmental Approach*, Institute of Health Promotion Research University of British California.
- Hilton & Watts. 2011. Pornography Addiction: A Neuroscience Prespective. *Journals of Surgical Neurology International*.
- Ibrahim I.Z., Rahmaniar., Zainal N.A., Mildawati, Rahmaliah A.Z.,(2018). Penyalahgunaan Sosial Media Pada Anak Di Bawah Umur Dalam Mengakses Pornografi.
- Jenings.,S. Howard and C. L. Perotte. 2014. Effect of a School – Based Sexuality EducationProgram on Peer Educator : The Teen PEP Model. *Journal of Health Education Research*, Vol. 29, 319 – 329.
- Kamila., N dan Siwiendrayanti. A. 2010. *Persepsi orang dengan HIV/AIDS terhadap peran kelompok dukungan sebaya*. KEMAS 6 (1), 36-34
- Kastlemen, Mark.B. (2012). *The Drug of The New Millenium* (Narkoba Millenium Baru). Yayasan Kita dan Buah Hati, Cetakan ke-2.
- Love.,T, Laier.,C, Brand.,M, Hatch.L., and Hajela. R.,2015. Neuroscience of Internet Pornography Addiction: A Review and Update. *Journals Behaviors Science*. Vol.5, 388-433.
- Mahat, G., Scoloveno, M.A., Ruales, N., Scoloveno, R. 2006. Preparing Peer Educators For Teen HIV/AIDS Prevention *Journal of Pediatric Nursing*, Vol.21 No.5, 378-384.
- Matthews BR. 2015. Memory dysfunction. *Continuum (Minneap Minn)*. Vol. 21:613-626.
- Menna.T, Ali Ahmed and Worku, A. 2015. Effect of peer education intervention on HIV/AIDS related sexual behaviors of secondary school in Addis Ababa, Ethiopia: a quasi-experimental study. *Journal Reproductive Health*.
- Panuju (2018). *Pengantar Studi (Ilmu) Komunikasi : Komunikasi sebagai kegiatan, komunikasi sebagai ilmu*. Edisi Pertama, Penerbit KENCANA Indonesia.
- Sulidar Fitri., (2017). Dampak Positif dan Negatif Sosial Media terhadap Perubahan Sosial Anak Tasikmalaya. *Naturalistic: Jurnal Kajian Penelitian Pendidikan dan Pembelajaran*, Vol.1 (2), 118-123.
- Supriati, Euis & Sandra Fikawati (2009). *Efek Paparan Pornografi Terhadap RemajaSMP Negeri Kota Pontianak*. *Jurnal Makara. Sosial Humaniora*, Vol. 13, No. 1 : 48-56.
- Walker S, Temple-Smith M, Higgs P, Sanci L. 2015. 'It's Always just there in your face' : Young People's views on porn. *Journal Sex Health*. 12:200-6.
- Wilson and Milburn. 2000. Understanding peer education : Insights from a process evaluation. *Journal of Health Education Research*. Vol. 15 no. 1, 85-96.
- Yayasan Kita & Buah Hati (2017). Panduan melindungi Anak dari Konten Pornografi.



Nutrition Status and Occupancy Density Compliance with Home Contact Pulmonary TB Incidence in Specialized Hospital of Pulmonary

Dahwan[✉], Fazidah Aguslina, Wirsal Hasan

S2 Public Health Sciences, Faculty of Public Health, University of North Sumatra

Article Info

Article History:
Submitted December 2019
Accepted April 2020
Published November 2020

Keywords:
Nutritional status, dwelling density, lung tuberculosis

DOI
<https://doi.org/10.15294/kemas.v16i2.22601>

Abstract

Pulmonary Tuberculosis is an important and serious public health problem throughout the world. It is caused by *Mycobacterium tuberculosis* which attacks lungs and other body organs. This study aimed to determine the effects of nutritional status and dwelling density on the risk of pulmonary TB incidence in Medan, North Sumatera. This was a case control study conducted at Pulmonary Disease Hospital, Medan, North Sumatera, from January to June in 2018. A sample of 120 patients was selected for this study, consisting 60 patients with TB and 60 patients without TB. The dependent variable was TB incidence. Data were collected through observations and interviews using questionnaires. Data was analyzed by bivariate using simple logistic regression test and multivariate by multiple logistic regression. The result showed poor nutritional status is closely associated with pulmonary TB infection. Impact of nutritional status and occupancy density on incidence of Pulmonary contact TB at Median Specialized Hospital in 2018.

Introduction

Tuberculosis is an infectious disease that is very dangerous and can cause death. This disease is caused by the bacteria *Mycobacterium Tuberculosis* (TBC). Most of the TB germs attack the lungs, but can also affect other organs (Kementerian Kesehatan RI, 2014). Until now, pulmonary TB is still a global public health problem and a world concern. In 2014 pulmonary TB killed 1.5 million, consisting of 890,000 men, 480,000 women and 140,000 children.

In 2016 the incidence of pulmonary tuberculosis has increased very rapidly by 10.4 million or 140 cases per 100,000 population, where the total population with age under or equal to 14 years is 1.05 million cases while the population over 14 years is 9,36 million cases. Compared to 2014 there were 9.6 million cases of pulmonary TB but only 6 million cases were reported, meaning that there were 3.6 million cases that were undiagnosed or unreported.

Meanwhile, globally there are 1.3 million deaths and 374,000 deaths due to tuberculosis with HIV per year. India, Indonesia and China are the countries with the highest number of new tuberculosis cases, namely 2.8 million 1.2 million and 979 thousand cases, respectively, from all new cases in the world throughout 2016.

In 2015, it was found that the number of tuberculosis cases was 330,910 cases, an increase compared to all tuberculosis cases found in 2014 which amounted to 324,539 cases. The highest number of cases reported was in West Java, East Java and Central Java Provinces. Tuberculosis cases in these three provinces account for 38 percent of the total number of new cases in Indonesia. North Sumatra Province is fourth after Central Java province (Kementerian Kesehatan RI, 2016).

Based on data from the Health Profile of North Sumatra Province, the discovery of pulmonary tuberculosis cases in 2014 was in

[✉] Correspondence Address:
Public Health Sciences, Faculty of Public Health, University of North Sumatra
Email: dahwanh.dh@gmail.com

accordance with the Case Notification Rate (CNR) figure of 122 per 100,000 population, while in 2016 it was 105 per 100,000 population and in 2017 the discovery of new cases of pulmonary TB in North Sumatra was 104 per 100,000 population, has decreased compared to 2014. For Medan City, the number of pulmonary TB cases was 2,829 cases in 2016. This figure has decreased compared to 2015 of 3,111 cases, where we can see the Case Notification Rate (NCR) figure in 2015 amounted to 294 per 100,000 population and in 2016 amounted to 287 per 100,000 population.

The main causes of the increasing problem of pulmonary tuberculosis include poverty in various groups of society, high economic growth but with too wide disparities and the burden of social determinants such as unemployment, low education levels, low per capita income which results in Community vulnerability to nutritional status which leads to pulmonary TB incidence (Kementerian Kesehatan RI, 2014).

Based on the medical record data of the UPT Specialized Pulmonary Hospital in 2014 to 2016, it can be seen that in 2014 the number of pulmonary TB patients was 237 patients, where the number of patients with a history of household contact was 71 patients or 29.95%. In 2015 the number of pulmonary TB patients was 214 patients, a history of household contacts was 66 patients or 30.84%, and in 2016 the number of pulmonary TB patients was 315 patients with a history of household contacts as many as 98 patients or 31, 11%.

The results of the initial survey conducted at the Specialized Hospital for Pulmonary of 15 patients with pulmonary TB indicated that 13 patients said they had household contact with pulmonary TB patients. A total of 11 patients said that their income was below Rp. 2.7 million / month and the nutritional status is also not good. The observations made also show that the occupancy of the house that is occupied does not meet the health requirements.

Based on this description, by looking at the phenomenon of the high incidence of pulmonary tuberculosis due to household contact at the UPT of the Special Hospital for Pulmonary, Health Service of North Sumatra Province, Medan, researchers are interested in

conducting research on "The Effect of Nutrition Status And Dwelling Density Compliance With Home Contact Pulmonary Tb Incidence In Specialized Hospital Of Pulmonary 2018".

Methods

This type of research is an observational study with a case control study design. This research was conducted at UPT. Specialized Pulmonary Hospital in the Health Office of North Sumatra Province, Medan. The case population was all patients who were diagnosed with pulmonary TB and confirmed smear positive and there was a history of home contact with pulmonary TB patients who were treated at the UPT. Medan Pulmonary Hospital. The control population was all patients who were declared not suffering from TB and confirmed negative smear and there was a history of home contact with pulmonary TB patients who were treated at the UPT.

The sample in this study consisted of case samples and control samples aged 15-64 years who were treated at the UPT. The Specialized Pulmonary Hospital in Medan were 60 (cases) and 60 (controls) where samples were taken by consecutive sampling. Data were collected through observation and interviews using a questionnaire. Bivariate analysis was performed using simple logistic regression test and multivariate analysis using multiple logistic regressions.

Result and Discussion

The results of this study were described in univariate, bivariate, and multivariate ways. The following is a deeper explanation of the data analysis methods used in this study:

Univariate analysis aims to determine the percentage of each frequency distribution, namely nutritional status and occupancy density. Table 1 explains that most of the respondents in the case and control groups have low nutritional status. The occupancy density in the majority of cases was dense, while in the control group, it was not dense.

The bivariate analysis used to determine the effect of nutritional status and occupancy density on the incidence of pulmonary tuberculosis in household contacts is by using the Simple Logistic Regression test. Table 2 shows that there is an effect of nutritional status and occupancy density on the incidence

of household contact pulmonary TB at the UPT. Specialized Pulmonary Hospital Medan. Table 3. Shows that nutritional status is the most influential variable in the incidence of household contact pulmonary TB at the UPT. Specialized Pulmonary Hospital in Medan with an OR value of 2.775 times (95% CI 1.254-6.139).

The Effect of Nutritional Status on Incidence of Household Contact Pulmonary TB

The results of this study indicate that there is an influence on nutritional status against the incident Pulmonary TB in-house

contact at a Specialized Pulmonary Hospital in Medan, where $p = 0.009$. The results of this study also showed that most of the respondents in the case group had a malnutrition status, namely 75%. The state of poor nutritional status is closely related to pulmonary TB infection. A person who has decreased nutrition will have a low immune system and is very susceptible to disease so that the immune response to infectious diseases decreases (Kementerian Kesehatan RI, 2011). There was a relationship between nutritional status and the incidence of pulmonary TB in North Sulawesi Province.

Table 1. Frequency Distribution of Respondents based on Nutritional Status and Occupancy Density

Variable	Cases		Control	
	n	%	n	%
Nutritional status				
Risky	45	75	31	51.7
Not risky	15	25	29	48.3
Occupancy Density				
Densely populated areas	41	68.3	27	45
Undensely populated areas	19	31.7	33	55

Source: Primary data 2018

Table 2. Effect of Nutritional Status and Occupancy Density on Incidence of Household Contacts Pulmonary TB

Variable	Pulmonary TB incidence				p	OR	95% CI
	Cases		Control				
	n	%	n	%			
Nutritional status							
Risky	45	75	31	51.7	0,009	2,806	1,295-6,081
Unrisky	15	25	29	48.3			
Occupancy Density							
Densely populated areas	41	68.3	27	45	0,011	2,637	1,252-5,554
Undensely populated areas	19	31.7	33	55			

Source: Primary data 2018

Table 3. Frequency Distribution of Multivariate Analysis with Multiple Logistic Regression Test

No.	Variable	B	p	OR	95% CI	
					Lower	Upper
1.	Nutritional status	1.021	0.012	2.775	1.254	6.139
2.	Occupancy density	0.959	0.014	2.608	1.212	5.612
3.	Constant	-1.198	0.003			

Source: Primary data 2018

Malnutrition can increase the development of active TB and active TB causes malnutrition to get worse.

The prevalence of malnutrition in pulmonary TB patients is quite high, especially in developing countries, including Indonesia. A high proportion of TB patients are malnourished. TB patients are very vulnerable to malnutrition and even the very distal reasons for malnutrition in society are proximal causes for TB patients (Feleke et al., 2019). Shukla et al. (2019) stated the proportion of severe malnutrition among pulmonary TB patients. There is an urgent need for the provision of appropriate nutritional management and hospital counseling of TB in hospitals according to national nutrition guidelines for TB patients. Poor nutrition in pulmonary tuberculosis patients can be caused by anorexia, impaired nutrient absorption, or increased body catabolism. Malnutrition in pulmonary tuberculosis patients if not identified immediately will cause more serious health problems, such as an increase in mortality (Dargie et al., 2016).

The relationship between TB and malnutrition is two-way, TB makes patients malnourished and malnutrition increases the risk of developing active TB by 6 to 10 times (Bhargava et al., 2014). The World Health Organization (2013) stated that a quarter of TB in the world is a result of malnutrition improving individual nutritional status reduces the risk of TB.

Tuberculosis can reduce energy intake caused by changes in metabolism due to decreased appetite as part of the inflammatory response and immunity (Mehta, 2016). A study in Uganda found that there was a decrease in a number of nutrients, consisting of macronutrients and micronutrients, such as carbohydrates, energy, protein, total fat, calcium, vitamin A, and folate in pulmonary TB patients (Mupere et al., 2012). The high incidence of malnutrition can be caused by several things such as bad food habits, ignorance of nutritious and balanced food intake, and low educational background (Chatterjee et al., 2015).

(Oktavia et al., 2016) stated that the proportion of the nutritional status of respondents who were underweight (body weight less than BMI) in the case group was

81.8% while in the control group it was 21.2%. The proportion in the case group was almost four times that of the control group with an OR value of 16.7 (95% CI 4.95 -56.39). People with poor nutritional status have an increased risk of developing pulmonary TB 16.7 times than respondents with normal / excess nutritional status. There was a statistically significant relationship between nutritional status and the incidence of pulmonary tuberculosis (p-value 0.001).

The state of poor nutritional status is closely related to pulmonary TB disease. Decreased nutrition or malnutrition will have low body resistance and are very susceptible to disease so that the immune reaction against infectious diseases decreases. Increasing the social economy level and increasing body resistance by eating a balanced nutritional diet can improve a person's nutritional status so as to avoid pulmonary TB disease (Kementerian Kesehatan RI, 2011).

Research conducted by Nurwitasari and Wahyuni (2015) concluded that contact history, length of contact, and closeness influenced the incidence of child tuberculosis in Jember Regency. It is necessary to actively search for new cases to break the chain of transmission of tuberculosis infection with in-house contact checks as early as possible.

The Effect of Occupancy Density on the Incidence of in-House Contact of Pulmonary TB

The environment is one of the risk factors that influence the incidence of pulmonary TB, especially in densely populated areas. This study explains that there is an effect of occupancy density on the incidence of pulmonary TB in household contacts who seek treatment at the Specialized Hospital for Pulmonary in Medan. Based on the results of this study, the occupancy density variable in the case sample mostly had a density of occupancy that did not meet the requirements or was dense, namely 68.3% and the control was 45%, which met the requirements or was not crowded in the case sample by 31.7% while the control was equal to 55%. The results of the simple logistic regression analysis showed p value = 0.011, the results of multivariate analysis using the enter method obtained OR = 2.645; 95% CI

1,031-6,788 means that the variable occupancy density has a significant effect on the incidence of household contact pulmonary TB.

This is in line with the research of Wulandari et al. (2015) explained that there was a relationship between occupancy density and the incidence of pulmonary TB in Kendal Regency, Central Java with a p value of 0.001. Mawardi and Indah (2014) also stated that there was a relationship between occupancy density and pulmonary TB disease in Kapuas District. Research conducted by Hill et al. (2006) in The Gambia show that household overcrowding and previous household exposure to known TB cases are prominent risk factors for TB disease. Prihanti and Rahmawati (2017) also mentioned a relationship between occupancy density and the incidence of pulmonary TB. The results showed that in the case group there were 23 people (69.7%) with a density of residents who did not meet the requirements, while in the control group there were 30 people (90.9%) with a density of residents who met the requirements.

The physical conditions of the home environment that are related to the incidence of pulmonary tuberculosis are occupancy density, natural ventilation and natural lighting, both in the dominant room and the respondent's bedroom (Deny, 2014). Occupant density is a risk factor for pulmonary TB. The denser the house, the easier and faster transfer of disease through the air, if there is a family member suffering from TB with positive AFB who accidentally coughs. Pulmonary TB bacteria will stay in the air for approximately 2 hours so that they have the possibility to transmit the disease to members who have not been exposed to these bacteria. The results of this study are consistent with research in India that a contaminated household environment increases the risk of Tuberculosis in India (Singh et al., 2018).

The results of this study are in line with research conducted by Anggraeni and Rahayu (2018) showing that occupancy density ($p = 0.007$), ventilation ($p = 0.003$), and nutritional status ($p = 0.030$) are associated with clinical symptoms of tuberculosis in families with tuberculosis AFB positive. The conclusion of this study is that there is a relationship between

occupancy density, ventilation, and nutritional status with clinical symptoms of tuberculosis. The residence of most of the pulmonary TB sufferers has not met the criteria for a healthy home in terms of occupancy density, lighting, ventilation, and humidity (Suharyo, 2013).

The case group that has a densely populated house must make good use of air ventilation in the form of the habit of opening windows every day, especially in the morning, having separate eating or drinking utensils for TB sufferers and not throwing phlegm in random places to prevent pulmonary TB transmission to other family members. A healthy home must have good ventilation because as a function of keeping the air flow fresh, freeing room air from bacteria, and keeping the room in optimum humidity.

A house with an unhealthy condition or not meeting health requirements can be a medium for transmitting respiratory diseases, one of which is pulmonary tuberculosis. This disease can be exacerbated by poor housing sanitation conditions, especially in dense settlements and poor people. Research conducted by Aditama et al. (2019) showed that occupancy density and ventilation were the biggest risk factors for pulmonary tuberculosis in the Lhoong CHC Aceh Besar district in 2018. Muslimah (2019) concluded that there was a relationship between temperature, humidity and lighting with the presence of *Mycobacterium tuberculosis* in the room air get together.

Occupancy density is also closely related to a person's socio-economic factors, because a small income makes people unable to live properly that meets health requirements. Dye et al. (2009) argued that TB transmission and development was largely driven by social factors such as poor living conditions and malnutrition. Standards for public housing are basically aimed at providing adequate housing in the form of design, location and size of the room, as well as other facilities in order to meet family needs or to fulfill the requirements of a healthy and pleasant home. A bad house or place of residence or slum can support the transmission of diseases and health problems such as pulmonary TB. Muchsin et al. (2019) argued that to break the chain of pulmonary TB

transmission, it is necessary to increase public awareness about the importance of healthy living habits and a healthy home by providing health education about the requirements for good nutritional status and ventilation.

The results of the study (Rohayu et al., 2017) shown that there is a relationship between occupancy density and the incidence of pulmonary TB. These results indicate that the size of the room in a house is closely related to the incidence of pulmonary tuberculosis. The largest incidence of pulmonary tuberculosis is caused by conditions in the house that do not meet the requirements for the size of the room. The results of this study indicate that the proportion of respondents whose occupancy density does not meet the requirements is more, namely 21 respondents (52.5%) compared to respondents whose occupancy density meets the requirements of 19 respondents (47.5%). The occupancy density that did not meet the requirements but did not suffer from positive smear pulmonary TB in the control group there were several respondents, this was due to a low economic situation so that there were still many respondents consisting of 2 heads of families (KK) living in one house with no density conditions meet the requirements of $<9 \text{ m}^2 / \text{person}$, based on information obtained by researchers in the field that this is also supported by the habit of respondents opening windows in the morning besides that some respondents also live a healthy lifestyle and have a history of low-risk contacts, while in the case group there are several respondents who have occupancy densities that meet the requirements but suffer from smear positive pulmonary TB, this is due to a lack of understanding of the transmission of pulmonary TB disease. Contact history and occupancy density are risk factors for pulmonary TB.

The results of research by Oktavia et al. (2016) also obtained an OR value of 4.3 (95% CI 1.38-12.94), indicating that homes with high occupancy densities have a 4.3 times risk of experiencing pulmonary TB incidence compared to densely populated homes. A house with a high occupancy density increases the risk of getting pulmonary TB by 1.38 to 12.94 times compared to a less dense occupancy. In conclusion, with a p-value of $0.016 < \alpha 0.05$,

it means that there is a statistically significant relationship between occupancy density and the incidence of pulmonary tuberculosis. This research is supported by the results of research conducted by Fitriani (2013) showing the results of the chi-square analysis, obtained a p value of 0.000 and an OR value of 5.4 (95% CI 1.885-15.637), meaning that there is a relationship between environmental conditions and the incidence of pulmonary tuberculosis and poor environmental conditions have a 5.4 times risk of increasing the incidence of pulmonary TB.

Conclusion

There is an effect of nutritional status on the incidence of contact pulmonary TB in a specialized pulmonary hospital in Medan and the state of malnutrition status is closely related to pulmonary TB infection. Environmental factors are one of the risk factors that influence the incidence of pulmonary TB, especially in densely populated areas. Occupancy density is also related to a person's socio-economic factors, because a small income makes people unable to live properly and meet health requirements.

References

- Aditama, W., Sitepu, F.Y., & Saputra, R., 2019. Relationship between Physical Condition of House Environment and the Incidence of Pulmonary Tuberculosis, Aceh, Indonesia. *International Journal of Science and Health Care Research*, 4(1),pp.227-231.
- Anggraeni, D.E., & Rahayu, S.R., 2018. Gejala Klinis Tuberkulosis pada Keluarga Penderita Tuberkulosis BTA Positif. *HIGEIA (Journal of Public Health Research and Development)*, 2(1),pp.91-101.
- Bhargava, A., Oxlade, O., & Pai, M.D., 2014. Undernutrition and the Incidence of Tuberculosis in India: National and Subnational Estimates of the Population Attributable Fraction Related to Undernutrition. *National Medical Journal of India*, 27(3),pp.128-33.
- Chatterjee, K., Ray, S., Das, B., Bhuniya, D.K., & Dash, S.S., 2015. Study of the Nutritional Status of High School Students from Medinipur Sadar Subdivision, Paschim Medinipur District, West Bengal, India. *The International Journal of Science and Technology*, 3(5),pp.137.
- Dargie, B., Tesfaye, G., & Worku, A., 2016. Prevalence and Associated Factors of Undernutrition Among Adult Tuberculosis Patients in Some Selected Public Health Facilities of Addis

- Ababa, Ethiopia: A Cross-sectional Study. *BMC Nutrition*, 2(1),pp.7.
- Deny, A., 2014. Hubungan Kondisi Fisik Lingkungan Rumah dengan Kejadian Tuberkulosis Paru di Wilayah Kerja Puskesmas Perumnasi dan II Kecamatan Pontianak Barat. *Jurnal Mahasiswa PSPD FK Universitas Tanjungpura*, 1(1).
- Dye, C., Lönnroth, K., Jaramillo, E., Williams, B., & Raviglione, M., 2009., Trends in Tuberculosis Incidence and Their Determinants in 134 Countries. *Bulletin of the World Health Organization*, 2009, 87683-691.
- Feleke, B.E., Feleke, T.E., & Biadlegne, F., 2019. Nutritional Status of Tuberculosis Patients, A Comparative Cross-sectional Study. *BMC Pulmonary Medicine*, 19(1):pp.182.
- Fitriani, E., 2013. Faktor Risiko Yang Berhubungan Dengan Kejadian Tuberkulosis Paru (Studi Kasus di Puskesmas Ketanggungan Kabupaten Brebes Tahun 2012). *Unnes Journal of Public Health*, 2(1).
- Hill, P.C., Jackson-Sillah, D., Donkor, S.A., Otu, J., Adegbola, R.A., & Lienhardt, C., 2006. Risk Factors for Pulmonary Tuberculosis: A Clinic-based Case Control Study in The Gambia. *BMC Public Health*, 6(1),pp.156.
- Kemenkes, RI., 2011. *Strategi Nasional Pengendalian TB di Indonesia 2010-2014*. Jakarta: Direktorat Jenderal Pengendalian Penyakit dan Penyehatan Lingkungan Kementerian Kesehatan RI.
- Kemenkes RI., 2014. *Pedoman Nasional Pengendalian Tuberkulosis*. Direktorat Jenderal Pengendalian Penyakit dan Penyehatan Lingkungan, Kementerian Kesehatan Republik Indonesia
- Kemenkes RI., 2016. *Profil Kesehatan Indonesia Tahun 2015*. Jakarta: Pusat Data dan Informasi Kementerian Kesehatan RI.
- Mawardi., & Indah, M.F., 2014. Hubungan Kondisi Fisik Rumah dan Kepadatan Hunian dengan Kejadian TB Paru Di Wilayah Kerja Upt Puskesmas Dadahup Kecamatan Dadahup Kabupaten Kapuas. *An-Nadaa: Jurnal Kesehatan Masyarakat*, 1(1),pp.14-20.
- Mehta, M., 2016. Impact of Nutrition Education on Pulmonary Tuberculosis Patients. *Global Journal for Research Analysis*, 5(6),pp.317-320.
- Muchsin, M., Siregar, F.A., & Sudaryati, E., 2019. The Influence of Nutritional Status and Ventilation on the Incidence of Pulmonary Tuberculosis at Langsa. *Open Access Macedonian Journal of Medical Sciences*, 7(20).
- Mupere, E., Parraga, I.M., Tisch, D.J., Mayanja, H. K., & Whalen, C.C., 2012. Low Nutrient Intake Among Adult Women and Patients with Severe Tuberculosis Disease in Uganda: A Cross-sectional Study. *BMC Public Health*, 12(1),pp.1050.
- Muslimah, D., 2019. Keadaan Lingkungan Fisik Dan Dampaknya Pada Keberadaan Mycobacterium Tuberculosis: Studi Di Wilayah Kerja Puskesmas Perak Timur Surabaya. *Jurnal Kesehatan Lingkungan*, 11(1),pp.26.
- Nurwitasari, A., & Wahyuni, C.U., 2015. Pengaruh Status Gizi dan Riwayat Kontak Terhadap Kejadian Tuberkulosis Anak di Kabupaten Jember. *Jurnal Berkala Epidemiologi*, 3(2),pp.158-169.
- Oktavia, S., Mutahar, R., & Destriatania, S., 2016. Analisis Faktor Risiko Kejadian TB Paru di Wilayah Kerja Puskesmas Kertapati Palembang. *Jurnal Ilmu Kesehatan Masyarakat*, 7(2).
- Prihanti, G.S. & Rahmawati, I., 2017., Analisis Faktor Risiko Kejadian Tuberkulosis Paru. *Saintika Medika: Jurnal Ilmu Kesehatan dan Kedokteran Keluarga*, 11(2),pp.127-132.
- Rohayu, N., Yusran, S., & Ibrahim, K., 2017. Analisis Faktor Risiko Kejadian TB Paru BTA Positif pada Masyarakat Pesisir di Wilayah Kerja Puskesmas Kadatua Kabupaten Buton Selatan Tahun 2016. *Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat*, 1(3).
- Shukla, A., Pandey, S., Singh, S., & Sharma, J., 2019. Nutritional Status of Pulmonary Tuberculosis Patients: A Hospital-based Cross-sectional Study. *Indian Journal of Community and Family Medicine*, 5(2),pp.134.
- Singh, S., Kashyap, G.C., & Puri, P., 2018. Potential Effect of Household Environment on Prevalence of Tuberculosis in India: Evidence from the Recent Round of a Cross-sectional Survey. *BMC pulmonary medicine*, 18(1),pp.66.
- Suharyo., 2013. Determinasi Penyakit Tuberkulosis di Daerah Pedesaan. *KEMAS: Jurnal Kesehatan Masyarakat*, 9(1),pp.85-91.
- Wulandari, A.A., Nurjazuli, N., & Adi, M.S., 2015. Faktor Risiko dan Potensi Penularan Tuberkulosis Paru di Kabupaten Kendal, Jawa Tengah. *Jurnal Kesehatan Lingkungan Indonesia*, 14(1),pp.7-13.



The Acupuncture Effect for Low Back Pain; Biochemical and Protein Profile Analysis

Suwaji Handaru Wardoyo✉, Solichan Badri

Acupuncture Department, Health Polytechnic of Health Ministry Surakarta

Article Info

Article History:

Submitted December 2019

Accepted April 2020

Published November 2020

Keywords:

Acupuncture, LBP, SDS-PAGE, total protein.

DOI

<https://doi.org/10.15294/kemas.v16i2.22650>

Abstract

Low back pain (LBP) is one of the common symptoms experienced by some of the world community. Acupuncture as a method of healing a disease offers a solution for LBP symptom. This study aimed to determine the effect of acupuncture with local and Yamamoto New Scalp Acupuncture (YNSA) points with biochemical analysis related to total protein, albumin, and globulin, and analysis of blood serum protein profiles using the SDS-PAGE method. This research was conducted using sterile acupuncture needles that inserted in patients with several local points, namely BL22 (Sanjiaoshu), BL23 (Shenshu), BL24 (Qihaihu), BL25C (Dachangshu), and BL26C (Guanyuanshu) and combined with the YNSA points through somatotope D points and extra lumbar points H and I. Blood serum was collected for total protein, albumin, and globulin analysis. That blood serum was also used for protein profile analysis using Sodium Dodecyl Sulfate Polyacrylamide Gel Electrophoresis (SDS-PAGE) method. The results showed that six times of acupuncture treatments gave positive correlation in total protein, albumin, and globulin. Analysis of blood serum protein profiles using SDS-PAGE showed a protein band of about 12 KDa and it might be an interleukin-13 protein. The results were expected can be useful as scientific information especially related to acupuncture for LBP treatment and this of about 12 KDa protein band can be used as biomarker candidates for the symptoms.

Introduction

LBP is a common complaint or symptom of musculoskeletal for everyone. This symptom generally occurred from the lower rib margins and the buttock creases (Dionne et al., 2008) and limitations or impossibilities in comparing or summarizing prevalence figures from different studies. Back pain definitions were identified from 51 articles reporting population-based prevalence studies, and dissected into 77 items documenting 7 elements. These items were submitted to a panel of experts for rating and reduction, in 3 rounds (participation: 76% and this is to be one of the most causes of disability in the world (Vos et al., 2016) a trend largely attributable to an epidemiological transition in many countries from causes affecting children, to non-communicable diseases (NCDs). LBP often occurred in the medium to

low end income of society such as in Asia and Africa people (Hoy et al., 2015) limitations and lessons learned from estimating the burden from musculoskeletal (MSK). In Indonesia, musculoskeletal disorders were many reported, one of them was in batik workers (Sumardiyo & Ada, 2014).

Acupuncture therapy uses effective and significant puncture points to reduce LBP. This is caused by the pricking of acupuncture points at the particular points which can affect the nociceptive, proprioceptive and autonomic nerve pathways. Acupuncture therapy can increase enkephalin and dinorphine in the local area around the waist and at the same time have a segmental effect to send impulses to the midbrain so that it can increase endorphins in the pituitary hypothalamus. Enkephalin flow in the midbrain can also stimulate the release

✉ Correspondence Address:
Acupuncture Department, Health Polytechnic of Health Ministry Surakarta,
Surakarta 57127, Indonesia
Email: suwajihandaru@gmail.com

of monoamine, serotonin and norepinephrine in the lower waist so that it can inhibit pain, including musculoskeletal pain (Audette & Ryan, 2004) arthritis, carpal tunnel syndrome, fibromyalgia, and upper extremity tendinitis. Randomization, appropriate sample size, and blinding using more sophisticated sham procedures raise the quality of the studies from a scientific, methodologic point of view. In addition, realistic treatment frequency and duration of some of the more recent studies have resulted in more favorable outcomes. Much work still has to be done, however, to find ways to preserve the clinical authenticity of acupuncture treatment methods when brought into the light of a research protocol. Attempts have been made to find a method of maintaining the standardization and reproducibility of a research protocol, while allowing the kind of flexible treatment that normally would be applied in a clinical setting. Other questions that should be answered with future studies include understanding how treatment length influences outcome, if maintenance treatments are needed for chronic conditions, and cost and risk comparisons with standard pharmacologic treatment. In addition, future studies need more overt statements of the rationale for the treatment method used (eg, were Chinese or Japanese diagnostic methods used for point selection, what needling technique was used, was the De Qi sensation elicited).

Several local points of acupuncture, such as BL-22, BL-23, BL-24, BL-25, and BL-26, were reported to be one choice for curing LBP (S. H. Lee et al., 2013). Next, related to LBP Japanese practice of craniopuncture microsystem, YNSA, is differ to Chinese one called by Chiao Shun Fa. This YNSA method of puncture only a tip of needle and concentrated in the forehead. Even though it seems simple method but it reported to be more effective in reducing pain compared to Chiao Shun Fa (S.-J. Lee, Shin, Lee, Han, & Kim, 2013).

Acupuncture combination therapy between local points and YNSA has a dual effect in reducing low back pain. Acupuncture therapy using a combination of local points and YNSA works through four domains, namely: 1) local inflammatory reaction, 2) intercellular meridian transduction, 3) cutaneousomato viscera reflex,

and 4) neural transmission to the brain (neuro acupuncture). Local inflammatory reactions are characterized by vasodilation. Intercellular transduction of meridians is characterized by the exchange of electric ions in the meridian pathway. The cutaneousomato viscera reflex is characterized by activating the pain modulation system by suppressing the transmission and perception of pain stimulation at different levels in the central nervous system. Therefore, this combination of therapies is excellent in decreasing musculoskeletal pain (Gellman, 2014; Ma & Cho, 2004; Saputra & Sudirman, 2009).

Serum is known as part of blood after removing of clotting factor, on the other hand, blood plasma is still there. Burtis & Ashwood (2001) reported that serum contains macromolecules such as proteins (amino acids), carbohydrates (sugars), and lipids. Albumin and globulin especially immunoglobulins make up blood serum, next to secreted and synthesized proteins (Kennedy, 2001; Schrader & Schulz-Knappe, 2001). Geyer et al., (2017) classified serum protein into three classes, i.e related to house-keeping function such as albumin, related to oxidation condition such as aspartate aminotransferase, and related to hormones such as cytokines. Both serum and plasma were reported to be important for biomarkers of many diseases (Dayon & Kussmann, 2013; Rajandram et al., 2014; White et al., 2014), but the diagnosis using serum is more accurate due to the absence of a blood clotting factor.

The biochemical parameters can explain the mechanism of pain, establish diagnosis and handle it appropriately. One measurement that can determine the therapeutic effect of pain management is to look at the biochemistry of one kind of protein called by cytokines or endorphins. Cytokine measurements can explain the mechanism of pain and subsequent actions in patients (Kaufman & Carl, 2013). Siswantoyo (2012) reported that exercise stressors can increase beta endorphin levels by 4.24 ng.ml⁻¹. To date, biochemical analysis of acupuncture therapy in patients with LBP has not been reported yet.

A human's health condition can be seen in various ways such as using protein analysis. This analysis can show a disturbance that

occurs in someone they are not even aware of because it gives a description of protein activity in a human's body at a certain time. Thus, by comparing with healthy and sick human as positive and negative control respectively, it can be seen that proteins can be as a biomarker candidates for certain diseases. One method of protein analysis that is simple and can provide a general description of human health is the SDS-PAGE method. This method although included into traditional method but is now still widely used (Adhitya, Ernawati, & Plumeriatuti, 2013; Liu et al., 2015).

Measurement of serum protein profiles in LBP cases to date has also not been reported yet. Based on these facts, it is necessary to conduct biochemical analysis and characterization of serum protein profiles in LBP patients receiving acupuncture therapy to investigate of total protein, albumin, and globulin for biochemical analysis and SDS PAGE method for serum protein profiles analysis.

Methods

Acupuncture treatment with local and YNSA points was done with sterile acupuncture needles that are inserted in patients with several local points, namely BL22 (Sanjiaoshu), BL23 (Shenshu), BL24 (Qihaihu), BL25C (Dachangshu), and BL26C (Guanyuanshu). That acupuncture therapy later was combined with the YNSA points through somatotope D points and extra lumbar points H and I.

Retrieval of serum protein samples was carried out through the brachial vein using an intravenous serum that had anticoagulant ethylene diamine tetra acetic acid (EDTA) or heparin at 0 and 6th times of acupuncture treatments. The blood was taken as much as 5 ml and then stored in the box to be stored further in the temperature of -20°C until the next step of protein extraction was started.

Blood serum of patients was investigated for its total protein, albumin, and globulin with Sinnowa 3000P machine. That blood serum was also investigated for its protein profiling using SDS-PAGE methods. Protein separation was done using SDS-PAGE method that consists of three stages, namely 1) protein extraction stage, 2) gel making and 3) protein separation through 1-D electrophoresis. Protein extraction was started by addition of ethanol solution on

samples following the centrifugation step at 13000 rpm. Supernatant was used for further analysis and called as soluble protein. Soluble protein concentrations were determined using the Bio-rad method. For SDS-PAGE analysis, protein samples along with markers each with a final volume of 25 µL and 5 µL were injected into gel well and electrophoresis was performed at 100 volt for 2 hours. The next steps were staining with Coomassie brilliant blue 0.1%, destaining, and storage in glacial acetic acid 10%. Analysis of the protein profiles that appear on the SDS-PAGE gel was carried out by identifying the molecular weight (MW) of protein bands formed in each sample and analyzed using ImageJ software (<https://imagej.nih.gov/ij/>).

Results and Discussions

In general, it can be seen that acupuncture therapy as many as six times can normalize total protein, albumin, or globulin. Normal level of total protein is around 6.0 to 8.0 g.dL⁻¹, normal level of albumin is around 3.5-5.0 g.dL⁻¹, and normal level of globulin is around 2.5-3.0 g .dL⁻¹ (Busher, 1990). Normal levels of total protein, albumin, and globulin will have an impact on improving the quality of health, which in this study is related to LBP.

Albumin and globulin in blood serum can be a sign of one's health. Albumin is known as one of the proteins contained in the blood and is produced in the liver. Next, globulin is also produced in the liver and is included in one component of self-defense. Both globulin and albumin are globular proteins (fetoproteins) that have many functions for body, such as catalisator (enzymes), signal transduction, and regulation.

The low ratio of both was reported to be related to the presence of breast cancer (Azab et al., 2013) and stomach cancer (Bozkaya et al., 2018). This condition was based on the fact that albumin and globulin constitute the largest portion of blood serum (K. Li, Fu, Bo, & Zhu, 2018) and albumin can be correlated with inflammatory condition (Ferrer et al., 2018). It was also thought that globulin can be a marker for inflammation due to the fact that some pro-inflammatory related proteins are present in globulin such as interleukin (interleukin 6 and 1β) and tumor necrosis factors (G. Li et

Tabel 1. Measurement of Total Protein, Albumin, and Globulin before and after Acupuncture Treatments

No	Name	Measurement	Total Protein	Albumin	Globulin	Evidence
1.	Mrs. A	Before	7.4	5.0	2.4	Total protein at below normal level
		After	7.2	4.5	2.7	Normal level
2.	Mrs. B	Before	8.0	4.5	3.5	Total protein at high level
		After	8.2	5.0	3.2	Trend globulin from high level --> normal
3.	Mrs. C	Before	7.2	4.7	2.5	Total protein at below normal level
		After	7.0	4.2	2.8	Normal level
4.	Mr. A	Before	7.2	4.8	2.4	Total protein stable
		After	7.2	4.0	3.2	Trend globulin at high level --> normal
5.	Mr. B	Before	8.6	5.4	3.2	Total protein at below normal level
		After	8.1	4.6	3.5	Tren albumin decreased --> normal
6.	Mr. C	Before	6.9	5.4	1.5	Total protein at below normal level
		After	6.8	4.6	2.2	Tren albumin decreased. Globulin increased --> normal

al., 2018; Simó, Barbosa-Desongles, Lecube, Hernandez, & Selva, 2012). Next, one kind of globulin, IgE, was also reported has positive correlation with allergy on poultry’s workers (Wijayanti, Sutomo, Astuti, & Asmara, 2018).

Acupuncture was also to be one choice for LBP’s treatment with varieties of its methods. The local point methods treatment was reported to be important to LBP patients in Korea following to distal point on the meridian of pain area(Yong-Suk, 2010). Matsubara et al., (2011) was also reported the benefit of local and distal points method of acupuncture for

chronic neck pain in females. In same hand, YNSA method was also reported to be more effective than sham treatment on acute non-specific LBP (Hasegawa, Baptista, de Souza, Yoshizumi, & Natour, 2013). A combination of local points and YNSA was used in this study based on Yatmihatun, Badri, & Wardoyo, (2019) that showed combination of local points and YNSA method can reduce LBP pain faster than the treatment of each of the two types of therapy. These all studies proved both local points and YNSA acupuncture were useful for back pain.

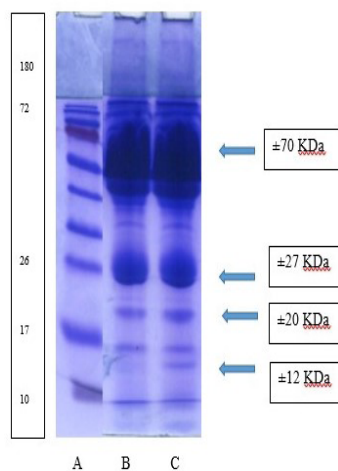


Figure 1 Protein profile using SDS-PAGE of sick and healthy control from human blood serum. Marker (A); sick control (B); healthy control (C).

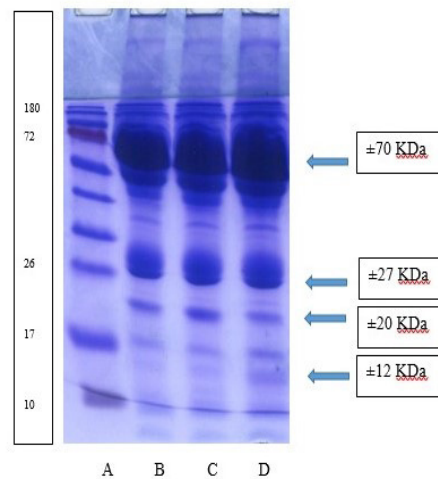


Figure 2 Protein profile using SDS-PAGE before acupuncture therapy, Marker (A); samples (B-D)

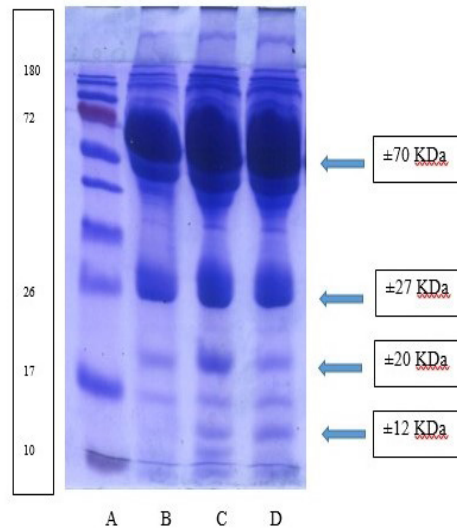


Figure 3 Protein profile using SDS-PAGE after acupuncture therapy, Marker (A); samples (B-D)

Protein bands with molecular weight of around 12 KDa were not seen in sick controls but were clearly seen in healthy control (Figure 1). This result showed the possibility of anti-inflammatory related protein was occurred in healthy control so that there were many anti-inflammatory related proteins that were estimated to be of about 12 KDa. The similar results were also seen in LBP patients' blood serum before and after acupuncture treatment as much as six times (Figures 2 and 3), i.e. enhancement in the intensity of the protein band thickness of about 12 KDa in blood serum

that had experienced acupuncture therapy as much as six times. This was predicted along with an enhancement in the amount of protein associated with anti-inflammation protein due to the reduction in inflammation.

A protein with a molecular weight of around 12 KDa is thought to be a candidate of biomarker of healthy control and patients with LBP. This band of around 12 KDa is thought to be an interleukin 13 protein known as anti-inflammatory protein. These proteins were included into cytokines members and were reported to be made by TH2 cells and secreted

by helper T cells, mast cells, NK cells (Gomes et al., 2016). These proteins were closely related to anti-inflammatory protein which has been proven in vitro and ex vitro.

Interleukin was one kind of cytokines that associated with immune system. One kind of interleukin, Interleukin 13, was reported to be associated with innate immunity type-2, next to interleukin 4 (Bao & Reinhardt, 2015) and belongs to anti-inflammatory cytokines. Locati et al., (2013) was reported that interleukin 10 was also associated with them. On other hand, interleukin [IL]-1 β , IL-6, and tumor necrosis factor alpha (TNF- α) were reported to be pro-inflammatory interleukin on systemic lupus erythematosus (Umare et al., 2014).

Interleukin 13 was reported to be associated with a reduction in the risk of cardiac injury due to viral myocarditis through activation of M2 macrophage cells (Yang, Chen, & Gao, 2017). The amount of this protein was correlated to asthma and diseases related to eosinophil cells (Doran et al., 2017). Martinez-Nunez, Louafi, & Sanchez-Elsner, (2011)pro-Th 1 also reported that interleukin-13 was also involved in human macrophages immunity.

Furthermore, for constitutive proteins, there were at least 3 protein bands, which were of around 20 KDa, 27 KDa, and 70 KDa. The three protein bands were thought to be stress-related types of proteins (heat shock proteins) i.e. Hsp20, Hsp27, and Hsp70. The Hsp20 and Hsp27 proteins are also known as HspB6 and HspB1 which are one type of small Hsp protein classified as Class I. The main difference between the two was Hsp20, that was found in muscles so that it was closely related to muscle relaxation, whereas Hsp27 is found in the cytoskeleton (Bakthisaran, Tangirala, & Rao, 2015)keeping them in a folding-competent state and refolding them by themselves or in concert with other ATP-dependent chaperones. Mutations in human sHsps result in myopathies, neuropathies and cataract. Their expression is modulated in diseases such as Alzheimer's, Parkinson's and cancer. Their ability to bind Cu²⁺, and suppress generation of reactive oxygen species (ROS. Hsp20 was reported to play a role in the protection of hepatocellular carcinoma (HCC) by blocking the proliferation stage through the formation

of a cascade cascade on HCC cells (Nagaswara et al., 2014). Hsp 20 and Hsp27 proteins were reported to have a function in apoptosis, namely in the event of Hella cell apoptosis inhibition through inhibition of cytochrome c release from mitochondria and activation of caspase 3 (Nahomi, DiMauro, Wang, & Nagaraj, 2015) when the cells were thermally stressed, the peptide was translocated from the cytoplasm to the nucleus. The two peptides inhibited apoptosis in HeLa cells by blocking cytochrome c release from the mitochondria and caspase-3 activation. We found that scrambling the last four amino acids in the two peptides (KAIV in Hsp20 and KTLV in Hsp27. In addition to the two proteins, the Hsp70 protein was also thought to be a constitutive protein in this study. This protein was found in the cytosol, nucleus, endoplasm and mitochondrial reticulum, and also extracellular (Turturici, Sconzo, & Geraci, 2011). This protein was also reported to have a role immunomodulation function and related to histocompatibility complex (MHC) in human (Radons, 2016)protein import into organelles, recovering of proteins from aggregation, and assembly of multi-protein complexes. These chaperones augment organismal survival and longevity in the face of proteotoxic stress by enhancing cell viability and facilitating protein damage repair. Extracellular HSP70s have a number of cytoprotective and immunomodulatory functions, the latter either in the context of facilitating the cross-presentation of immunogenic peptides via major histocompatibility complex (MHC).

Electrophoresis is known as a protein separation method and can be used for early detection of a disease. Protein separation using the electrophoresis "Sebia" method can be used in the pathological detection of human blood serum (Rostini & Rita, 2009). Nevertheless, SDS-PAGE as one of the simple electrophoresis methods, can also be used for getting scientific information about disease or symptom, and here we proved that the SDS-PAGE can be useful for that especially in LBP symptom.

Conclusions

Six times acupuncture therapy using combination of local and YNSA points can normalize total protein, albumin, and globulin in LBP patients. Protein analysis using SDS-

PAGE showed that there was of about 12 KDa protein bands which later might be used as a biomarker candidate in LBP.

References

- Adhitya, H., Ernawati, R., & Plumeriatuti, H., 2013. Profil Protein Hemagglutinin (Ha) Berdasarkan Berat Molekul Virus Avian Influenza Isolat Lokal. *Media Veterinaria Medika*, 6(2),pp.127–132.
- Audette, J.F., & Ryan, A.H., 2004. The Role of Acupuncture in Pain Management. *Physical Medicine and Rehabilitation Clinics of North America*, 15(4),pp.749–772.
- Azab, B.N., Bhatt, V.R., Vonfrolio, S., Bachir, R., Rubinshteyn, V., Alkaied, H., Habeshy, A., Patel, J., Picon, A.I., & Bloom, S.W., 2013. Value of the Pretreatment Albumin to Globulin Ratio in Predicting Long-term Mortality in Breast Cancer Patients. *American Journal of Surgery*, 206(5),pp.764–770.
- Bakthisaran, R., Tangirala, R., & Rao, C.M., 2015. Small Heat Shock Proteins: Role in Cellular Functions and Pathology. *Biochimica et Biophysica Acta - Proteins and Proteomics*, 1854(4),pp.291–319.
- Bao, K., & Reinhardt, R.L., 2015. The Differential Expression of IL-4 and IL-13 and Its Impact on type-2 Immunity. *Cytokine*, 75(1),pp.25–37.
- Bozkaya, Y., Erdem, G., Demirci, N., Yazıcı, O., Yıldırım-Özdemir, N., Kostek, O., & Zengin, N., 2018. Prognostic Importance of Albumin to Globulin Ratio in Metastatic Gastric Cancer Patients. *Current Medical Research and Opinion*, 35,pp.1–15.
- Burtis, C.A., & Ashwood, E., 2001. *Tietz Fundamentals of Clinical Chemistry, Fifth Edition*.
- Busher, J.T., 1990. Serum Albumin and Globulin. *Clinical Methods: The History, Physical, and Laboratory Examinations*.
- Dayon, L., & Kussmann, M., 2013. Proteomics of Human Plasma: A Critical Comparison of Analytical Workflows in Terms of Effort, Throughput and Outcome. *EuPA Open Proteomics*, 1,pp.8–16.
- Dionne, C.E., Dunn, K.M., Croft, P.R., Nachemson, A.L., Buchbinder, R., Walker, B.F., Wyatt, M., Cassidy, J.D., Rossignol, M., Leboeuf-Yde, C., Hartvigsen, J., Leino-Arjas, P., Latza, U., Reis, S., Real, M.T.G.D., Kovacs, F.M., Oberg, B., Cedraschi, C., Bouter, L.M., Koes, B.W., Picavet, H.S.J., van_Tulder, M.W., Burton, K., Foster, N.E., Macfarlane, G.J., Thomas, E., Underwood, M., Waddell, G., Shekelle, P., Volinn, E., & Von-Korff, M., 2008. A Consensus Approach Toward the Standardization of Back Pain Definitions for Use in Prevalence Studies. *Spine*, 33(1),pp.95–103.
- Doran, E., Cai, F., Holweg, C.T.J., Wong, K., Brumm, J., & Arron, J.R., 2017. Interleukin-13 in Asthma and Other Eosinophilic Disorders. *Frontiers in Medicine*, 4,pp.139.
- Ferrer, R., Mateu, X., Maseda, E., Yébenes, J.C., Aldecoa, C., De-Haro, C., Ruiz-Rodriguez, J.C., & Garnacho-Montero, J., 2018. Non-Oncotic Properties of Albumin. A Multidisciplinary Vision about the Implications for Critically Ill Patients. *Expert Review of Clinical Pharmacology*, 11(2),pp.125–137.
- Gellman, H., 2014. *Acupuncture Treatment for Musculoskeletal Pain: A Textbook for Orthopaedics, Anesthesia, and Rehabilitation*. CRC Press.
- Geyer, P.E., Holdt, L.M., Teupser, D., & Mann, M., 2017. Revisiting Biomarker Discovery by Plasma Proteomics. *Molecular Systems Biology*, 13(9),pp.942.
- Gomes, A., Alves, D., Miguel, P., Inoue, V., Correia-Lopes, T., Santana, L., Geller, M., & Siqueria-Batista, R., 2016. Anti-Inflammatory Cytokines in Sepsis: Immunological Studies and In Silico Investigation. *Journal of Pharmaceutical Care & Health Systems*, 3(3).
- Hasegawa, T.M., Baptista, A.S., de Souza, M.C., Yoshizumi, A.M., & Natour, J., 2013. Acupuncture for Acute Non-specific Low Back Pain: A Randomised, Controlled, Double-blind, Placebo Trial. *Acupuncture in Medicine: Journal of the British Medical Acupuncture Society*, 32(2),pp.109–115.
- Hoy, D.G., Smith, E., Cross, M., Sanchez-Riera, L., Blyth, F.M., Buchbinder, R., Woolf, A.D., Driscoll, T., Brooks, P., & March, L.M., 2015. Reflecting on the Global Burden of Musculoskeletal Conditions: Lessons Learnt from the Global Burden of Disease 2010 Study and The Next Steps Forward. *Annals of the Rheumatic Diseases*, 74(1),pp.4–7.
- Kaufman, E.L., & Carl, A., 2013. Biochemistry of Back Pain. *The Open Spine Journal*, 5(1),pp.12–18.
- Kennedy, S., 2001. Proteomic Profiling from Human Samples: The Body Fluid Alternative. *Toxicology Letters*, 120(1–3),pp.379–384.
- Lee, S.J., Shin, B.C., Lee, M.S., Han, C.H., & Kim, J.I., 2013. Scalp Acupuncture for Stroke Recovery: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *European Journal of Integrative Medicine*,

- 5(2),pp.87–99.
- Lee, S.H., Kim, C.E., Lee, I.S., Jung, W.M., Kim, H.G., Jang, H., Kim, S.J., Lee, H., Park, H.J., & Chae, Y., 2013. Network Analysis of Acupuncture Points Used in the Treatment of Low Back Pain. *Evidence-Based Complementary and Alternative Medicine*, 2013.
- Li, G., Wu, W., Zhang, X., Huang, Y., Wen, Y., Li, X., & Gao, R., 2018. Serum Levels of Tumor Necrosis Factor Alpha in Patients with IgA Nephropathy are Closely Associated with Disease Severity. *BMC Nephrology*, 19(1),pp.1–9.
- Li, K., Fu, W., Bo, Y., & Zhu, Y., 2018. Effect of Albumin-globulin Score and Albumin to Globulin Ratio on Survival in Patients with Heart Failure: A Retrospective Cohort Study in China. *BMJ Open*, 8(7),pp.1–7.
- Liu, B., Pang, Y., Bouhenni, R., Duah, E., Paruchuri, S., & McDonald, L., 2015. A Step Toward Simplified Detection of Serum Albumin on SDS- PAGE using an Environment-sensitive Flavone Sensor. *Chem Commun (Camb)*, 51(55),pp.11060–11063.
- Locati, M., Mantovani, A., & Sica, A., 2013. Macrophage Activation and Polarization as an Adaptive Component of Innate Immunity. *Advances in Immunology*, 120,pp.163–184.
- Ma, Y., & Cho, Z.H., 2004. *Biomedical Acupuncture for Pain Management-E-Book*. Elsevier Health Sciences.
- Martinez-Nunez, R.T., Louafi, F., & Sanchez-Elsner, T., 2011. The Interleukin 13 (IL-13) Pathway in Human Macrophages is Modulated by microRNA-155 via Direct Targeting of Interleukin 13 Receptor $\alpha 1$ (IL13Ra1). *Journal of Biological Chemistry*, 286(3),pp.1786–1794.
- Matsubara, T., Arai, Y.C.P., Shiro, Y., Shimo, K., Nishihara, M., Sato, J., & Ushida, T., 2011. Comparative Effects of Acupressure at Local and Distal Acupuncture Points on Pain Conditions and Autonomic Function in Females with Chronic Neck Pain. *Evidence-Based Complementary and Alternative Medicine*, 2011.
- Nagaswara, T., Matsushima-Nishiwaki, R., Hidenori, T., Matsuura, J., Kumada, T., & Kozawa, O., 2014. Heat Shock Protein 20 (HSPB6) Regulates Apoptosis in Human Hepatocellular Carcinoma Cells: Direct association with Bax. *Oncology Report*, 32,pp.1291–1295.
- Nahomi, R.B., DiMauro, M.A., Wang, B., & Nagaraj, R.H., 2015. Identification of Peptides in Human Hsp20 and Hsp27 that Possess Molecular Chaperone and Anti-apoptotic Activities. *Biochem J*, 465(1),pp.115–125.
- Radons, J., 2016. The Human HSP70 Family of Chaperones: Where Do We Stand?. *Cell Stress and Chaperones*, 21(3),pp.379–404.
- Rajandram, R., Yap, N.Y., Pailoor, J., Razack, A.H.A., Ng, K.L., Ong, T.A., Morais, C., & Gobe, G.C., 2014. Tumour Necrosis Factor Receptor-associated Factor-1 (TRAF-1) Expression is Increased in Renal Cell Carcinoma Patient Serum but Decreased in Cancer Tissue Compared with Normal: Potential Biomarker Significance. *Pathology*, 46(6),pp.518–522.
- Rostini, T., & Rita, C., 2009. Elektroforesis Protein Serum Pasien Dengan Kadar Protein Normal (Patients' serum Protein Electrophoresis with Normal Serum Total Protein Level). *Indonesian Journal of Clinical Pathology and Medical Laboratory*, 15(3),pp.87–90.
- Saputra, K., & Sudirman, S., 2009. Akupunktur untuk Nyeri dengan Pendekatan Neurosain. In *Jakarta: Sagung Seto*.
- Schrader, M., & Schulz-Knappe, P., 2001. Peptidomics Technologies for Human Body Fluids. *Trends in Biotechnology*, 19,pp.S55–60.
- Simó, R., Barbosa-Desongles, A., Lecube, A., Hernandez, C., & Selva, D.M., 2012. Potential Role of Tumor Necrosis Factor- α in Downregulating Sex Hormone-binding Globulin. *Diabetes*, 61(2),pp.372–382.
- Siswantoyo., 2010. Perubahan Kadar Beta Endorfin Akibat Latihan Olahraga Pernafasan (Sebuah Kajian Psikoneuroendokrinologi Pada Aktivitas Fisik). *Buletin Penelitian Sistem Kesehatan*, 13(2),pp.157–162.
- Sumardiyono, S., & Ada, Y.R., 2014. Perbedaan Gangguan Muskuloskeletal Pembatik Wanita Dengan Dingklik Dan Kursi Kerja Ergonomis. *KESMAS - Jurnal Kesehatan Masyarakat*, 9(2),pp.144–149.
- Turturici, G., Sconzo, G., & Geraci, F., 2011. Hsp70 and Its Molecular Role in Nervous System Diseases. *Biochemistry Research International*.2011.
- Umare, V., Pradhan, V., Nadkar, M., Rajadhyaksha, A., Patwardhan, M., Ghosh, K.K., & Nadkarni, A.H., 2014. Effect of Proinflammatory Cytokines (IL-6, TNF, and IL-1 β) on Clinical Manifestations in Indian SLE Patients. *Mediators of Inflammation*, 2014.
- Vos, T., Allen, C., Arora, M., Barber, R. M., Brown, A., Carter, A., & Zuhlke, L.J., 2016. Global, Regional, and National Incidence, Prevalence, and Years Lived with Disability for 310 Diseases and Injuries, 1990–2015:

- A Systematic Analysis for the Global Burden of Disease Study 2015. *The Lancet*, 388(10053),pp.1545–1602.
- White, N.M.A., Masui, O., DeSouza, L.V., Krakovska-Yutz, O., Metias, S., Romaschin, A.D., Honey, R.J., Stewart, R., Pace, K., Lee, J., Jewett, M.A.S., Bjarnason, G.A., Siu, K.W.M., & Yousef, G.M., 2014. Quantitative Proteomic Analysis Reveals Potential Diagnostic Markers and Pathways Involved in Pathogenesis of Renal Cell Carcinoma. *Oncotarget*, 5(2),pp.506–518.
- Wijayanti, Y., Sutomo, A.H., Astuti, I., & Asmara, W., 2018. Dust Exposures, IgE Levels, History of Allergy, and Symptoms of Allergy in Poultry Workers. *Jurnal Kesehatan Masyarakat*, 14(1),pp.34–40.
- Yang, H., Chen, Y., & Gao, C., 2017. Interleukin-13 Reduces Cardiac Injury and Prevents Heart Dysfunction in Viral Myocarditis Via Enhanced M2 Macrophage Polarization. *Oncotarget*, 8(59),pp.99495–99503.
- Yatmihatun, S., Badri, S., & Wardoyo, S., 2019. Pengaruh Kombinasi Titik Lokal Dan YNSA Terhadap Penurunan Derajat Nyeri Pada Pasien Nyeri Pinggang (Low Back Pain). *Jurnal Keterampilan Fisik*, 4(2),pp.100–104.
- Yong-Suk, K., 2010. Acupuncture Treatment for Low Back Pain in Korea. *Japanese Acupuncture and Moxibustion*, 6(1),pp.65–69.



Teenage Pregnancy as a Risk Factor of Stunting and Wasting among Children Aged 6-23 Months in Indonesia (IFLS 5 Analysis Study)

Justiyulfa Syah^{1✉}, B.J. Istiti Kandarina², Abdul Wahab²

¹Nutrition Study Program, Institute of Health Mitra Bunda, Batam, Indonesia

²Department of Biostatistics, Epidemiology and Population Health, Faculty of Medicine, Public Health, and Nursing, Gadjah Mada University

Article Info

Article History:

Submitted March 2020

Accepted August 2020

Published November 2020

Keywords:

Teenage pregnancy,
stunting-wasting, IFLS 5

DOI

<https://doi.org/10.15294/kemas.v16i2.23655>

Abstract

Stunting and wasting are interrelated with an increase in mortality, especially when both are experienced by the same child and an increase in perinatal mortality and morbidity in Indonesia due to pregnancy and birth in adolescence. The purpose of this study was to analyze the magnitude of the risk of teenage pregnancy against stunting and wasting in children aged 6-24 months in Indonesia. This study uses a nested case-control study design by analyzing data from the 5th Indonesia Family Life Survey. The results of the bivariable analysis of the incidence of stunting and wasting were not statistically related to teenage pregnancy with $p = 0.39$ (OR = 1.30; CI 95 = 0.67-2.48). The results of multivariate analysis of the incidence of stunting and wasting with teenage pregnancy by including variables of birth weight, maternal height, infectious diseases, and location of residence were not correlated with $p = 0.47$ (OR = 1.25; 95% CI = 0.67-2.35). This study found that there was no correlation between teenage pregnancy with stunting and wasting, but it still needed a strategy to reduce teenage pregnancy rates through socialization and education on the dangers of early marriage to get a generation with better health status.

Introduction

Stunting and wasting are often described as two nutritional problems that require different interventions in prevention or treatment. However, stunting and losing are closely related and often occur in the same child (Khara & Dolan, 2014). Stunting and losing are linked to increased mortality, especially when both are experienced by the same child. In overcoming the problem of stunting and wasting as a factor that often triggers mortality, it is necessary to design an efficient program to overcome it (Briend et al., 2015). The nutritional status of stunting and wasting can be measured based on the Z-score calculation, namely for the incidence of stunting using the index of body length / height according to

age at the vulnerable age of 0-60 months and for the incidence of wasting using the index weight according to body length / height for age vulnerable 0-60 months (Kementerian Kesehatan RI, 2011).

Children under five years are an age group that is vulnerable to problems with nutritional status, one of which is stunting and wasting. Provision of adequate nutrition is essential to ensure good physical and mental development and for long-term health. Malnutrition accounts for 35% of all deaths among infants under five years of age. Babies under five years of > 2 million die each year due to malnutrition (Fikadu et al., 2014). If the problem of nutritional status is not detected early, the nutritional improvement process will

✉ Correspondence Address:
Nutrition Study Program, Institute of Health Mitra Bunda, Batam, Indonesia
Email: justiyulfa@gmail.com

be delayed in the following year (Fitri, 2018).

Based on data from Basic Health Research (2013), the national incidence of stunting in 2010 in children under five was 35.8% and in 2013 it increased to 37.2%. The number of stunting sufferers is 37.2% of the 24 million children under five, meaning Indonesia has more than 8.9 million children with stunting (Kementerian Kesehatan RI, 2017). This condition makes Indonesia the fifth country with the highest number of stunted children in the world (UNICEF, 2013). For the national incidence rate of wasting in children under five was 13.6% in 2007 and decreased to 12.1% in 2013, however WHO states that the prevalence of wasting is a serious public health problem if it is in the range 10.0-14.0 %, and is considered critical if the incidence is $\geq 15.0\%$ so that the incidence of wasting is declared as a serious public health problem in Indonesia (BAPPENAS, 2013).

The nutritional status of children at birth is one of the causes of nutritional problems. Chances of survival are lower and anthropometric failure (stunting, wasting, and underweight) is higher in children born to mothers with poor reproductive health (Prakash et al., 2011). Teenage pregnancy results in various health losses for women, namely morbidity and mortality, mental and psychological well-being, economic and career opportunities, poverty and future life prospects (Paul, 2018; Utomo & Utomo, 2013).

The increase in mortality and morbidity in perinatals in Indonesia is one of the contributions to the incidence of pregnancy and birth experienced by adolescent mothers. (Kementerian Kesehatan RI, 2016). Indonesia still makes marriage and childbirth in adolescence a formidable challenge. The high rate of marriage in adolescents is shown by data from the 2012 Indonesian Demographic and Health Survey, namely Indonesia has a teenage birth rate of 48 individuals per 1000 young women aged 15-19 years (BKKBN et al., 2013).

If the right policies and interventions are not given to the high incidence of stunting and wasting and high pregnancy rates in adolescence, then this incident will contribute to an increase in mortality and morbidity in children and mothers and have an impact

on reducing the human development index ultimately has an impact on future regional development.

Researchers think there is a need for research on teenage pregnancy and the incidence of stunting and wasting using IFLS 5 data, because the results of this study allow to see the changes in the next IFLS survey with the same subjects considering that this survey is ongoing.

Method

This study used a nested case-control study design by analyzing the 5th period of the Indonesia Family Life Survey (IFLS) data. IFLS is a longitudinal survey whose sample represents 83% of Indonesia's population. This survey was conducted in 13 Provinces in September 2014 – March 2015. IFLS 5 data can be accessed in March 2016.

The study population was all children aged 6–23 months in Indonesia ($n = 1653$). Samples were selected based on inclusion criteria, namely 1) families with children aged 6-23 months; 2) families who have children and / or registered caregivers and were interviewed as respondents in the 2014 IFLS data. Children with incomplete data and / or children who were only wasting or stunting were excluded. The case group (children aged 6-23 months who experienced wasting and stunting) and the control group (children aged 6-23 months with good / normal nutritional status) were selected using simple random sampling method. Cases and controls involved 167 people. This study used a comparison of cases and controls, namely 1: 2 in order to obtain a case group of 167 children and a control group of 334 children.

Data were analyzed using the chi-square statistical test and using a significance value of $\alpha < 0.05$ and the magnitude of the relationship or risk between the independent and dependent variables using the OR (Odds Ratio) value. The test used to see the factors that most influence the dependent variable is the logistic regression test.

Results and Discussion

The general description of the characteristics of research subjects can be seen in Table 1 below. It shows that mothers with adolescence were more often found in

the case group (11.38%) than the case group (8.98%). Children with a history of low birth weight (10.78%) were also more in the case group than the control group (5.09%). Non-exclusive breastfeeding was more in the control group (65.87%) than the case group (62.87%). Mothers with low education were more often found in the case group (44.91%) than in the control group (42.51%). More short mothers in the case group (49.10%) than the control group (34.73%). Low economic status was also more in the case group (55.69%) than the control group (52.99%). More infectious disease history was found in case respondents (26.95%) than in the control group (21.56%). There were more urban density in the control group (62.57%) than the case group (54.49%).

The relationship between stunting and

wasting variables with adolescent pregnancy variables and external variables is illustrated in Table 2, where children with the incidence of stunting and wasting are not significantly associated with adolescent pregnancy. It can be concluded that children who experience stunting and wasting have a 1.3 times greater risk of coming from mothers with teenage pregnancies than children with normal nutritional status. The incidence of stunting and wasting was significantly associated with birth weight of children. Children who experienced the incidence of stunting and wasting had a 1.3 times greater risk of having a history of low birth weight than children with normal nutritional status.

Stunting and wasting were not significantly associated with exclusive

Table 1. Distribution of the characteristics of research subjects to cases and controls

Variable	Stunting and Wasting			
	Cases		Control	
	N	%	N	%
Mother's Age				
Teenage	19	11.38	30	8.98
Adult	148	88.62	304	91.02
Birth weight				
LBW	18	10.78	17	5.09
Normal	149	89.22	317	94.91
Exclusive Breastfeeding				
Not exclusive breastfeeding	105	62.87	220	65.87
exclusive breastfeeding	62	37.13	114	34.13
Mother's education				
Low	75	44.91	142	42,51
High	92	55.09	192	57.49
Mother's height				
Short	82	49.10	116	34.73
Normal	85	50.90	218	65.27
Economic status				
Low	93	55.69	177	52.99
High	74	44.31	157	47.01
Infectious disease				
Ever	45	26.95	72	21.56
Never	122	73.05	262	78.44
Location of residence				
Urban	91	54.49	209	62.57
Rural	76	45.51	125	37.43

Source: IFLS data for 2014

breastfeeding. Children who experienced the incidence of stunting and wasting had a 0.87 times smaller risk of coming from children with a history of exclusive breastfeeding than children with normal nutritional status. Stunting and wasting nutritional status did not have a significant relationship with maternal education. Children who experience stunting

and wasting have a 1.1 times greater risk from a history of low maternal education than children with normal nutritional status.

Stunting and wasting were significantly associated with maternal height. Children who experienced the incidence of stunting and wasting had a 1.81 times greater risk from mothers with short stature than children with

Table 2. Bivariate analysis between stunting and wasting variables with adolescent pregnancy variables and external variables

Variable	Stunting and Wasting				p	OR
	Cases		Control			
	n	%	n	%		
Independent Variable (Bound)						
Mother's Age						
Tenage	19	11.38	30	8.98	0.39	1.30
Adult	148	88.62	304	91.02		
External variables						
Birth weight						
LBW	18	10.78	17	5.09	0.01*	2.25
Normal	149	89.22	317	94.91		
Exclusive breastfeeding						
Not exclusive breastfeeding	105	62.87	220	65.87	0.50	0.88
Exclusive breastfeeding	62	37.13	114	34.13		
Mother's education						
Low	75	44.91	142	42.51	0.61	1.10
High	92	55.09	192	57.49		
Mother's height						
Short	82	49.10	116	34.73	0.001**	1.81
Normal	85	50.90	218	65.27		
Economic status						
Low	93	55.69	177	52.99	0.56	1.11
High		44.31	157	47.01		
Infectious disease						
Ever	45	26.95	72	21.56	0.17	1.34
Never	122	73.05	262	78.44		
Location of residence						
Urban	91	54.49	209	62.57	0,08	0.72
Rural	76	45.51	125	37.43		
OR= Odds Ratio *= Meaningful / Significant ($\alpha < 0,05$) $p = p \text{ value}$ **= Meaningful / Significant ($\alpha < 0,01$)						

Source: IFLS data for 2014.

normal nutritional status. Stunting and losing were not significantly related to economic status. Children with stunting and losing had a 1.11 times greater risk of coming from a family history with a low income level than children with normal nutritional status. Stunting and wasting were not significantly associated with infectious diseases. Children with stunting and wasting had a 1.34 times greater risk from a history of infectious diseases than children with normal nutritional status.

Stunting and wasting did not show a significant relationship with the location of residence. Children with stunting and losing had a 0.72 times lower risk of coming from children with urban living locations than children with normal nutritional status.

Several models made to see the factors associated with the incidence of stunting and wasting in children aged 6-23 months in Indonesia are shown in Table 3 below, where Table 3 shows that model IV was chosen as the best model to explain the relationship between teenage pregnancy and the incidence of stunting and wasting by considering all variables that are significant to the incidence of stunting and wasting as seen from the largest determinant coefficient (R^2) and the smallest deviation value. Model IV was built to see the relationship between the incidence of stunting and wasting in children aged 6-23 months with the age of the mother at pregnancy by including the variables of the child's birth weight, maternal height, history of infectious disease, and location of residence. The results of the analysis showed that the relationship was not statistically significant with OR 1.25. These results indicate that children with stunting and wasting have a 1.25 times greater risk from mothers with teenage pregnancies (<19 years) along with variables of birth weight, maternal height, infectious diseases and location of residence. The R^2 value of 0.028 is defined as pregnancy in adolescence which contributes to the incidence of stunting and wasting by 2.8% after controlling for variables of maternal height, socioeconomic status and location of residence, while 98.2% is caused by other factors.

The incidence of stunting and wasting with adolescent pregnancy does not have a

statistical relationship. This is probably because the age of adolescent mothers and adult mothers are both psychologically immature when they attend health services and fulfillment of nutrition (Anwar et al., 2006). Teenage pregnancy can significantly reduce the risk of health problems, one of which is preeclampsia (Vienne et al., 2009). Preeclampsia has an impact on the health of both mother and fetus. For the fetus, preeclampsia is a factor that causes growth restriction (Byberg et al., 2017). Several factors influence children's growth, namely socioeconomic, child care, biological factors and child feeding practices (Yu et al., 2016).

The analysis results showed a significant relationship between the incidence of stunting and wasting with birth weight. Birth weight is the most important determinant of the subsequent growth status of children (Aryastami et al., 2017; Saville et al., 2018). Infants with low birth weight have poor weight and linear growth in children compared to babies with normal birth weight (Adair, 1989; Rahman et al., 2016).

The incidence of stunting and wasting was not significantly associated with a history of exclusive breastfeeding. The same thing was found by Pravana et al. (2017) stated that exclusive breastfeeding of children before or after six months of age was not significantly associated with the incidence of malnutrition. A history of exclusive breastfeeding does not have to be a cause of malnutrition in children because community interventions for newborn care that have been implemented in the intervention area are the reason the nutritional status of children remains at normal limits (Mishra et al., 2013).

Children with the incidence of stunting and losing were not significantly related to maternal education. Low maternal education is not a benchmark in assessing maternal knowledge at this time, because knowledge can be accessed through many available media. Mothers with good education, but only have a small allocation of time to care for, care for and educate their children because having a busy job will have an impact on children's growth disorders (Nasikhah & Margawati, 2012). Better knowledge allows mothers to apply it in caring for their children, especially in providing proper food, so that children do not lack nutritional

Table 3. Logistic regression analysis between teenage pregnancy and the incidence of stunting and wasting with external variables

Variable	Model I OR (95% CI)	Model II OR (95% CI)	Model III OR (95% CI)	Model IV OR (95% CI)
Mother's age				
Teenage	1.30 (0.71-2.39)	1.17 (0.63-2.18)	1.32 (0.71-2.46)	1.25(0.67-2.35)
Adult	1	1	1	1
Birth weight				
LBW		2.08* (1.03-4.19)		1.91(0.94-3.88)
Normal		1		1
Mother's height				
Short			1.82** (1.24-2.66)	1.77*(1.20-2.59)
Normal			1	1
Infectious disease				
Ever		1.34(0.87-2.07)	1.33 (0.86-2.06)	1.33(0.85-2.06)
Never		1	1	1
Location of residence				
Urban		0.75(0.51-1.10)	0.74 (0.51-1.09)	0.75(0.51-1.10)
Rural		1	1	1
Pseudo R2	0.001	0.015	0.023	0.028
AIC	641.1	638.3	632.9	631.7

Information: CI (Confidence interval); * significant ($\alpha < 0.05$); ** significant ($\alpha < 0.01$); OR (Odds Ratio) is calculated using logistic regression test

Source: IFLS Data for 2014

intake (Ni 'mah & Nadhiroh, 2015)

The results showed a significant relationship between the incidence of stunting and wasting with maternal height. The linear acceleration of a child has a relationship with the mother's height (Hambidge et al., 2012). Mothers with short stature are a problem of chronic nutritional status that can decrease in the next generation and become a risk factor for perinatal and neonatal mortality (Ferreira et al., 2009; Lawn et al., 2005; Özaltın et al., 2010). Short mothers will have less protein and energy reserves, smaller reproductive organs, and limited space for fetal development. This is related to the placenta which can affect fetal growth. In addition, it will have an impact on infant growth because it is related to the quality and quantity of breast milk (Addo et al., 2013; Martorell & Zongrone, 2012).

The incidence of stunting and losing was not significantly related to socioeconomic status. Research (Hien & Hoa, 2009) also shows

the same thing that there is no relationship between household income per capita and malnutrition. Socioeconomic status can affect a person in accessing healthy and nutritious food and health services. High socioeconomic status must be supported by good nutritional knowledge of parents because it can affect the nutritional status of children and care for children's growth (Pravana et al., 2017).

The results of statistical analysis showed no relationship between the incidence of stunting and wasting and infectious diseases. The same thing was shown by research (Assefa et al., 2013) conducted in Southwest Ethiopia that diarrhea was not significantly related to nutritional status. Likewise with research (Anisa, 2012) conducted in Kalibaru Village, infectious diseases (diarrhea and ISPA) were not related to the nutritional status of children under five.

The incidence of stunting and wasting was not significantly related to the location of

residence. The existence of research in India shows that there are significant differences in health behavior between pregnant women in rural and urban areas (Singh et al., 2012). Pregnant women in rural areas tend not to routinely check their pregnancies to health workers because access to health services is very far away and it is difficult to make pregnant women rarely have their pregnancy checked in health services.

The results of statistical analysis showed that the dominant factor associated with stunting and wasting was maternal height. From the results of this study it can be concluded that the incidence of stunting and wasting in Indonesia today is strongly influenced by genetic factors, one of which is the mother's height. This is because the mother's height is a complex interaction of several factors before pregnancy. Therefore, it is necessary to achieve optimal health and nutritional status before and during pregnancy.

Conclusion

Teenage pregnancy is not a proven risk factor for stunting and wasting in children aged 6-23 months in Indonesia. However, birth weight and maternal height are variables that have a relationship with the incidence of stunting and wasting. Therefore, it is necessary to make policies that support intensive pregnancy care for pregnant women, especially pregnant women who are at risk of having pregnancy problems. Mothers are expected to check their pregnancy or baby's health. Mothers who do not perform pregnancy checks or their babies' health at health services must have home visits so that health services can still be accessed optimally. Mothers are also expected to use pregnancy care services that have been prepared by the government and be more responsive in finding out about pregnancy care and child development care in order to avoid problems with nutritional status in children.

This research can be carried out well thanks to the help of various parties, for this reason the researcher would like to thank the entire academic community of FKMK UGM and the Survey Meter Institute for providing support, assistance and information in completing this research.

References

- Adair, L.S., 1989. Growth of Filipino Infants Who Differ in Body Proportions at Birth. *American Journal of Human Biology*, 1(6),pp.673-682.
- Addo, O.Y., Stein, A.D., Fall, C.H., Gigante, D.P., Guntupalli, A.M., Horta, B.L., Kuzawa, C.W., Lee, N., Norris, S.A., Prabhakaran, P., Richter, L.M., Sachdev, H. S., & Martorell, R., 2013. Maternal Height and Child Growth Patterns. *The Journal of Pediatrics*, 163(2),pp.549-554. e1.
- Anisa, P., 2012. *Faktor-faktor yang Berhubungan dengan Kejadian Stunting Pada Balita Usia 25-60 Bulan di Kelurahan Kalibaru Depok Tahun 2012*. Universitas Indonesia.
- Anwar, K., Juffrie, M., & Julia, M., 2006. Faktor Risiko Kejadian Gizi Buruk di Kabupaten Lombok Timur, Provinsi Nusa Tenggara Barat. *Gizi Klinik Indonesia*, 2,pp.108-116.
- Aryastami, N.K., Shankar, A., Kusumawardani, N., Besral, B., Jahari, A.B., & Achadi, E., 2017. Low Birth Weight was the Most Dominant Predictor Associated with Stunting Among Children Aged 12-23 Months in Indonesia. *BMC Nutrition*, 3(1),pp.1-6.
- Assefa, H., Belachew, T., & Negash, L., 2013. Socioeconomic Factors Associated with Underweight and Stunting among Adolescents of Jimma Zone, South West Ethiopia: A Cross-Sectional Study. *International Scholarly Research Network Public Health*, 2013(7).
- BAPPENAS., 2013. Riset Kesehatan Dasar (RISKESDAS) 2013. *Laporan Nasional 2013*,pp.1-384.
- BKKBN, BPS, & Kemenkes., 2013. *Survei Demografi dan Kesehatan Indonesia 2012*. Direktorat Statistik Kependudukan dan Ketenagakerjaan BPS, Puslitbang Kependudukan, Badan Kependudukan dan Keluarga Berencana Nasional (BKKBN), Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan.
- Briend, A., Khara, T., & Dolan, C., 2015. Wasting and Stunting-similarities and Differences: Policy and Programmatic Implications. *Food and Nutrition Bulletin*, 36(1),pp.S15-S23.
- Byberg, K.K., Oymar, K., Eide, G.E., R-Forman, M., & Juliusson, P.B., 2017. Exposure to Preeclampsia in Utero Affects Growth from Birth to Late Childhood Dependent on Child's Sex and Severity of Exposure : Follow-up of a Nested Case-control Study. *Plos One*, 2017,pp.1-15.
- Ferreira, H.S., Moura, F.A., Ju, C.R.C., Vieira, R.C., & Assunc, M.L. De., 2009. Short Stature of Mothers from an Area Endemic for

- Undernutrition is Associated with Obesity, Hypertension and Stunted Children: A Population-based Study in the Semi-arid Region of Alagoas, Northeast Brazil. *British Journal of Nutrition*, 1009, pp.1239–1245.
- Fikadu, T., Assegid, S., & Dube, L., 2014. Factors Associated with Stunting among Children of Age 24 to 59 Months in Meskan district, Gurage Zone, South Ethiopia: A Case-control Study. *BMC Public Health*, 14(1), pp.1–7.
- Fitri, L., 2018. Hubungan BBLR Dan Asi Eksklusif Dengan Kejadian Stunting Di Puskesmas Lima Puluh Pekanbaru. *Jurnal Endurance*, 3(1), pp.131–137.
- Hambidge, K.M., Mazariegos, M., Kindem, M., Wright, L.L., Cristobal-Perez, C., Juárez-García, L., Westcott, J.E., Goco, N., & Krebs, N.F., 2012. Infant Stunting is Associated with Short Maternal Stature. *Journal of Pediatric Gastroenterology and Nutrition*, 54(1), pp.117–119.
- Hien, N.N., & Hoa, N.N., 2009. Nutritional Status and Determinants of Malnutrition in Children under Three Years of Age in Nghean, Vietnam. *Pakistan Journal of Nutrition*, 1009, pp.958–964.
- Kementerian Kesehatan., 2011. *Standar Antropometri Penilaian Status Gizi Anak*. Direktorat Jenderal Bina Gizi dan Kesehatan Ibu dan Anak.
- Kementerian Kesehatan., 2017. *Profil Kesehatan Indonesia Tahun 2017*. Kementerian Kesehatan RI.
- Kementerian Kesehatan RI., 2016. InfoDATIN. *Situasi Balita Pendek*, pp.2442–7659.
- Khara, T., & Dolan, C., 2014. The Relationship between Wasting and Stunting, Policy, Programming and Research Implications. *Additives for Polymers*, 8.
- Lawn, J.E., Cousens, S., & Zupan, J., 2005. 4 Million Neonatal Deaths: When? Where? Why? *The Lancet*, 365(9462), pp.891–900.
- Martorell, R., & Zongrone, A., 2012. Intergenerational Influences on Child Growth and Undernutrition. *Paediatric and Perinatal Epidemiology*, 26(SUPPL.1), pp.302–314.
- Mishra, K., Kumar, P., & Basu, S., 2013. Risk Factors for Severe Acute Malnutrition in Children below 5 y of Age in India: A Case-Control Study. *India Journal Pediatrics*, 81(8).
- Nasikhah, R., & Margawati, A., 2012. Faktor Risiko Kejadian Stunting pada Balita Usia 24-36 Bulan di Kecamatan Semarang Timur. *Journal of Nutrition*, 1(1), pp.176–184.
- Ni 'mah, K., & Nadhiroh, S.R., 2015. Faktor Yang Berhubungan Dengan Kejadian Stunting Pada Balita. *Media Gizi Indonesia*, 10(1), pp.13–19.
- Özaltın, E., Hill, K., & Subramanian, S.V., 2010. Association of Maternal Stature With Offspring Mortality, Underweight, and Stunting in Low- to Middle-Income Countries. *Journal of the American Medical Association*, 303(15), pp.1507–1516.
- Paul, P., 2018. Maternal Age at Marriage and Adverse Pregnancy Outcomes: Findings from the India Human Development Survey, 2011-2012. *Journal of Pediatric and Adolescent Gynecology*, 31(6), pp.620–624.
- Prakash, R., Singh, A., Pathak, P.K., & Parasuraman, S., 2011. Early Marriage, Poor Reproductive Health Status of Mother and Child Well-being in India. *Journal of Family Planning and Reproductive Health Care*, 37(3), pp.136–145.
- Pravana, N.K., Piryani, S., Chaurasiya, S.P., Kawan, R., Thapa, R.K., & Shrestha, S., 2017. Determinants of Severe Acute Malnutrition Among Children Under 5 Years of Age in Nepal: A Community-based Case-control Study. *BMJ Open*, 7(8), pp.1–7.
- Rahman, M.S., Howlader, T., Masud, M.S., & Rahman, M.L., 2016. Association of Low-birth Weight with Malnutrition in Children Under Five Years in Bangladesh: Do Mother's Education, Socio-economic Status, and Birth Interval Matter? *PLoS ONE*, 11(6), pp.1–16.
- Saville, N.M., Shrestha, B.P., Style, S., Harris-Fry, H., Beard, B.J., Sen, A., Jha, S., Rai, A., Paudel, V., Sah, R., Paudel, P., Copas, A., Bhandari, B., Neupane, R., Morrison, J., Gram, L., Pulkki-Brännström, A.M., Skordis-Worrall, J., Basnet, M., ... Costello, A., 2018. Impact on Birth Weight and Child Growth of Participatory Learning and Action Women's Groups with and without Transfers of Food or Cash During Pregnancy: Findings of the Low Birth Weight South Asia Cluster-randomised Controlled Trial (LBWSAT) in Nepal. *PLoS ONE*, 13(5), pp.1–29.
- Singh, L., Rai, R.K., & Singh, P.K., 2012. Assessing The Utilization Of Maternal and Child Health Care Among Married Adolescent Women: Evidence From India. *Journal of Biosocial Science*, May 2019, pp.1–26.
- UNICEF., 2013. *Improving Child Nutrition-The Achievable Imperative for Global Progress*. *United Nations Children's fund*. United Nations Publications.
- Utomo, I. D., & Utomo, A., 2013. *Adolescent Pregnancy in Indonesia: A Literature Review*. World Population Day, pp.1–11.

- Vienne, C.M. De, Creveuil, C., & Dreyfus, M., 2009. European Journal of Obstetrics & Gynecology and Reproductive Biology Does Young Maternal Age Increase the Risk of Adverse Obstetric, Fetal and Neonatal Outcomes: A Cohort Study. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 147,pp.151–156.
- Yu, S.H., Mason, J., Crum, J., Cappa, C., & Hotchkiss, D.R., 2016. Differential Effects of Young Maternal Age on Child Growth. *Global Health Action*, 9(1),pp.1–13.



The Implementation of Community Based on Total Sanitation among Fisherman Families in West Java

Clara R.P. Ajsuksmo^{1✉}, Nilla S.D. Iustitiani²

¹Faculty of Psychology, Atma Jaya Catholic University of Indonesia

²Centre for Societal Development Studies, Atma Jaya Catholic University of Indonesia

Article Info

Article History:

Submitted January 2020

Accepted May 2020

Published November 2020

Keywords:

Community led total sanitation, open defecation, urban poor, water sanitation, and hygiene

DOI

<https://doi.org/10.15294/kemas.v16i2.23019>

Abstract

The aim of this study was to obtain a picture on the implementation of Sanitasi Total Berbasis Masyarakat (STBM) the Indonesian term for Community Led Total Sanitation (CLTS) among the families of fisherman in Eretan Kulon, Indramayu West Java. Participants of this Household Survey were categorized into two, namely households that have under-five children and households that have youth. Father or mother or any adult who live with under-five children or youth were purposively chosen as the participants of this study. In total 307 Households (HH Under five 51.14%; HH Youth 48.86%) participated in this study. Five pillars of STBM were used to develop a questionnaire for this HH Survey. The result revealed that among the five pillars of STBM, the highest mean score was in safe management of drinking water and food (Mean=4.08), followed by washing hands with soap (Mean=3.45), management of solid waste (Mean=2.79), management of liquid waste (Mean=2.64), and open defecation (Mean=1.90). The result of this study indicated that not all families have latrines so that they still practice of open defecation. The study also showed that solid and liquid waste management is still not considered important to maintain health and environmental hygiene.

Introduction

World Health Organization and the United Nations Children's Fund (2017) reported that in 2015 there were 2.3 billion people in the world who did not get adequate basic sanitation services, and of these numbers there were 892 million people who still practiced open defecation. WHO/UNICEF also shows that almost all the inadequacies in obtaining basic sanitation services are experienced by vulnerable and poor communities, who generally live in rural or slum areas in the cities. In fact, access to proper sanitation services is very important and fundamental to the life of every human being, and therefore water and sanitation apparently become the component of human right that must be facilitated to fulfill (WHO & UNICEF, 2017). This means

that letting people to could not access proper drinking water and adequate sanitation is denying their right to live (Ribeiro, de Abreu & Laporta, 2018). This also means that the fulfillment of proper sanitation is used as a key indicator in determining the level of a nation's well-being. The better sanitation services that can be obtained by the people, means the higher the level of well-being and vice versa.

Adequate sanitation and hygiene correlate to human and environmental health. Previous studies reported that poor hygiene and sanitation are related to poor health quality. Lawrence, Yeboah-Antwi, Biemba, et.al. (2016) reported that high rates of adults and infant mortality is influenced by the poor quality of health and environmental hygiene. Contaminated food and drinking water, as

✉ Correspondence Address:
Faculty of Psychology, Atma Jaya Catholic University of Indonesia
Jl. Jenderal Sudirman 51 Jakarta 12930, Indonesia
Email: clara.as@atmajaya.ac.id

well as unclean and healthy human behavior contribute to the spread of viruses, bacteria and parasites that cause diarrhea (Mara, Lane, Scott & Trouba, 2010; Walker, Friberg, Binkin, et.al., 2011; Carlton, Liang, McDowell, et.al., 2012; Adane, Mengistie, Kloos, et.al., 2017). The qualities of water, nutrition, sanitation, and hand washing habits have important roles in supporting children's growth and development such as stunting, anaemia and diarrhoea (Larsen, Griham, Slawsky & Narine, 2017). The long and repeated diarrhoea experiences will likely influence children's cognitive development (Tofail, Fernald, Das, et.al, 2018).

The experience of inadequate drinking water and poor sanitation that caused to diarrhea, as one diseases that cause mortality especially among under-five years children is especially common in poor and low income community (Walker, et.al., 2011; Carlton, et.al., 2012; Tofail, Fernald, Das, et.al, 2018). Tuyet-Hanh, Lee, Oh, et.al. (2016) stated that increasing access to clean water and sanitation can reduce the spread of disease and improve the quality of public health. Therefore, efforts to improve access to clean water sources and better sanitation facilities, especially for underserved communities should be made.

School can be powerful agent of change for advocating and socializing sanitation and hygiene issue. At school children learn about healthy life and clean behaviour to protect themselves and their families from infectious diseases. However, some studies reported that schools do not provide students with adequate sanitation facilities. Majra and Gur (2010) conducted a study on school environment and sanitation in India and the result indicated that not all school provide healthy and clean sanitation facilities, such as drinking water points, adequate latrine for boys and girls, appropriate disposal for liquid and solid waste. Jasper, Le, and Bartram (2012) reported that students' absenteeism, especially female students who are menstruating, is influenced by the availability of water and sanitation facilities. The study also reported that diarrheal and gastrointestinal diseases among students decreased due to increased access to adequate sanitation facilities in school. Magoji, Dedek, Jaiyeola, Adeniran, et.al. (2017) assessed the

support of Water Sanitation and Hygiene (WASH) program on soil-transmitted helminthiasis (STH). The results of the study showed that WASH program at school give positive impact in preventing children from the STH infections. The prevalence of Hookworm, Ascariasis and Trichuriasis is lower among students of WASH program school.

Community Based Total Sanitation (STBM) is the Indonesian terminology used by the Indonesian Ministry of Health for Community Led Total Sanitation (CLTS). CLTS is an approach to tackle open defecation that trigger to the need of community sanitation (Crocker, Saywell & Bartram, 2017). Referring to the Ministry of Health Decree No. 852/Menkes/SK/IX/2008 concerning National Strategy for Community Based Total Sanitation, STBM is referred to an approach to change hygiene and sanitation behaviours through community empowerment with triggering methods. Within the decree it is stated that the total sanitation condition is indicated through five indicators, namely stop open defecation, hand washing with soap, safe management of drinking water and food, safe management of domestic solid waste and safe management of domestic liquid waste.

In implementing STBM a participatory method is carried out by empowering and mobilizing the community to change people's behavior regarding open defecation and the provision of latrines that meet hygiene and health standards. In STBM the most important thing is that all resources come from the community. According to Venkataramanan (2015), the main actors involved in the implementation of STBM in Indonesia are national government, local government, non-government organization, local health center, village facilitators, and community leaders. Through this participatory approach, it is expected that the changes that occur regarding hygiene and health in the community will be more sustainable (Pickering, Djebari, Lopez, et.al, 2015). Lüthi, McConville and Kvarnström (2010) stated that the strengths of CLTS are in triggering behavior changes and mobilizing the community. Therefore, the success of CLTS is largely determined by the training given to the important figures in the community, and the

efforts given to overcome the problems faced by the households so that they can make good latrines (Crocker, Saywell & Bartram, 2017).

The study of Tofail et.al. (2018) showed that intervention program that combine improved water quality, environmental health, hand washing with soap, and nutritional counseling have a positive effect on children's development. In other words, the intervention program will have a positive effect if done through intensive communication related to sanitation and environmental health, both individually and in groups. Pickering, Djebbari, Lopez, et.al. (2015) reported that clean and healthy behavioral intervention programs aimed at improving the quality of water and increasing access to latrines were significantly correlated with the increases of height and weight of the children, especially among children under two years old. Referring to the study of Tofail et.al (2018) and Pickering et.al (2015), it is concluded that intervention program intended for improvements of water quality and environmental sanitation have an important role for the growth of children.

Musoke, Ndejjo, Halage, et al. (2018) conducts intervention programs on water, sanitation and hygiene in poor communities in urban areas by involving universities and community members. From the intervention program implemented, it was shown that the health and wellbeing of the community increased. In addition, since the local community fully participated in the intervention program, the community considered that the program is part of their lives, which also means that the continuation of the program will occur.

This research was conducted in Eretan Kulon Village, Indramayu District West Java, a traditional fishing village. Traditional fishermen are people who live on the coast and create kinship and do work utilizing fisheries resources by relying on simple fishing equipment (Amiruddin, 2014; Humaedi, 2017; Juliantono & Munandar, 2016). Traditional fishermen generally only have small business capital and their activities are oriented towards meeting the needs of everyday life (Amiruddin, 2014; Humaedi, 2017; Juliantono & Munandar, 2016). In some literature, it is explained that fishermen are a group of poor people. In fact, it

can be said that compared to other community groups who are both in the agricultural sector, fishermen (especially traditional laborers and fishermen) can be classified as the poorest social strata (Amiruddin, 2014; Humaedi, 2017; Juliantono & Munandar, 2016). Although it cannot be concluded that all fishermen are poor. Limited capital and technology, affecting the traditional fishing space, so they are less competitive than modern fishermen who have strong capital and sophisticated technology so that the fishing space is wider. Thus, development and technological progress have resulted in the marginalization of traditional fishermen (Amiruddin, 2014; Humaedi, 2017; Juliantono & Munandar, 2016).

Based on the above explanation, the research question of this study was how the Community Based Total Sanitation or known as *Sanitasi Total Berbasis Masyarakat* (STBM) implemented among the fishermen families in Eretan Kulon Village, Indramayu District West Java. How do community village perceive the five pillars of CBTS as important factors that support environmental health and hygiene so that they can improve their quality of health and well-being.

Method

This study carried out in order to obtain picture of the implementation of five pillars of STBM among fisherman families in the village of Eretan Indramayu District, West Java. This study used a mixed of quantitative and qualitative approach. In quantitative approach this study implemented a Household Survey by using questionnaire, while in the qualitative study series of Focus Group Discussions (FGDs) were carried out.

The participants of this study were adult – father or mother or adult who live in the same house with children or youth. Referring to the Convention on the Rights of the Children, children were defined as any individual a boy or a girl below 18 years old. In total 307 households involved in this study [(HH_{Under five} = 157; 51.14%); (HH_{Youth} = 150; 48.86%)]. In term of gender 89.25% of the total participants were female and of that numbers 80.71% were mothers.

In relation to the participants' education, the data showed that most of the participants

were graduated from elementary school [(HH_{Under five} n = 49; 31.2%) and (HH_{Youth} n = 53; 35.3%)] and never go to school or not graduated from elementary school [(HH_{Under five} n = 18; 11.5%) and (HH_{Youth} n = 42; 28%)]. If “never go to school”, “do not complete elementary school” and “graduated from elementary school” were put together and categorized as low level of education, then the percentage of low level of education was HH_{Under five} 45.9% and HH_{Youth} 76.6%. Number of participants who graduated from high school and undergraduate program was small (HH_{Under five} 19.8% and HH_{Youth} 5.3%).

Five pillars of STBM namely stop open defecation, washing hands with soap, safe management of drinking water and food, safe management of domestic solid waste, and safe management of domestic liquid waste were used to develop questionnaire on the implementation of STBM. Series of Focus Group Discussions (FGDs) were carried out in order to gain deeper information on the implementation of STBM in the neighborhood of Eretan village. FGDs protocol was developed for guidance. In total there were 6 groups of FGDs, namely group of fathers, mothers, boys, girls, youth organization and health cadres. Ethical approval for this study was approved by the Ethics Committee of Institute for Research and Community Services Atma Jaya Catholic University of Indonesia No. 1497/III/LPPM-PM.10.05/11/2018.

Results and Discussion

Regarding community’s perceptions on the five pillars of STBM, the data showed that pillar 3 (safe management of drinking water and food; Mean 4.08) was perceived as the most important for sanitation and hygiene, followed by pillar 2 (washing hands with soap; Mean 3.45), pillar 4 (safe management of solid waste; Mean 2.79) and pillar 5 (safe management of liquid waste; Mean 2.64). Pillar 1 (stop open defecation) was perceived as the least important of sanitation and hygiene (Mean average 1.90).

Based on the FGDs it was indicated that the community awareness on sanitation and hygiene is low. Instead of their own awareness and responsibility, the community is more entrusting the cleanliness of their environment to the janitor who has been paid to carry out his duties.

“Back again, the level of public awareness is not there yet” (FGD with group of Youth Club/Karang Taruna)

“It’s just that the problem of environmental hygiene seems like being underestimated. In my environment, there is no awareness about it ..” (FGD with group of youth club)

“Village officials have given efforts to the community about the awareness of maintaining environmental hygiene, but those who take out the garbage and clean the sewers are coolies or paid janitors. So it does not connect between the awareness and behavior of environmental hygiene (FGD with group of fathers)

The first indicator of STBM is every individual in the community have access to basic sanitation facilities to realize the community free from open defecation in any place. The result of this HH Survey indicated that not all households in Eretan Kulon Village, Indramayu District have latrines in their home. Only 64.3% (n=101) of the HH_{Under five} and 69.3% (n=104) of the HH_{Youth} who said has latrines or toilets. The households who do not have their own toilets or latrines in their home often use public toilets or go to any places (e.g. the sea side) for bowel movements. The community does not realize yet that by practicing open defecation, there is environmental pollution that affects health such as diarrhea and worms. The experience of prolonged diarrhea and worms can affect to the quantity and quality of food intake which in the future will affect cognitive development, especially in children (Mara, et.al., 2010; Walker, et.al., 2011; Carlton, et.al., 2012; Adane, et.al., 2017; Magoji, et.al., 2017; Tofail, et.al, 2018)

When FGD were conducted with health cadres, one health cadres said that there were times when people chose to defecate on the ground in front of their homes. Also, based on observations when the survey was conducted, there were children who suddenly ran and defecated in the middle of the road that was usually passed by local residents.

“Sometimes in the hut, there is no

toilet. In front of the hut there is a soil to bury the feces. Like a cat” (FGD with group of health cadres)

“Children do not want to go to the toilet (public toilet), because it is far away. It is also a habit when they were young (FGD with group of mothers)

“The children defecate while playing with friends, so any places” (FGD with group of mothers).

There are several reasons why households do not have toilets or latrines to defecate, namely: (1) there is no money to build latrines (HH_{Under five} 67.9%; HH_{Youth} 64.4%), (2) there are already public toilets, so there is no need to build our own latrine (HH_{Under five} 17.9%; HH_{Youth} 17.8%), (3) space is limited in the environment (HH_{Under five} 3.6%; HH_{Youth} 11.1%), and (4) easy to defecate anywhere and no one disputes (HH_{Under five} 5.4%; HH_{Youth} 2.2%). Data from the survey shows that of households who claim they have latrines (201 families) only 72.14% have their own septic tanks for feces distribution. Sewage disposal is carried out in ponds (10.45%), drainage channels (13.86%), rivers (15.84%), shared septic tanks and others (5.94%). The result of this study also shows that having a toilet at home to be used by family members is a luxury that is difficult to meet, and not a basic need that must be met as a condition for a decent living (Pickering, et.al., 2015; Musoke, et al., 2018; Tofail et.al., 2018)

The aim of pillar 2 in STBM is that hand washing facilities (water and soap) are available in every households and public services facility in the community (i.e. schools, offices, restaurants, health centers, markets, terminals), so that everyone can wash their hands properly. Data from this household survey indicated 93% of the participants responded that water is available for hand washing. However, only 86.6% said that soap is available for hand washing.

In pillar 2 of STBM hand washing with soap behavior is revealed in six conditions, and this survey showed that not all participants wash their hands with soap, in the following conditions: 1) before preparing food (88.92%), 2) before eating (97%), 3) after defecating (98.05%), 4) before feeding the baby (94.14%), 5) before and after cleaning baby feces (97.07%),

and 6) after holding livestock or pets (95.44%). The result of this study shows that the community in Eretan Village still did not see soap as an important object that must be use to wash hands thoroughly. There is possibility because the soap also has a price so that they see soap as a luxurious object that is difficult to fulfill (Republic of Kenya, UNICEF & Water and Sanitation Program, 2009)

When asked about the habit of washing hands with soap, children answered they did not always wash their hands with soap after doing activities that could bring worm and germs. Washing hands with soap is only done occasionally. According to mothers, they need to force their children to wash their hands with soap. Therefore, hand washing with soap is only done by children because they are afraid of their mothers rather than their own awareness to keep clean and healthy.

“Sometimes yes and sometimes no”
(FGD with group of girls)

“I forced my kids to wash their hands ...” (FGD with group of mothers)

“Wash his hands, if only mother is there” (FGD with group of mothers)

In Pillar 3, it is expected that each household has implemented safe management of drinking water and food. This survey indicated that not all households kept drinking water (98.05%) and store food (95.77%) in a closed container. Only 85.02% of the participants said that the water container washed and cleaned at least once a week.

Regarding vegetables processing, prior to cook the vegetables 59.61% said that they wash and cut them, and 35.50% said that they cut and wash them. Meanwhile, 4.89% said that they cut and cook the vegetables without washing them. The data indicated that not all families understand how to process the vegetables.

Pillar 4 deals with solid waste management carried out by the community. This survey indicated that only 78.83% of the households participated in this survey said that they have trash bin in the house, and those who do not have trash bin said that they just scattered the garbage scattered on the home page. Regarding the methods of solid waste

processing, the most common treatment is throw the garbage into the river or sea (59.93%), put the garbage in a plastic bag then throw it in the trash (49.3%), put the garbage in a plastic bag and burn it (30.62%). Only few of the participants who said that they sort the trash and sell part of it (15.64%), or process it and make compost (5.54%), or sort and reuse some of it (5.54%). The data indicated that very few of the households who understand and practice the reused and recycle principles of waste by sorting the dry from the wet garbage (17.92%).

When asked about the habit of disposing the garbage, children as well as mothers responded that there were those who threw garbage in their place but there were also those who littered.

“To the trash, but there are those who careless” (FGD with group of children)

“Throw it under the floor” (FGD with group of children)

“If there is a trash bin in the house, then throw in the trash bin. But, when I was out of the house, just throw it anywhere (FGD with group of mothers)

Referring to the above data it can be concluded that community awareness on cleanliness remain low. The schools have taught about the children on the importance of cleanliness, and to sort out the trash. However, the knowledge being provided by teachers does not give positive impact on their behavior, since at home children are not concerned about cleanliness.

Only 37.46% of the participants of this household survey said that there is water absorption in their home, and the number was in line with as many as 42.67% of the participants who said that they saw a pool of water in their neighborhood. Drains owned by households are more in the form of open channel, where the condition of the channel cannot flow smoothly or in other words sometimes the channel can flow and sometimes clogged (49.19%). Only 29.97% of the participants said that the sewerage in their neighborhood can flow properly.

Referring to the waste liquid management, there were five method of

managing the liquid waste: 1) just throw it away in the yard/road until it is flooded (12.70 %) 2) discharged to a closed storage infiltration well (15.96%), 3) discharged to an open storage infiltration well (13.68%), 4) directly flowed to the drain channel, river and the sea (82.08%), and 5) some were collected to water the plants (5.86%). Based on the observation during the research process, it was seen that the sewer in the village did not flow properly and found mosquito larvae. This is relevant to the results of the FGD which revealed that most of common disease is dengue fever. From this study it was also shown that not many people understand waste management, both solid and liquid waste. The principle of reduce, reuse, and recycle, in managing waste is still not done, even though they are likely to have enough knowledge about it (Setyowati & Mulasari, 2013; Laor, Suma, Keawdoungek, & Hongtong, 2018;). Based on the above data it can be concluded that only very few of the households who understand and practice about the safe management of liquid waste. If the wastewater is directly discharged into the drain channel or sewer or river without being treated first it can cause water pollution.

Conclusion

This study shows that the implementation of STBM in Eretan Kulon Village Indramayu District West Java is still not going well. Open defecation is still considered irrelevant to the environmental health and cleanliness. It was the habit since childhood to defecate not in a private latrine. The factor that drives open defecation is the absence of latrines at home. The expensive cost of building latrines is the main factor that causes no latrines at home, and as a result people rely on the existence of public toilets which cannot be ascertained by their cleanliness.

Referring to the above explanation, it is important to provide recommendations to the local government to conduct interventions related to sanitation and environmental hygiene. In addition, it is also very important to equip key figures with various knowledge and skills aimed at mobilizing local communities to maintain sanitation and environmental hygiene. Previous reports indicated that partnerships with various stake holder i.e. local-government, private sector, universities,

non-government organizations, and local community play important role for the success of the implementation of STBM. Besides, the continuation of STBM program in the long-term will depend on the involvement of local community in planning, implementing, as well as monitoring and evaluation of the program.

The research was funded by Pertamina Hulu Energy Offshore North West Java (PHEONWJ). The authors would like to thank PHEONWJ and all participants in this study for their support. Appreciations were also granted for all data collector and team member of this study.

Acknowledgement

The research was funded by Pertamina Hulu Energy Offshore North West Java (PHEONWJ). The authors would like to thank PHEONWJ and all participants in this study for their support. Appreciations were also granted for all data collector and team member of this study.

References

- Amiruddin, S., 2014. Jaringan Sosial Pemasaran pada Komunitas Nelayan Tradisional Banten. *Komunitas: International Journal of Indonesian Society and Culture*, 6 (1),pp.106-114.
- Adane, M., Mengistie, B., Kloos, H., Medhin, G., & Mulat, W., 2017. Sanitation Facilities, Hygienic Conditions, and Prevalence of Acute Diarrhea Among Under-Five Children in Slums of Addis Ababa, Ethiopia: Baseline Survey of a Longitudinal Study. *PLoS ONE*, 12(8),pp.1-18.
- Carlton, E.J., Liang, S., McDowell, J.Z., Li, H., Luo, W., & Remais, J.V., 2012. Regional Disparities in the Burden of Disease Attributable to Unsafe Water and Poor Sanitation in China. *World Health Organization. Bulletin of the World Health Organization*, 90(8),pp.578-87.
- Crocker, J., Saywell, D. & Bartram, J., 2017. Sustainability of Community-led Total Sanitation Outcomes: Evidence from Ethiopia and Ghana. *International Journal of Hygiene and Environmental Health*, 220,pp.551-557.
- Garna, J.V., Sclar, G.D., Freeman, M.C., Penakalapati, G., Alexander, K.T., Brooks, P., Rehfuess, E.A., Boisson, S., Medlicott, K.O., Thomas, F., & Clasen, T.F., 2016. The Impact of Sanitation Interventions on Latrine Coverage and Latrine Use: A Systematic Review and Meta-analysis. *International Journal of Hygiene and Environmental Health*, 220,pp.329-340.
- Humaedi, M.A., 2017. Kemiskinan Nelayan: Studi Kasus Penyebab Eksternal dan Upaya Revitalisasi Tradisi Pengentasannya di Kaliori, Rembang, Jawa Tengah. *J Sos Ekon Kelaut dan Perikan*, 7(2):193.
- Jasper, C., Le, T.-T., & Bartram, J., 2012. Water and Sanitation in Schools: A Systematic Review of the Health and Educational Outcomes. *International Journal of Environmental Research and Public Health*, 9,pp.2772-2787.
- Juliantono, F.J., & Munandar, A., 2016. Fenomena Kemiskinan Nelayan: Perspektif Teori Strukturasi. *J Kaji Polit Dan Masal Pembang*, 12(2),pp.1857-1866.
- Laor, P., Suma, Y., Keawdoungek, V., & Hongtong, A., 2018. Knowledge, Attitude, and Practice of Municipal Solid Waste Management Among Highland Residents in Northern Thailand. *Journal of Health Research*, 32(2),pp.123-131.
- Larsen, D.A., Grisham, T., Slawsky, E., & Narine, L., 2017. An Individual-level Meta-analysis Assessing the Impact of Community-level Sanitation Access on Child Stunting, Anemia, and Diarrhea: Evidence from DHS and MICS Surveys. *PLoS Neglected Tropical Disease*, 11(6),pp.e0005591.
- Lawrence, J.J., Yeboah-Antwi, K., Biemba, G., Ram, P.K., Osbert, N., Sabin, L.L., & Hamer, D.H., 2016. Beliefs, Behaviors, and Perceptions of Community-led Total Sanitation and Their Relation to Improved Sanitation in rural Zambia. *American Journal of Tropical Medicine and Hygiene*, 94(3),pp.553-562.
- Lüthi, C., McConville, J., & Kvarnström, E., 2010. Community-based Approaches for Addressing the Urban Sanitation Challenges. *International Journal of Urban Sustainable Development*, 1(1-2),pp.49-63.
- Mara, D., Lane, J., Scott, B., & Trouba, D., 2010. Sanitation and Health. *PLoS Medicine*, 7(11),pp.e1000363.
- Mogaji, H.O., Dedeke, G.A., Jaiyeola, O.A., Adeniran, A.A., Olabinke, D.B., Oluwole, A.S., Abe, E.M., Adeaga, D.O., Yusuff, Q.A., Yusuff, H.A., & Ekpo, U.F., 2017. A Preliminary Survey of School-based Water, Sanitation, Hygiene (WASH) Resources and Soil Transmitted Helminthiasis in Eight Public Schools in Odeda LGA, Ogun State, Nigeria. *Parasitology Open*, 3(e16),pp.1-10.
- Musoke, D., Ndejjo, R., Halage, A.A., Kasasa, S., Ssempebwa, J.C., & Carpenter, D.O., 2018. Drinking Water Supply, Sanitation, and

- Hygiene Promotion Interventions in Two Slum Communities in Central Uganda. *Journal of Environmental and Public Health*, 2018.
- Pickering, A.J., Djebbari, H., Lopez, C., Coulibaly, M., & Alzua, M.L., 2015. Effect of a Community-led Sanitation Intervention on Child Diarrhoea and Child Growth in Rural Mali: A Cluster-randomised Controlled Trial. *Lancet Global Health*, 3(11),pp.e701-11.
- Republic of Kenya, UNICEF & Water and Sanitation Program., 2009. Are Your Hands Clean Enough? Study Findings on Handwashing with Soap Behaviour in Kenya.
- Ribeiro, M.R., de Abreu, L.C., & Laporta, G.Z., Drinking Water and Rural Schools in the Western Amazon: An Environmental Intervention Study. *PeerJ*, 6,pp.e4993.
- Setyowati, R., & Mulasari, S.A., 2013. Pengetahuan dan Perilaku Ibu Rumah Tangga Dalam Pengelolaan Sampah Plastik. *Kesmas. National Public Health Journal*, 7(12),pp.562-566.
- Tofail, F., Fernald, L.CH., Das, K.K., Rahman, M., Ahmed, T., Jannat, K.K., Unicomb, L., Arnold, B.F., Ashraf, S., Winch, P.J., Kariger, P., Stewart, C.P., Colford Jr, J.M., & Luby, S.P., 2018. Effect of Water Quality, Sanitation, Hand Washing, and Nutritional Interventions on Child Development in Rural Bangladesh (WASH Benefits Bangladesh): A Cluster-randomized Controlled Trial. *Lancet Child Adolescent Health*, 2(4),pp.255-268.
- Tuyet-Hanh, T.T., Lee, J-K, Oh, J., Minh, H.V., Lee, C.O., Hoan, L.T., Nam, Y-S., & Long, T.K., 2016. Household Trends in Access to Improved Water Sources and Sanitation Facilities in Vietnam and Associated Factors: Findings from the Multiple Indicator Cluster Surveys, 2000-2011. *Global Health Action*, 9,pp.29434.
- Venkataramanan, V., 2015. *Testing CLTS Approaches for Scalability CLTS Learning Series: Indonesia Country Report*. Chapel Hill, NC: The Water Institute Gillings School of Global Public Health The University of North Carolina at Chapel Hill and Plan International USA Inc.
- Walker, C.L.F., Friberg, I.K., Binkin, N., Young, M., Walker, N., Fontaine, O., Weissman, E., Gupta, A., & Black, R.E., 2011. Scaling up Diarrhea Prevention and Treatment Interventions: A Lives Saved Tool Analysis. *PLoS Medicine*, 8(3),pp.e1000428.
- World Health Organization and the United Nations Children's Fund., 2017. *Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines*. Geneva: World Health Organization (WHO) and the United Nations Children's Fund (UNICEF).



The Incidence of Stunting and the Frequency and Duration of Diarrhea in Toddler

Diyah Arini^{1✉}, Ike Faradilah¹

¹Sekolah Tinggi Ilmu Kesehatan Hang Tuah Surabaya

Article Info

Article History:

Submitted July 2019

Accepted April 2020

Published November 2020

Keywords:

Stunting incidence, frequency, duration, diarrhea

DOI

<https://doi.org/10.15294/kemas.v16i2.20032>

kemas.v16i2.20032

Abstract

Infectious diseases (diarrhea) that repeatedly cause children's health to increase in the pattern of children's appetite which can lead to less nutritional status of children. This study was to analyze the relationship between the incidence of stunting and the frequency and duration of diarrhea in children under five in the Kenjeran Health Center Surabaya Working Area. Analytical research design with cross sectional design in 4 villages in Kenjeran Health Center. Data retrieval is done by questionnaire sheet and observation using microtoise, sample technique uses Sampling Probability by using Stratified Random Sampling as many as 152 children. Data were analyzed using the Spearman Rho statistical test. The results of research on children under five who experience the incidence of stunting with the frequency and duration of diarrheal disease indicate children who experience stunting and longer frequency. The Rho Spearman Test showed differences in the incidence of stunting with the frequency of diarrhea $p = 0.005$ ($p < \alpha = 0.05$), duration of diarrhea $p = 0.003$ ($p < \alpha = 0.05$). The implication of this study is that stunting is related to the frequency and duration of diarrheal diseases, so that posyandu activities can add counseling about children's health that requires the treatment of diarrhea in children under five in the Kenjeran Health Center Surabaya.

Introduction

In health development for the 2015-2019 period, efforts to improve the nutritional status of the community, including reducing the prevalence of stunting, are a priority for national development with a target of reducing the prevalence to 28% (Kementrian Kesehatan RI, n.d.). Stunting is a toddler with nutritional status based on body height according to age with a z-score less than -2SD while a toddler is categorized as very short if the z-score is less than -3SD (WHO et al., 2018). A stunting toddler is a toddler who is chronically malnourished due to lack of nutrient intake for a long time and is usually followed by frequent illness (Khoeroh & Indriyanti, 2017). The literature said that stunted children experience repeated infection with symptoms, including diarrhea (Checkley

et al., 2014) with a duration of diarrhea in children 15 days per year (Alberto, Karen, T, & John, 2016).

Nowadays, the stunting incidence is one of the nutritional problems experienced by toddlers around the world. According to WHO data in 2008, diarrhea is the first cause of toddler mortality in the world. In Indonesia, diarrhea is one of the main health problems, this is due to the high morbidity rate of diarrhea which causes a lot of mortality, especially among toddlers. Diarrhea morbidity rate in Indonesia is around 200-400 incidents per 1000 population annually. Thus, it is estimated that in Indonesia, there are about 60 million diarrhea sufferers found per year, most (70% -80%) of them are toddler (Munggaran et al., 2015). In 2017 22.2% or about 162 million toddlers in

✉ Correspondence Address:

Sekolah Tinggi Ilmu Kesehatan Hang Tuah, Surabaya

Email: diyaharini76@yahoo.co.id

the world were stunted (States, 2012). Based on the 2018 Basic Health Research, the proportion of malnutrition and poor nutrition status in toddlers is 17.7%, while the proportion of very short and short height in toddlers is 30.8%. The prevalence of diarrheal diseases is 12.3% (Riset Kesehatan Dasar, 2018). Based on the results of a preliminary study conducted on 10 toddlers, it was found that 4 children with stunting had a history of diarrhea with a frequency of suffering from diarrhea > 3 times a day when they were sick for up to 3 days.

Stunting in children causes a decrease in the body's immune system and increases the risk of developing infectious diseases (Lestari, Margawati, & Rahfiludin, 2014). Toddlers who experience acute diarrhea for more than two weeks every three months will have a greater risk of growing into stunting (Sunita, 2011). During diarrhea, bacteria enter the small intestine and multiply, the bacteria secrete toxins that affect the small intestinal mucosal cells (stimulate the enzyme adenylcyclase) and this enzyme converts Adenosine Tri Phosphate (ATP) into cyclic Adenosine Mono Phosphate (cAMP), with increasing cAMP there will be an increase secretion of Cl ions into the intestinal lumen which causes failure to be absorbed by the intestine (Sunita, 2011).

Stunting can be prevented by paying attention to nutritional status in the first 1000 days of a child's life, giving exclusive breastfeeding, providing nutritious food according to the body's needs, making clean as living habits, doing physical activity, to balance energy expenditure and nutrient intake into the body, so that the child not susceptible to infections such as diarrhea.

Method

The design used in this study was a correlation analytic study design with a cross-sectional approach. The total population was 720 toddlers and the sample size was 152 respondents.

The independent variable in this study was the incidence of stunting in toddlers in the Kenjeran Health Center in Surabaya and the dependent variables in this study were the frequency and duration of diarrhea in toddlers in the Kenjeran Health Center, Surabaya.

Independent variable was measured

using a tool to measure toddlers, namely the body measuring device (Microtoise) and the age of the toddler. The results of the toddler's height will be matched using the WHO z-score standard table, according to the Indonesian Ministry in 2011 the variable code BH / A uses the following assessment:

Category and Threshold of Children Nutrition Status Based on Index

Indeks	Nutrition Status Category	Threshold (Z-Score)
Height by Age (BH/A) on children aged 1- 3 years	Very Short	< -3SD
	Short	-3SD s/d < -2SD
	Normal	-2SD s/d 2SD

Source : (Kemenkes, 2010).

The dependent variables were measured using a questionnaire sheet. The dependent variables is the frequency and duration of diarrhea in toddlers in the Kenjeran Health Center, Surabaya.

This study was conducted on April 22 – May 22 2019 on the Kenjeran Health Center, Surabaya. The sampling technique in this study was Probability Sampling using Stratified Random Sampling. Kenjeran Community Health Center is divided into four areas / strata, Kenjeran village, Bulak village, Kedung Cowek village and Sukolilo village. Each stratum selected as a sample can represent the population of each variable.

Result and Discussion

General data in this research is the characteristics of respondents include the gender of toddlers who live with their parents, age of children, mother's education, maternal occupation, breastfeeding and breastfeeding complementary. Meanwhile, specific data include the incidence of stunting and the frequency and duration of diarrheal infectious diseases.

There were 76 normal toddler in the Kenjeran Health Centre Surabaya area (50%), based on the data of stunting incidence and maternal education, it was found that most of them have parents with high school education as many as 47 people, almost half of them who were categorized as short and very short toddler have parents with junior high school education, namely 15 children. The results of

Table 1. General data on the relation between stunting with the frequency and duration of diarrhea in toddlers on the Kenjeran Health Center, Surabaya.

General data		N	Frequency (f)	Percentage (%)
Gender	Male	152	79	52.0
	Female		73	48.0
Age	12-23 months	152	60	39.5
	24-36 months		92	60.5
Mother education	Senior High	152	69	45.4
	Junior High		44	28.9
	Elementary		30	19.7
	Graduate		9	5.9
Mother Occupation	House wife	152	113	74.3
	Private sectors		32	21.1
	Entrepreneur		5	3.3
	Government Employee		2	1.3
Breast feeding	Yes	152	41	27.0
	No		111	73.0
Breast feeding history	Exclusive	152	63	41.5
	Partial		54	35.5
	Predominant		35	23.0
	Porridge		78	51.4
Breastmilk substitution history	Formula Milk	152	49	32.2
	Fruits Juice		21	13.8
	Cerelac		4	2.6

Source : Primary Data, 2019

interviews with parents stated that they were mostly fishermen who do not have a regular income, so that the education problem was put aside. They thought that all that matter was that the children eat enough. The incidence of stunting is largely influenced by the low income and education of parents. Families with high incomes will have easier access to education and health so that the nutritional status of children can be better (Bishwakarma, 2011). Research in Semarang stated that the number of family members is a risk factor for stunting in toddlers aged 24-36 months (Nasikhah, 2012). According to Bishwakarma (2011) families with good economic status will be able to get better public services such as education. In addition, the families spending ability will increase so that family access to food will be better. Parents, especially mothers who have higher education,

can perform better child care than parents with lower education. Parents with lower education are more likely to come from families with low socioeconomic conditions, so it is hoped that the government will increase access to education for families with less socioeconomic conditions (Ikeda, Yuki, & Sibuya, 2013).

Researchers assume that maternal education plays an important role in the process of child growth, this is because the care of children is mostly carried out by the mother. The incidence of stunting in the working area of the Kenjeran Health Center in Surabaya was considered by mothers as a normal or common thing, it is caused by the mother's lack of knowledge about nutrition that the child must get since in the womb and the lack of health education about stunting in the area.

There were 44 toddlers (28.9%) who

Table 2 : Particular Data on the Relation between Stunting and the Frequency and Duration of Diarrhea in Toddlers in the Kenjeran Health Center, Surabaya.

Particular Data		N	f	%
Stunting Incident	Normal		76	50.0
	Short	152	44	28.9
	Very short		32	21.1
Diarrhea frequence in less than 6 months	Infrequently		76	50.0
	Never	152	54	35.5
	Frequently		22	14.5
Diarrhea duration in less than 6 months	Long		55	36.2
	Never	152	54	35.5
	Not long		43	28.3

Source : Primary Data, 2019

were categorized as stunting and 32 were very short (21%). The result of the interview with the mothers stated that the children were still exclusively breastfed for 1 year because the mother did not think she needed to spend money on formula milk. The nutritional status of pregnant women greatly affects the health and development of the fetus. Growth disorders in the womb can cause low birth weight (WHO, 2014). The use of milk bottles can increase the risk of diarrhea, because bottle is difficult to clean so that one that is not sterile in washing can become a breeding ground for bacteria such as *E. Coli* (Falasifa, 2015). Research in Nepal showed that babies with low birth weight have a higher risk of becoming stunted (Penny, 2013). Researchers assumed that mothers who have exclusively breastfed their children but the mother's nutrition during pregnancy is not fulfilled causing the child is born with a low birth weight which puts 1000 days of life for the child at risk of stunting.

Toddler who often experienced diarrhea within less than the last 6 months were as many as 22 children (14.5%) and those who had experienced diarrhea on more than the last 6 months were 55 children (36.2%). Based on the result of parental education data, there were 11 high school (SMA) educated mothers who often experienced diarrhea and 20 who had diarrhea for a long time. The results of interviews with parents stated that they had never received any education about the importance of maintaining a child's play environment to avoid infectious diseases so that the mother did not care about

the child's environment. According to Lailatul Mafazah (2013), factors that increase diarrhea include clean water for personal hygiene or household hygiene, water contaminated with feces, improper food storage. Research in Purwoharjo stated that the low availability of basic sanitation facilities owned by the community and personal hygiene, especially mothers with toddlers, is a factor in the occurrence of diarrhea (Lailatul Mafazah, 2013). Basic house sanitation and the behavior of housewives with the incidence of diarrhea showed a significant relation in the villages of NTT (Anyerdy and Azizah, 2013). Children who get good food but because they often have diarrhea or fever can suffer from malnutrition (Andayani, 2016).

Researchers assumed that the mothers have not been able to keep the environment clean for children's playgrounds. Children were not accustomed to washing their hands after playing, free to play anywhere without parental supervision. In addition, the children were often cared for by their grandmothers so that when the children cry, they ask for snacks that the children should not be able to eat, but the grandmother still buy them as it was not given too much.

There are 54 toddlers (35.5%) who have never had diarrhea within <6 months. Based on the results of breastfeeding data for children who have never had diarrhea, as many as 24 had history of exclusive breastfeeding. Observations from researchers showed that children who were exclusively breastfed for up to six months and

continued for \leq two years made the child less susceptible to disease. Exclusive breastfeeding is an effort to achieve optimal growth and development and is protected from diseases such as diarrhea (Eka Putri, 2013). Increased susceptibility to diarrhea, including not giving exclusive breast milk so that children are malnourished and immunodeficient (Wijaya, 2012). Environmental factors such as clean water facilities, waste handling, and disposal of feces also cause children to have frequent diarrhea (Wijaya, 2012). Children who are given exclusive breastfeeding have maximum immunity so that the body can be protected from pathogens from environments (Swa, Id, Kyaw, & Tun, 2019).

Researchers assumed that mothers understand the importance of giving exclusive breastfeeding to children until the age of the child is six months so that the child is not susceptible to diseases such as diarrhea, but sometimes the mothers mix water, tea and formula milk when the child was left for work because the mother did not know how to stock

breastmilk when the child was left for work and there still be children who had been given exclusive breastfeeding still has diarrhea, this possibility due to the mother after carrying out household activities did not wash her hands before breastfeeding activity.

The Spearman rho statistical test results significance value of $p = 0.005$ with a significant level of 0.01 ($\rho < 0.05$), it can be concluded that there is a relation between the incidence of stunting and the frequency of diarrhea in toddlers on Kenjeran Health Center Surabaya while from the Spearman rho statistical test resulting significance of $p = 0.003$ with a significant level of 0.01 ($\rho < 0.05$), It can be concluded there is a relation between the incidence of stunting and the duration of diarrhea in toddlers on Kenjeran Health Center, Surabaya.

Based on the results of the study, the normal category of children experiencing frequent diarrhea was 6 children (3.9%) and long duration diarrhea was 17 children (11.2%). Normal toddlers experiencing diarrhea are

Table 3. The Relation between Stunting and the Frequency and Duration of Diarrhea and URTI in Toddlers on the Kenjeran Health Center, Surabaya, May 2019.

Stunting Incident	Diarrhea Frequency							
	Frequently		Infrequently		Never		Total	
	f	%	f	%	f	%	n	%
Normal	6	3.9	33	21.7	37	24.3	76	100.0
Short	12	7.9	25	16.4	7	4.6	44	100.0
Very Short	4	2.6	18	11.8	10	6.6	32	100.0
Total	22	14.5	76	50.0	54	35.5	152	100.0

Spearman statistic test $\rho p=0.005$ ($\alpha=0.05$)

Source : Primary Data, 2019

Stunting Incident	Durasi Diare							
	Long		Not Long		Never		Total	
	f	%	f	%	f	%	n	%
Normal	17	11.2	22	14.5	37	24.3	76	100.0
Short	27	17.8	10	6.6	7	4.6	44	100.0
Very Short	11	7.2	11	7.2	10	6.6	32	100.0
Total	55	36.2	43	28.3	54	35.5	152	100.0

Spearman statistic test $\rho p=0.003$ ($\alpha=0.05$)

Source : Primary Data, 2019

one of them because the environment such as the house does not have a latrine (Saleh & Rachim, 2014). Long-term socioeconomic inequality increases the prevalence of diarrhea (Alam et al., 2019). Researchers assume that normal children who still have diarrhea were caused by the environment where the children live still does not meet the requirements for a healthy home. The short category children with frequent diarrhea was 12 children (7.9%) and long diarrhea duration was 27 children (17.8%) while the very short category with frequent diarrhea frequency was 4 children (2.6%) and long diarrhea duration was 11 children (7.2%). Research in Norway said that there is a relation between stunted children and diarrhea (Kismul, Acharya, Mapatano, & Hatløy, 2017). Diarrhea is a disease characterized by changes in the shape and consistency of feces that mushy and defecating more than 3 times a day (Saleh & Rachim, 2014). Each episode of diarrhea causes a loss of nutrition needed by children to grow, so diarrhea is the main cause of malnutrition (Saleh & Rachim, 2014). Research in Southern Ethiopia stated that diarrheal disease has a significant association with stunting (Batiro, Demissie, Halala, & Anjulo, 2017). Stunting is associated with recurrent infections and diarrhea is the most important infectious disease determining (Dinh et al., 2016). Researchers assume that stunted children are a chronic impact of continuous consumption of a low-quality diet supported by infectious diseases such as diarrhea and environmental problems.

The normal category with an infrequent diarrhea frequency was 33 children (21.7%) and 22 children (14.5%) were not long duration. According to research from Surakarta, pre-school age children have been encouraged to prevent diarrhea by washing their hands before or after eating (Listiyorini, Irdawati, & Zulaicha, 2012). Children of mothers with higher education are less prone to diarrhea (Alam et al., 2019). The incidence of diarrhea in children can be influenced by the cleanliness of the food purchased at the stall (Listiyorini et al., 2012). Researchers assume that normal children who experienced diarrhea were caused by purchased external food and after playing children do not wash their hands. The

short category with infrequent diarrhea was 25 children (16.4%) and not long duration as many as 10 children (6.6%), very short category with infrequent diarrhea was 18 children (11.8%) and not long diarrhea duration as many as 11 children (7.2%). Stunting children who have a history of diarrhea in the last 3 months and poor hygiene practices increase the risk of stunting 3,619 and 4,808 times (Desiyanti, 2017). Family food security and the incidence of infectious diseases experienced by toddler, especially diarrhea, are indicated to be factors that cause stunting (Safitri & Nindya, 2017). Researchers assume that one of the factors that causes children to have frequent diarrhea was the environment that was not supported by the knowledge of parents to care for their children and their environment.

The normal category toddlers who never experienced diarrhea as many as 37 children (24.3%). Education is one of the factors that affect a person's knowledge (Ernawati, 2012). pre-natal care, maternal breastfeeding practice, access to health facilities and mass media communication, and high immunization coverage that clearly explain diarrhea on children (Alam et al., 2019). People who are knowledgeable about diarrhea take action to reduce the risk by using clean water and conserving it (Ernawati, 2012). Researchers assume that mothers with at least high school education were able to care for and prevent their children from diarrhea because mothers more often seek information about children's health. The short category toddlers who never experienced diarrhea as many as 7 children (4.6%) and the very short category toddlers who never experienced diarrhea as many as 10 children (6.6%). In a study by Wiwien Fitrie et al (2016) stated that the frequency of diarrhea and URTI is not a factor in the incidence of stunting.

Conclusion

This study states that most of the toddlers in the Kenjeran Health Center, Surabaya, suffer frequent diarrhea (Based on the results of the Spearman rho statistical test, the significance value is $p = 0.005$ with a significant level of 0.01 ($p < 0.05$)) and in a long duration (based on test results. Spearman statistics rho significance value $p = 0.003$ with a significant level of 0.01

($p < 0.05$).

References

- Alam, R., Id, M., Alam, K., Renzaho, A. M. N., Sarker, R., Sultana, M., ... Gow, J. (2019). Changes In Inequality Of Childhood Morbidity In Bangladesh 1993-2014: A Decomposition Analysis, 1–20. <https://doi.org/10.1371/journal.pone.0218515>
- Alberto, M., Karen, E., T, A. C., & John, E. (2016). Association Of Diarrhoea And Upper Respiratory Infections With Weight ...
- Andayani, R. (2016). Metode Drill Bermedia Flash Card Untuk Meningkatkan Pengetahuan Dan Praktik Cuci Tangan Pakai Sabun Pada Anak Tunagrahita. *Journal Of Health Education*, 1(1), 37–43. Retrieved From <http://journal.unnes.ac.id/sju/index.php/jhealthedu/%0AMETODE>
- Batiro, B., Demissie, T., Halala, Y., & Anjulo, A. A. (2017). Determinants Of Stunting Among Children Aged 6-59 Months At Kindo Didaye Woreda , Wolaita Zone , Southern Ethiopia : Unmatched Case Control Study, 1–16. <https://doi.org/10.1371/journal.pone.0189106>
- Bishwakarma, R. (2011). Spatial Inequality In Children Nutrition In Nepal: Implications Of Regional Context And Individual/Household Composition. *United States*.
- Checkley, W., Buckley, G., Gilman, R. H., Assis, A. M. O., Guerrant, R. L., Valentiner-Branth, P., ... Black, R. E. (2014). Multi-Country Analysis Of The Effects Of Diarrhoea On Childhood Stunting, (May 2014). <https://doi.org/10.1093/ije/dyn099>
- Desiyanti, C. (2017). Hubungan Riwayat Penyakit Diare Dan Praktek Higiene Dengan Kejadian Stunting Pada Balita Usia 24-59 Bulan Di Wilayah Kerja Puskesmas Simolawang.
- Dinh, D. M., Ramadass, B., Kattula, D., Sarkar, R., Naumova, E. N., Kang, G., & Ward, H. D. (2016). Longitudinal Analysis Of The Intestinal Microbiota In Persistently Stunted Young Children In South India, 1–18. <https://doi.org/10.1371/journal.pone.0155405>
- Ernawati, F. (2012). Pengaruh Pendidikan Kesehatan Terhadap Peningkatan Pengetahuan Tentang Diare Pada Anak Jalanan Di Semarang.
- Falasifa, M. (2015). Hubungan Antara Sanitasi Total Dengan Kejadian Diare Pada Balita Di Wilayah Kerja Puskesmas Kepil 2 Kecamatan Kepil Kabupaten Wonosobo Tahun 2015.
- Ikedo, N., Yuki, I., & Sibuya, K. (2013). Determinants Of Reduced Child Stunting In Cambodia: Analysis Of Pooled Data From Three Demographic And Health Surveys. *Bulletin Of The World Health Organization*.
- Kemenkes, R. I. (2010). Standar Antropometri Penilaian Status Gizi Anak.
- Kementrian Kesehatan RI. (N.D.). Rencana Strategis Kementerian Kesehatan 2015-2019.
- Kesehatan, K. (2018). Hasil Utama Riskesdas 2018.
- Khoeroh, H., & Indriyanti, D. (2017). Evaluasi Penatalaksanaan Gizi Balita Stunting Di Wilayah Kerja Puskesmas Sirampog. *Unnes Journal Of Public Health*, 6(3). Retrieved From <http://journal.unnes.ac.id/sju/index.php/ujph%0Aevaluasi>
- Kismul, H., Acharya, P., Mapatano, M. A., & Hatløy, A. (2017). Determinants Of Childhood Stunting In The Democratic Republic Of Congo: Further Analysis Of Demographic And Health Survey 2013-14. *BMC Public Health*, 18(1), 1–15. <https://doi.org/10.1186/s12889-017-4621-0>
- Lailatul Mafazah. (2013). Ketersediaan Sarana Sanitasi Dasar, Personal Hygiene Ibu Dan Kejadian Diare. *Jurnal Kesehatan Masyarakat*, 8(2), 176–182. Retrieved From <http://journal.unnes.ac.id/nju/index.php/kemas%0Aketersediaan>
- Lestari, W., Margawati, A., & Rahfiludin, M. Z. (2014). Faktor Risiko Stunting Pada Anak Umur 6-24 Bulan Di Kecamatan Penanggalan Kota Subulussalam Provinsi Aceh, 3(1), 37–45.
- Listiyorini, W., Irdawati, & Zulaicha, E. (2012). Hubungan Antara Kebiasaan Mencuci Tangan Anak Pra Sekolah Dengan Kejadian Diare Di Wilayah Kerja Puskesmas Pajang Surakarta.
- Munggaran, A. P., Hidayatulloh, T., Studi, P., Informasi, S., Studi, P., Informatika, M., & Selatan, J. (2015). Penerapan Algoritma C4.5 Untuk Diagnosa Penyakit Diare Pada Anak Balita Berbasis Mobile, II(1), 47–58.
- Nasikhah, R. (2012). Faktor Risiko Kejadian Stunting Pada Balita Usia 24 – 36 Bulan Di Kecamatan Semarang Timur.
- Penny, M. E. (2013). Zinc Supplementation In Public Health. *Annals Of Nutrition And Metabolism*, 62(SUPPL.1), 31–42. https://doi.org/10.1007/978-1-4614-6546-1_65
- Safitri, C. A., & Nindya, T. S. (2017). Hubungan Ketahanan Pangan Dan Penyakit Diare Dengan Stunting Pada Balita 13-48 Bulan, Di Kelurahan Manyar Sabrangan, Surabaya.
- Saleh, M., & Rachim, L. H. (2014). Hubungan Kondisi Sanitasi Lingkungan Dengan Kejadian Diare Pada Anak Balita Di Wilayah Kerja Puskesmas Baranti Kabupaten Sidrap Tahun 2013, VII(1).

- States, M. (2012). Stunting Policy Brief, (9).
- Sunita, A. (2011). *Prinsip Dasar Ilmu Gizi*. Jakarta: PT Gramedia Pustaka.
- Swa, K., Id, M., Kyaw, A. T., & Tun, T. (2019). Feeding Practices And Nutritional Status Of Children Age 6-23 Months In Myanmar : A Secondary Analysis Of The 2015-16 Demographic And Health Survey, 1–14. <https://doi.org/10.1371/Journal.Pone.0209044>
- Wijaya, Y. (2012). Faktor Risiko Kejadian Diare Balita Di Sekitar Tps Banaran Kampus Unnes. *Unnes Journal Of Public Health*, 1(1).



Trial of IMCI Algorithm in Disease Detection Card in Suku Anak Dalam in Batanghari District, Jambi

M. Dody Izhar^{1✉}, Hubaybah², Ruwayda³

¹Department of Epidemiology, Faculty of Public Health, Universitas Jambi

²Department of Health Policy Administration, Faculty of Public Health, Universitas Jambi

³Department of Midwifery, Jambi Health Polytechnic, Ministry of Health of the Republic of Indonesia

Article Info

Article History:

Submitted May 2019

Accepted April 2020

Published November 2020

Keywords:

Knowledge, IMCI, SAD.

DOI

<https://doi.org/10.15294/kemas.v16i2.19295>

Abstract

Integrated Management of Childhood Illness (IMCI) is one of management strategies for sick toddlers, in the form of curative and preventive efforts in order to overcome the toddler's health problems in the Suku Anak Dalam (SAD) in Jambi Province. The study uses a quasi experiment design. The research sample consisted of 11 parents of toddlers (1-5 years old) Tribe of Children in the Village of Hajran, Batin XXIV Sub-District, Batanghari District, Jambi. Statistical analysis with the significance level of the test $p < 0.05$. The results of the study revealed that the detection card for 1-5 year old children is a valid instrument (coeff: 0,564-0,814) and reliable (coeff: 0,765) in detecting the symptoms of the disease. Based on the analysis of paired samples T test it is known that there is a difference in knowledge before (Mean = 6.45) with after (Mean = 10.18) treatment, thus there is a significant influence (Mean = 3.73. t Test= 5.632, p Value= 0.000) knowledge of parents. The study concluded that the detection card for diseases of infants is a valid and reliable instrument, and there was a significant effect of treatment with the IMCI algorithm.

Introduction

The mortality children under five years old age (toddlers) rate in world is still quite high, each year 6.6 million children under five years age died, 18,000 died almost every day. Most of children under five years age deaths are in developing countries, more than half of it due to acute respiratory tract infections (pneumonia), diarrhoea, measles, malaria, and HIV/AIDS. In addition, malnutrition (54%) was a major factor of all the deaths of child. Globally, in the year 2020 these diseases will contribution main causes death of children in the world. Thus, efforts are constantly made to control it with integrated management strategies for sick toddlers (Alkema et al., 2014).

Although there is an increase in programmes to addressing the problem of

disease, the number of mortality and morbidity still remain high, a variety of innovative ways to reduce mortality and morbidity rate in children starting from pregnancy continue to be developed. The strategy of Integrated Management of Childhood Illness program include curative and preventive efforts to increase improvement in health systems, case management, and health practices by families and communities (Gera et al., 2016).

Integrated Management of Childhood Illness activities have three typical components that benefit, like improving health worker skills in corporate governance children under five years age of illness case, improve health systems, and improve practices in households and communities in home care and find efforts on the case of toddlers of sick treatment (Rakha

✉ Correspondence Address:
Department of Epidemiology, Faculty of Public Health, Universitas Jambi
Email: mdodyizhar@unja.ac.id

et al., 2013).

According to (Kiplagat et al., 2014), Integrated Management of Childhood Illness activities is an effort aimed to lowering number of morbidity and mortality rate while enhancing quality of health services in basic health outpatient units such as community health centers.

Most disease in toddlers can be done corporate governance with integrated management toddlers of sick program activities is a disease that is the leading cause of death such as pneumonia, diarrhea, malaria, measles and conditions in add by nutritional problems (malnutrition and anemia). Integrated management toddlers of sick program approach steps is to use simple algorithms used by nurses and midwives in order to overcome the problem of pain in toddlers. Integrated management of toddlers who is sick is a cost effective interventions to address mortality children under five years age problems caused by acute respiratory tract infections, diarrhoea, measles, malaria, and malnutrition which is often a combination of these circumstances (Firdaus et al., 2013).

Acute respiratory tract infections themselves had dubbed as main killer of infant mortality as well as toddlers in Indonesia (Hidayati, 2011). According data Batanghari of District Health Office acute respiratory tract infection is most disease in 10 of biggest disease in toddlers. A case of pneumonia on toddlers was recorded as much as 24.61% in 2016, and ever experienced extraordinary occurrence of measles in 2012.

One of work areas in Durian Luncuk for Public health center is Batin village. Most of inhabitants are isolated tribes in Jambi province in name Suku Anak Dalam (SAD) or Kubu people or Rimba people. In 2016, the data recorded in Batin Subdistrict as much as 70 household, most types of diseases that plagued by Kubu people such as coughing, diarrhea, malaria and malnutrition.

Different types of disease in toddlers can be prevented by implementing one of government's programs in coping diseases at toddlers with integrated management of toddlers of illness programme. These activities include assessment, classification, and actions

including advice to mothers in form of counselling and follow-up, so that does not occur in morbidity and mortality on toddlers (Gera et al., 2016).

Based on above problems then researchers interested in conducting research with title research Algorithms Tests at Integrated Management of toddlers of illness programme with Disease Detection cards on toddlers at Suku Anak Dalam at Hajran Village Batanghari sub district Jambi province.

Methods

This research is analytical research with quasy experiment two group pre and post test design Aiming research to find out influence Algorithms Tests at Integrated Management of toddlers of illness programme with Disease Detection cards on toddlers for Suku Anak Dalam at Hajran Village Batin XXIV sub district Batanghari district Jambi province. The research was carried out on Suku Anak Dalam at Hajran Village Batin XXIV sub district Batanghari district Jambi province Jambi province starting from March until October 2018.

The population in this study are parents of toddlers who are in Suku Anak Dalam (SAD) group Desa Hajran working area Durian Luncuk community health center Batin XXIV sub district Batanghari district Jambi province. Number of population is 11 people. Number of samples is 11 people. Samples are taken with total population.

Instruments used on this research are integrated management of toddlers of sick format and knowledge Questionnaire of integrated management of toddlers of illness program developed by Ministry of health of Indonesia as well as Disease Detection Cards on children under five years age (IMCI Algorithm), Detection of disease in Suku Anak Dalam (SAD) children under five years age, developed by researcher. The result showed validity coefficient in range 0,564-0,814 and reliability coefficient with cronbach alpha method is 0,765.

Results and Discussion

The characteristics of subject shows that proportions of sex women subject more than men subject that is 7 people (63.63%), where as the characteristics of age, weight and height of subject in outline presented in following table

Table 1. Characteristics of respondents according to age, weight and Height (N Total = 384 subject)

Subject characteristics	Min	Max	Mean \pm Up to
1 Age (years)	3	5	3.91 \pm 0.83
2 Weight (kg)	12	18	12.86 \pm 2.67
3 Height (cm)	70	100	82.27 \pm 11.94

Source: Primary Data, 2018

Table 2. Knowledge of Parents Test results before (Pre-test) and after (Post-test) treatment

		Pre-test Knowledge	Post-test Knowledge
N	Valid	11	11
	Missing	0	0
Mean		6.45	10.18
Median		7.00	10.00
Mode		5	8
Std. Deviation		1.809	2.228
Minimum		3	7
Maximum		9	14

Source: Primary Data, 2018

1. Frequency distribution score Pre-test class experiments can be seen from following table 2.

The results of calculations with statistical analysis software note that the average score of knowledge after more increased (3.73 ± 2.23), this data shows that there is a difference between increasing parents knowledge towards early detection of illness experienced by their children.

Testing prerequisites analysis is done before performing data analysis. Prerequisites which are used in this research is homogeneity and normality test. Analysis prerequisite test results are presented in following: Normality data test results note that data pre-test and post-test results of knowledge has value sig $>$ 0.05, it can be concluded that group data normal distribution. Test results presented in following table 3.

Table 3. Normality Test Summary

No	Knowledge	Sig.	Conclusion
1.	Pre-test	0,466	Normal
2.	Post-test	0,788	Normal

Results of homogeneity test research

variables known value F of 0.588 significantly 0.452. From results of calculation of significant knowledge data (pre-test or post-test) is greater than 0.05 (sig $>$ 0.05), then it can be inferred that data in this study have a variance homogeneity. The results of analysis presented in following table 4.

Table 4. A Summary of Homogeneity Test

Variable	F	Sig.	Conclusion
Knowledge [Pre-test & Post-test]	0.588	0.452	Homogeneous

The t-test analysis before and after treatment aims to find out whether there is an increase in score. Conclusion the study revealed significant when t calculate $>$ t tables at 5% significance level and value of p $<$ 0.05. As for the summary of test t pre-test and post-test experimental class shown in following table 5.

Table 5. The paired t test results summary Pre-test with Post-test

Experiment	Mean	t	p value
Pre-test	6.45	5.632	0.000
Post-test	10.18		

Based on the results of t-test known average pre-test of 6.45 at time of post-test increase to 10.18, making its increase of 3.73. Furthermore based on a test t obtained t count of 5.632 significance with 0.000. The value of t_{table} pada ($df : n-k = 10$, with 5% significance level is 2.228. So value t calculate $> t$ tables ($5,632 > 2,228$) and their significance value less than 0.05 ($p = 0.000 < 0.05$). From the data above, it can be concluded that an increase of 3.73 or there is increased significantly on the score of knowledge of respondents.

In Indonesia many areas that are hard to reach by regular medical services basic such as mountainous regions, inland and swamps, small islands, a cluster of Islands and coastal areas, border areas (Siska, 2018). Other obstacles due to condition availability of public transportation and a routine that is used both by land, sea or air (only 1 time a week), travel time round trip takes more than 6 hours, only available transportation that existed at any time and no public transportation available. This difficult areas there may be facilities health service but without professionals resource and infrastructure is very minimal or indeed location is very far from population (Davy et al., 2016) can be complex. This framework synthesis aimed to identify issues that hindered Indigenous peoples from accessing primary health care and then explore how, if at all, these were addressed by Indigenous health care services. Methods: To be included in this framework synthesis papers must have presented findings focused on access to (factors relating to Indigenous peoples, their families and their communities.

The problem of disparity is meant one of which is experienced by Remote Indigenous Communities (KAT) or previously known as the Isolated Tribes and Isolated Communities in Jambi Province known as Suku Anak Dalam (SAD). The problems experienced by SAD residents are inherent and identical to the Remote Indigenous Communities criteria or characteristics, are complex and multidimensional so that efforts need to be empowered comprehensively, holistically, integrally, and institutionalized (continuously) both by the government, business world and components of civil society.

It is limited access to social, economic and health services. As a logical consequence of remoteness, access to various socio-economic and health services available at the location or around the location is either non-existent or very limited, making it difficult for KAT residents to obtain it in order to improve their quality of life. Examination of health status in SAD is very necessary to be carried out on all age groups, especially toddlers, in order to detect health status and morbidity by implementing several health programs, one of which is to detect comprehensive and quality morbidity events through integrated management of sick toddlers (IMCI).

Organizing an integrated management of sick toddlers programme community based aims to improve access toddlers of illness programme service at community level in difficult access areas to health services. The difficult access area in question is community groups that do not get a sustainable healthcare resources, community groups with constraints of socio-cultural and community groups by geographical, transport and season constraints (Titaley et al., 2014).

Organization of health services with an integrated management toddlers of illness programme approach to community-based are applied to difficult areas access in the district/city (Pradhan et al., 2013) despite being in the late implementation phase of the strategy, continues to report high under-five mortality due to pneumonia, diarrhea, measles, and malnutrition - the main targets of the strategy. Objective: The study determines the factors influencing IMCI implementation at public-sector primary health care (PHC. With the focus of activities for health promotion behavior to search aid health, toddlers of home care and training to community members (Harerimana et al., 2014). In some parts of Indonesia number of health care personnel resources are still limited and its uneven, a comparison between the basic health care facilities with a number of health workers is still not appropriate, this led to health service cannot run continuously. Many areas that have not been estimated the operational costs as well as provision of sufficient logistics to be able to support basic health services for children and mothers are

routinely.

The implementation of IMCI in Durian Luncuk public health center in dealing with sick children still uses the conventional method so that all patients who come are treated in general regardless of their status. The clerk revealed that there was no time to use the MTBS form because there were many patients and activities that needed to be handled. If using the MTBS form, the time spent serving patients will not be enough, because 1 patient requires about 10-15 minutes. Thus the officer said that as much as possible implemented in accordance with the IMCI procedures.

In addition to this, various constraints include the limited number of personnel trained by IMCI, the transfer of trained personnel, incomplete supporting facilities and infrastructure, challenges in the location of work areas that are very far apart and in remote areas and include providing special services to remote indigenous communities namely Suku Anak Dalam (SAD) whose locations are deep in the forest. Providing services to children under five years old SAD routinely has been carried out for 3 months to join with other program health services, so that the application of IMCI procedures has not been done completely and correctly.

Based on these problems the researchers developed the MTBS algorithm format from the form of media images that are identical to the symptoms or special signs of disease problems experienced by SAD of infants with the name Disease Detection Card. The instrument is deemed relevant by the author, the instrument test results are known to be quite valid and reliable instrument. This instrument was developed bearing in mind the limitations of the ability to disclose the signs and symptoms of disease by SAD residents due to primitive language and cultural barriers and other common obstacles namely education, knowledge, information about health and disease.

The results showed have difference in knowledge of respondent before and after treatment with a mean average: 3.73. Thus the given treatment Disease Detection Cards on toddlers (1-5) are very influential towards knowledge of parents against symptoms of

disease in order to early detection of diseases. This research is not in line with other studies suggesting that there is no meaningful relationship between the variables were tested by behavior of officers in implementation of an integrated management children under five years age sick programme. Knowledge is basis for formation of one's actions. The existence of variation knowledge indicates knowledge of someone affected by a variety of factors among other levels of education, information, culture, experience and social economy. The lack of a relationship between knowledge with the implementation of integrated management children under five years age sick programme due to knowledge does not always change the mindset of person's behavior (Dalglish, 2018).

The use of media can also be used as an effort to increase the knowledge and awareness of individuals and the public about health problems and changes in healthy behavior (Boles et al., 2014). Another alternative that can be done in assessing the health status of children under five can be used with the method of using image media that facilitates increased knowledge and is able to interpret signs of a person's illness which is limited by language and cognitive abilities (Islami, 2018).

The results of other studies suggests that implementation of an integrated management of toddlers of illness programme can give impact to the level of children under five years age health, due to early parents can recognize early symptoms of onset disease. Application of integrated management of toddlers of illness programme strategy can be used as a way to make a concerted effort to prevention and disease control (Shewade et al., 2013; Odotei Adjei, 2013).

The results showed that communication factor, resources, predisposing and bureaucratic structure affects implementation of integrated management toddlers of illness programme in public health centre. The officer who served toddlers sick not yet support successful achievement of objectives integrated management children under five years age sick programme because not all officers get integrated management toddlers of illness programme training, number of officers who are not proportional to number of toddlers

of illness visit. All health officers integrated management children under five years age sick programme had a positive attitude to support integrated management of toddlers of illness programme though already available Standard Operational Procedures (SOP) but not all officers to use them in service of integrated management of toddlers of illness program. The construction of health service is not done routinely, supervision are still common and no follow-up given (Firdaus et al., 2013).

Community groups with socio-cultural barriers and socioeconomic and sosiokultural constraints causing parents to be less knowledgeable about health services especially for of toddlers (Zulaikha et al., 2018). On community groups who live sedentary on this group much needed cross-sector engagement, anthropologist, community organizations, public figures including religious figures and customs in order to approach, education and dissemination of information about health services (Sagrim et al., 2015).

The limited knowledge of a person will have an impact on the lack of understanding of the information conveyed, the solution to good communication between health workers and *Suku Anak Dalam* (SAD) has great potential in helping patients to regulate emotions, improve understanding of medical information, perceptions and expectations, build a sense of trust the health workers who handle it so that they will comply with all suggestions and advice. But it is not easy for health workers to extract information from SAD. It is necessary to create a good relationship between the two parties to achieve success in the treatment of patients. Communication is one of the competencies that doctors must have (Kusuma, 2013).

Some communication problems in the health sector that often surface, are more due to lack of understanding of communication by both parties, both officers and the public. It is ironic that in the midst of technological and medical developments today the Indonesian people are actually still very backward in terms of health. This is reflected in the behavior of the people who, because of their ignorance, surrendered their full fate to health workers, so they often become victims of malpractice, or even act ignorant and seek shortcuts by treating

themselves (Hutagaol, E. E & Agustin, 2012).

Suku Anak Dalam is a remote traditional community that has a culture and habits that they have followed for generations, local wisdom towards the statement that illness and treatment all originate from nature, traditional medicine and belief in gods. Therefore, the change in health behavior that will be carried out requires an understanding of the importance of cultural aspects, because society and human culture everywhere are always in a state of change, including those with primitive culture that are isolated from community relations outside their own location. Changes that occur in primitive cultures occur because of causes that originate from within the community and the culture itself (Samovar et al., 2014).

According to Samovar et al, (2014) often a lot of people get informal learning that is sometimes difficult to recognize, usually occurs through interaction, observation, and imitation. Informal learning often occurs in daily life through interactions in family, friends, and the community. Likewise in the context of learning the tradition of treatment and disease. The next generation of the community of *Suku Anak Dalam* will learn through interaction, observation, and imitation, namely how parents follow changes in health behavior in everyday life is important. In the end the next generation of the community of *Suku Anak Dalam* imitates what their parents have done.

Thus changes in healthy behavior, prevention, early detection of disease events in SAD is something that is very comprehensive and sustainable with the principle of community empowerment about health. These things are influenced by several interrelated aspects of one another including knowledge, information and understanding of health, culture and communication through an instrument in the form of simple and attractive visual media so that the application of health services can be adopted, and in the context of achieving the purpose of fostering the welfare of isolated indigenous communities is to empower remote indigenous communities in all aspects of life and livelihood so that they can live naturally, physically, spiritually and socially so that they can play an active role in development, the implementation of which is carried out with

due regard to local customs.

Conclusion

The algorithm implementation of integrated management of toddlers of illness programme for *Suku Anak Dalam* (SAD) or Kubu people or Rimba people in Hajran village Batin XXIV sub-district Batanghari district Jambi Province can run well marked with Disease Detection Card instrument on of toddlers very valid and reliability. There is influence of the treatment card early detection of disease in of toddlers (integrated management of of toddlers of illness programme algorithms) to knowledge of *Suku Anak Dalam* (SAD) parents in Hajran village Batin XXIV sub-district Batanghari district Jambi Province. To a later date in order to be alert (early detection) when their children is experiencing symptoms of certain diseases.

Reference

- Alkema, L., Chao, F., You, D., Pedersen, J., & Sawyer, C.C., 2014. National, Regional, and Global Sex Ratios of Infant, Child, and Under-5 Mortality and Identification of Countries with Outlying Ratios: A Systematic Assessment. *The Lancet Global Health*, 2(9), pp.e521–e530.
- DalGLISH, S.L., 2018. Methods for the Strategic Review of Programmes for Integrated Management of Childhood Illness and Community Cases. *BMJ (Clinical Research Ed.)*, 362, pp.k2989.
- Davy, C., Harfield, S., McArthur, A., Munn, Z., & Brown, A., 2016. Access to Primary Health Care Services for Indigenous Peoples: A Framework Synthesis. *International Journal for Equity in Health*, 15(1), pp.1–9.
- Firdaus, N., Sudiro., & Mawarni, A., 2013. Implementasi Program Manajemen Terpadu Balita Sakit (MTBS) Puskesmas Wilayah Kabupaten Pasuruan. *Jurnal Manajemen Kesehatan Indonesia*, 1(1), pp.54–60.
- Gera, T., Shah, D., Garner, P., Richardson, M., & Sachdev, H.S., 2016. Integrated Management of Childhood Illness (IMCI) Strategy for Children Under Five. *The Cochrane Database of Systematic Reviews*, 6.
- Harerimana, J.M., Nyirazinyoye, L., Ahoranyezu, J.B., Bikorimana, F., Hedt-Gauthier, B.L., Muldoon, K.A., Mils, E.J., & Ntaganira, J., 2014. Effect of Shortened Integrated Management of Childhood Illness Training on Classification and Treatment of Under-five Children Seeking Care in Rwanda. *Risk Management and Healthcare Policy*, 7, pp.99–104.
- Hidayati, A.N., & Wahyono, B., 2011. Pelayanan Puskesmas Berbasis Manajemen Terpadu Balita Sakit Dengan Kejadian Pneumonia Balita. *KESMAS-Jurnal Kesehatan Masyarakat*, 7(1), pp.35–40.
- Hutagaol, E.E., & Agustin, H., 2012. Komunikasi Interpersonal Petugas Kesehatan dalam Kegiatan Posyandu di Wilayah Kerja Puskesmas Muara Siberut Kabupaten Mentawai. *Jurnal Kesehatan Masyarakat Andalas*, 6(2), pp.104–112.
- Islami, W., & Agustiansyah, A., 2018. Efektivitas Modifikasi Cakram Gizi Sebagai Media Lingkaran Status Gizi Untuk Meningkatkan Keterampilan Kader Dalam Menentukan Status Gizi Balita. *Pontianak Nutrition Journal (PNJ)*, 1(2), pp.82–86.
- Kiplagat, A., Musto, R., Mwizamholya, D., & Morona, D., 2014. Factors Influencing the Implementation of Integrated Management of Childhood Illness (IMCI) by Healthcare Workers at Public Health Centers & Dispensaries in Mwanza, Tanzania. *BMC Public Health*, 14(1), pp.1–10.
- Kusuma, S., 2013. Teknik Komunikasi Dalam Perubahan Sosial. *Ijtima'iyya*, 6(1), pp.79–96.
- Odotei, A.R., 2013. Health Behaviour Change: Advancing the Utility of Motivational Interviewing(MI) to Health Promotion. *Journal of Addiction Research & Therapy*, 4(5).
- Pradhan, N.A., Rizvi, N., Sami, N., & Gul, X., 2013. Insight into Implementation of Facility-based Integrated Management of Childhood Illness Strategy in a Rural District of Sindh, Pakistan. *Global Health Action*, 6(1).
- Rakha, M.A., Abdelmoneim, A.N.M., Farhoud, S., Pièche, S., Cousens, S., Daelmans, B., & Bahl, R., 2013. Does Implementation of the IMCI Strategy Have an Impact on Child Mortality? A Retrospective Analysis of Routine Data from Egypt. *BMJ Open*, 3(1), pp.1–9.
- Sagrim, M., Noor, N.N., Thaha, R., & Maidin, A., 2015. Kearifan Lokal Komunitas Adat Terpencil Suku Taburta Dalam Perilaku Hidup Bersih Dan Sehat Berbasis Rumah Tangga. *Media Kesehatan Masyarakat Indonesia Universitas Hasanuddin*, 11(4), pp.218–227.
- Samovar, Larry A., Porter, R.E., & McDaniel, E.R., 2014. *Komunikasi Lintas Budaya*. Jakarta: Salemba Humanika.
- Shewade, H.D., Aggarwal, A.K., & Bharti, B., 2013. Integrated Management of Neonatal and Childhood Illness (IMNCI): Skill Assessment of Health and Integrated Child Development

- Scheme (ICDS) Workers to Classify Sick Under-five Children. *Indian Journal of Pediatrics*, 80(6),pp.448—454.
- Siska, A., 2018. Kondisi Kesehatan Masyarakat Kelompok Adat Terpencil (KAT) di Kepulauan Mentawai, Sumatera Barat. *Berita Kedokteran Masyarakat*, 8(2005),pp.11.
- Titaley, C., Jusril, H., Ariawan, I., Soeharno, N., Setiawan, T., & Weber, M., 2014. Challenges to the Implementation of the Integrated Management of Childhood Illness (IMCI) at Community Health Centres in West Java province, Indonesia. *WHO South-East Asia Journal of Public Health*, 3(2),pp.161.
- Zulaikha, F., Triasih, R., & Purwanta., 2018. Knowledge and Implementation of Integrated Management of Childhood Illness at East Kalimantan. *KEMAS: Jurnal Kesehatan Masyarakat*, 14(2),pp.163–171.



Insomnia and Quality of Life in the Elderly: WHOQOL-BREF and WHOQOL-OLD Indonesian Version

Binar Cinta^{1✉}, Sharon Gondodiputro², Santi Andayani³

¹Faculty of Medicine, Padjadjaran University, Bandung, Indonesia

²Department of Public Health, Faculty of Medicine, Padjadjaran University, Bandung, Indonesia

³Department of Psychiatry, Faculty of Medicine, Padjadjaran University, Bandung, Indonesia

Article Info

Article History:

Submitted January 2020

Accepted January 2020

Published November 2020

Keywords:

Elderly, insomnia, quality of life, WHOQOL-BREF, WHOQOL-OLD

DOI

<https://doi.org/10.15294/kemas.v16i2.22895>

Abstract

In Indonesia, the Elderly are someone who has reached the age of 60 years old and over. Along with the aging, there will be changes in sleep pattern and awakening process so that insomnia will appear. Insomnia can cause decrease in quality of life. The aim of this study was to analyze the relationship between insomnia and quality of life in elderly which measured by WHOQOL-BREF and WHOQOL-OLD Indonesian version. The quantitative analytical cross-sectional study had been carried out to 60 elderly from 6 Public Health Centers in Bandung City, West Java, Indonesia. This study was conducted from August to November 2019. Insomnia was measured by Insomnia Severity Index and quality of life was measured by WHOQOL-BREF and WHOQOL-OLD Indonesian version. The Spearman correlation test was used for data analysis. This study discovered that the proportion of insomnia in the elderly was 36,7%(95%ci:24.5%-48.9%). The correlation coefficient between insomnia and quality of life was -0,386 (WHOQOL-BREF) and -0,302 (WHOQOL-OLD). It can be concluded that the proportion of insomnia in the elderly is high and there is a correlation between insomnia and quality of life even though the correlation is weak.

Introduction

Aging will cause changes in sleep patterns and awakening process.(Sateia, 2010) Changes in sleep patterns and awakening process can cause one of the sleep disorders namely insomnia. Insomnia is a subjective complaint in the form of difficulty starting to sleep, difficulty maintaining sleep, and waking up too early which appears at least three nights a week and lasts for three months (Rodriguez, Dzierzewski, Alessi, 2015). Insomnia can cause several consequences such as difficulty concentrating, mood disorders, fatigue, anxiety about sleep patterns, increasing the risk of falling, and difficulties both physically and psychologically. Difficulty concentrating, fatigue, physical difficulties, and psychological

difficulties can affect the quality of life of the elderly (Rodriguez, Dzierzewski, Alessi, 2015).

According to World Health Organization (WHO), quality of life (QoL) is an individual perception about their position in life, in the context of culture and values in their surrounding environment, as well as with the goals, expectations, standards and attention of each individual.(Soósová, 2016) A study conducted by I. Uchmanowicz discovered that sleep problems had a significant negative impact on the QoL. (Uchmanowicz et al., 2019)

One of the instruments to measure insomnia that frequently used is the Insomnia Severity Index (ISI). This instrument composes of seven items that assess the nature, severity, and impact of insomnia. This instrument

✉ Correspondence Address:
Faculty of Medicine, Padjadjaran University, Bandung, Indonesia
Email: binarcinta@yahoo.com

consists of several items which are the severity of sleep onset, sleep maintenance, waking up too early, dissatisfaction with sleep, the relationship between sleep disturbance and function during the day, sleep disturbance seen by others, and difficulties arising from sleep disorders. (Morin et al., 2011) it often remains unrecognized and untreated. Brief and valid instruments are needed both for screening and outcome assessment. This study examined psychometric indices of the Insomnia Severity Index (ISI)

The World Health Organization developed several instruments for measuring the quality of life which is the World Health Organization Quality of Life (WHOQOL)-100 (WHOQOL-100), World Health Organization Quality of Life (WHOQOL)-BREF (WHOQOL-BREF), and specifically for the elderly is World Health Organization Quality of Life (WHOQOL)-OLD (WHOQOL-OLD) in addition to WHOQOL-100 or WHOQOL-BREF instruments. The Indonesian version of the WHOQOL-BREF instrument consists of 24 items covering four dimensions which are physical aspects, psychological aspects, social aspects, and environmental aspects. (Purba et al., 2018) The Indonesian version of the WHOQOL-OLD consists of 24 items covering six dimensions which are sensory ability; autonomy; past, present and future activities; participation; death and dying; and intimacy. (Gondodiputro et al., 2019)

Studies on the correlation between insomnia and QoL using both WHOQOL-BREF and WHOQOL-OLD Indonesian version has not been carried out, therefore, the aim of this study was to analyze the correlation between insomnia and quality of life in elderly as measured using the Indonesian version of WHOQOL-BREF and WHOQOL-OLD.

Method

A quantitative analytic study with a cross-sectional approach had been carried out from August 2019 to November 2019 in Bandung City, West Java, Indonesia. The population of this study was the elderly who were aged ≥ 60 years and who came for treatment at the Public Health Centers (*Puskesmas*). The inclusion criteria in this study were respondents aged ≥ 60 years, both men and women, came to

Public Health Center for treatment, would participate in this study, were able to speak and hear well, did not suffer from cognitive impairment as measured by a mini-cog test, and did not suffer from severe psychotic disorders as measured by MINI-Psychotic Symptoms. The exclusion criteria were the respondents who were not able to fill all the questionnaires until the end. The total sample needed in this study was 60 respondents; therefore 6 from 80 Public Health Centers were selected using random number by the help of a computer. The respondents were taken from each Public Health Center using a consecutive sampling technique. This study was approved by the Ethics Commission of Padjadjaran University and The Bandung Municipality Health Office. The variables studied were insomnia and quality of life. Insomnia was measured using the Insomnia Severity Index (ISI) consisted of seven items, which were the severity of sleep onset, sleep maintenance, waking up too early, dissatisfaction with sleep, the relationship between sleep disturbance and function during the day, sleep disturbance seen by others, and difficulty which arises from sleep disorders. Each item was answered using a Likert Scale from zero to four. Zero point indicated no problems and four points indicated very severe problems. The total value of each item in this questionnaire was 0 to 28. The assessment of insomnia status was 0-7: no insomnia; 8-14: sub-threshold insomnia; 15-21: moderate insomnia; and 22-28: severe insomnia (Morin et al., 2011) it often remains unrecognized and untreated. Brief and valid instruments are needed both for screening and outcome assessment. This study examined psychometric indices of the Insomnia Severity Index (ISI).

Quality of life was measured using The Indonesian version of The WHOQOL-BREF and WHOQOL-OLD. The WHOQOL-BREF instrument was a questionnaire consisted of 26 items, two of them assess quality of life and overall health, 24 items consisted of four dimensions which were physical health (7 items), psychological (6 items), social relations (3 items), and environment (8 items). (Purba et al., 2018) The WHOQOL-OLD instrument was a questionnaire consisting of 24 items with six dimensions, each dimension contained four

items. The six dimensions were sensory ability, independence, past activities, present, past and future activities, participation, death and dying, and intimacy.(Gondodiputro et al., 2019) The score of each item both in WHOQOL-BREF and WHOQOL-OLD instruments used a Likert scale from one to five. After the questionnaire was filled out by the respondents, each dimension was added up, then the total score of each dimension was converted to a scale from zero to one hundred (World Health Organization, 2006).

Prior to data collection, selected respondents were given an explanation of the objectives, procedures, and risks of this study. After respondent agrees to participate in this study, they signed the informed consent form. The data collection was carried out by guiding the respondents to answer the statements listed in the questionnaire of the ISI, WHOQOL-BREF and WHOQOL-OLD.

The categorical data from ISI scores and scores from each domain at both WHOQOL-BREF and WHOQOL-OLD, were transformed into interval data in the form of logit unit values using the Rasch Modelling, assisted by the Winstep program version 3.73.(Boone, 2016) The logit unit value obtained was tested for normality using Kolmogorov-Smirnov, assisted by the IBM® SPSS® version 22.0 program. The

result of the normality test indicated that the transformed data were not normally distributed so the correlation test used in the study was the Spearman correlation test. The interpretation of the correlation coefficient was 0.00-0.10: there was no correlation; 0.10-0.39: weak correlation; 0.40-0.69: moderate correlation; 0.70-0.89: strong correlation; and 0.90-1.00: very strong correlation (Schober & Schwarte, 2018). If the p value <0.05 indicates there is a significant relationship between insomnia and quality of life.

Result and Discussion

The study on the correlation between insomnia and quality of life in elderly had been carried out to 60 respondents from 6 *Puskesmas* in Bandung. This study discovered that 81.7% of respondents were aged 60-70 years, 66.7% were female, 73.3% were married, 41.7% had elementary school education and below, and 75% did not work. Insomnia is a sleep disorder that often occurs in the elderly (El-Gilany et al., 2017; Suzuki et al., 2017). The prevalence of insomnia in elderly varies, and is higher than in adults (Suzuki, Miyamoto, Hirata, 2017). A study conducted by Woo Jung Kim et al (2017) found the prevalence of insomnia is 32.4% (Kim et al., 2017). A study conducted in Nepal, found a prevalence of insomnia is 40.6% (Chhantyal, Rekha, 2017). Our study discovered that the

Table 1, Respondent Characteristics and Insomnia

No.	Characteristic	Not Insomnia		Insomnia	
		n	%	n	%
1.	Age				
	60-70 years old	31	81.6	18	81.8
	>70 years old	7	18.4	4	18.2
2.	Gender				
	Male	14	36.8	6	27.3
	Female	24	63.2	16	72.7
3.	Marital Status				
	Married	30	78.9	14	63.6
	Divorced	8	21.2	8	36.4
4.	Education				
	Elementary School	12	31.6	13	59.1
	Junior High School	13	34.2	3	13.6
	Senior High School	7	18.4	6	27.3
	>Senior High School	6	15.8	0	0,0
5.	Profession				
	Unemployed	29	76.3	16	72.7
	Employed	9	23.7	6	27.3

Source: Primary Data, 2019

Table 2, Severity Level of Sleep Disorders

No.	Sleep Disorders	None n (%)	Low n (%)	Moderate n (%)	Severe n (%)	Very Severe n (%)	Total n (%)
1.	Difficulty falling asleep	41 (68.3)	6 (10.0)	5 (8.3)	4 (6.7)	4 (6.7)	60 (100.0)
2.	Difficulty staying asleep	32 (53.3)	6 (10.0)	10 (16.7)	8 (13.3)	4 (6.7)	60 (100.0)
3.	Waking up earlier than usual	46 (76.7)	2 (3.3)	4 (6.7)	6 (10.0)	2 (3.3)	60 (100.0)

Source: Primary Data, 2019

proportion of insomnia in the elderly was 22 out of 60 respondents (36.7%, 95% CI:24.5%-48.9%). The prevalence of insomnia is higher in elderly than in general population. Not all of the elderly seek for a professional help, made it under-diagnosed and under-treated.(Mukku et al., 2018) Moreover, there are some of the important misconceptions about insomnia in elderly, among others:

“reduced sleep is a normal aging phenomenon; reduced sleep in elderly is due to lack of any specific reason; elderly generally sleep during daytime, so they do not sleep at night; sleep problems in the elderly is a trivial issue; insomnia in the elderly does not require any specific professional help; insomnia in elderly just requires medicine prescription for few days; insomnia in elderly is always due to physical illness and elderly cannot sleep without sleeping pills.” (Mukku et al., 2018)

From 22 respondents who experienced insomnia, 14 respondents experienced sub-threshold insomnia, 7 respondents experienced moderate insomnia, and only 1 respondent experienced severe insomnia. It appeared that the majority of respondents who experienced insomnia were aged 60-70 years, female, had a junior high school education or below, married, and not working.(Table 1)

The incidence of insomnia in the elderly is related to the presence of comorbidities both physically and mentally, the use of drugs, and changes in sleep patterns (El-Gilany et al.,

2017; Suzuki et al., 2017). Changes in sleep patterns occur due to increased time spent in bed, awakening at night, as well as taking a nap.(Uchmanowicz et al., 2019) In the elderly, deeper stages of sleep which is stage three or slow wave sleep and REM stage lasts for a shorter period of time, whereas lighter sleep lasts for a longer period of time.(Uchmanowicz et al., 2019) Aging process also affects circadian rhythm. (Mattis & Sehgal, 2016; Miner & Kryger, 2017). The impact of the changes of the circadian rhythm is the occurrence of insomnia, consists of difficulty starting sleep, difficulty maintaining sleep, and waking up too early which appears at least three nights a week and lasts for three months (Rodriguez, Dzierzewski, Alessi, 2015).

Sleep disorders detected by The ISI questionnaire, in the form of three symptoms, namely difficulties in falling asleep, in staying asleep, and waking up earlier than usual. This study discovered that, as many as 10 elderly (16.7%) had difficulty in staying asleep with a ‘moderate’ severity and as many as 6 elderly (10.0%)had woken up earlier than usual (Table 2).

The sleep disorders can arise with more than one symptom. This study revealed that the proportion of the elderly who experienced two sleep symptoms (20.0%) was higher than the elderly who experienced one symptom (18.3%) or three symptoms (15.0%). The most common sleep symptoms that occur together were the difficulty falling asleep and difficulty staying asleep (66.7%).

Table 3, Number of Symptoms on Sleep Disorders

No.	Symptoms	n=60	%
1.	No symptom	28	46.7
2.	One symptom	11	18.3
	Difficulty falling asleep	1	9.1
	Difficulty staying asleep	9	81.8
	Waking up earlier than usual	1	9.1
3.	Two symptoms	12	20.0
	Difficulty falling asleep and difficulty staying asleep	8	66.7
	Difficulty falling asleep and waking up earlier than usual	1	8.3
	Difficulty staying asleep and waking up earlier than usual	3	25
4.	Three symptoms	9	15.0

Source: Primary Data, 2019

Insomnia in elderly can have a negative effect on sleep quality that causes fatigue during the day, cognitive impairment, decreased physical and psychological health, and decreased quality of life (El-Gilany et al., 2017). Our study discovered that the median score of the four dimensions of the WHOQOL-BREF in the respondents who experienced insomnia was lower than the median score in the respondents who did not experience insomnia. (Table 4)

This study discovered that the median score from the dimensions of sensory ability; past, present and future activities; death and dying in the respondents who experience insomnia was lower than the respondents who did not experience insomnia, whereas in the domain of autonomy; participation; and intimacy, the median score both for respondents who did not experience insomnia and who experienced insomnia was equal.

Correlation test was conducted to analyze the correlation between insomnia and quality of life in elderly. This study discovered that there was a negative correlation between insomnia and quality of life using WHOQOL-BREF, but the correlation was weak (-0,386). In the physical domain, the correlation was moderate (-0,518). Negative correlation also occurred between insomnia and quality of life using WHOQOL-OLD with weak correlation

Table 4, Insomnia and Quality of Life Score in Elderly using WHOQOL-BREF

	WHOQOL-BREF			
	Physical	Psychological	Social	Environment
Not Insomnia (n=38)				
Median	69	69	69	69
Minimum	38	44	44	56
Maximum	88	81	75	81
Insomnia (n=22)				
Median	56	59.5	56	63
Minimum	38	44	25	38
Maximum	81	88	100	94

Source: Primary Data, 2019

Table 5, Insomnia and Quality of Life Score in Elderly using WHOQOL-OLD

	WHOQOL-OLD					
	Sensory Ability	Autonomy	Past, present, and future activities	Participation	Death and Dying	Intimacy
Not Insomnia (n=38)						
Median	87.5	62.5	68.75	68.75	81.25	75
Minimum	56.25	50	31.25	50	25	12.5
Maximum	100	100	81.25	81.25	100	100
Insomnia (n=22)						
Median	84.375	62.5	62.5	68.75	62.5	75
Minimum	25	43.75	6.25	25	18.75	37.5
Maximum	100	100	81.25	100	100	100

Source: Primary Data, 2019

Table 6, The Spearman Correlation Test between Insomnia and WHOQOL-BREF and WHOQOL-OLD

Insomnia	WHOQOL-BREF			
	Physical	Psychological	Social	Environment
Correlation Coefficient	-0.518	-0.159	-0.117	-0.106
p-value	0.000	0.224	0.374	0.422

	WHOQOL-OLD						Total
	Sensory Ability	Autonomy	Past, present, and future activities	Participation	Death and Dying	Intimacy	
Correlation Coefficient	-0.257	-0.049	-0.019	-0.074	-0.226	0.015	-0.302
p-value	0.047	0.711	0.888	0.573	0.082	0.912	0.019

Source: Primary Data, 2019

(-0.302). Other study discovered that there was significant negative relationship between sleep disorders and quality of life (Tel, 2013).

This study had limitations. The use of the cross-sectional method makes the causal relationship between insomnia and quality of life cannot be determined. Other limitation was that the risk factors contributed to insomnia had not been studied.

Conclusions

It can be concluded that 36.7% elderly had insomnia. A negative correlation was discovered between insomnia and the quality of life in elderly even though the correlation was weak. In the future, the Public Health Center could give early interventions to insomnia in the elderly in order to prevent several consequences caused by insomnia and

to enhance their quality of life. A further study should be carried out to analyze the risk factors contributed to insomnia.

We thank all the head and staff of six Public Health Centers in Bandung City to facilitate this study and all the elderly who participate in this study. We also thank Dr. Deni K. Sunjaya, dr., DESS who gave us permission for using the Winstep program version 3.73.

References

- Boone, W. J. (2016). Rasch Analysis for Instrument Development: Why, When, and How? *CBE Life Sciences Education*, 15(4), 1–7.
- Chhantyal, A., & Rekha, T. (2017). Factors Associated with Insomnia Among Elderly of A Selected Community of Lalitpur. *Journal of Gerontology & Geriatric Research*, 06(02), 1–7.
- El-Gilany, A.-H., Saleh, N., Mohamed, H., & Elsayed, E. (2017). Prevalence of Insomnia and Its Associated Factors Among Rural Elderly: A Community-based Study. *International Journal of Advanced Nursing Studies*, 6(1), 56.
- Gondodiputro, S., Wiwaha, G., Lionthina, M., & Sunjaya, D. (2019). Reliability and Validity of The Indonesian WHOQOL-OLD Version: A Rasch Modelling. *Unpublished*.
- Kim, W. J., Joo, W. T., Baek, J., Sohn, S. Y., Namkoong, K., Youm, Y., Kim, H. C., Park, Y. R., Chu, S. H., & Lee, E. (2017). Factors Associated With Insomnia Among The Elderly in A Korean Rural Community. *Psychiatry Investigation*, 14(4), 400–406.
- Mattis, J., & Sehgal, A. (2016). Circadian Rhythms, Sleep, and Disorders of Aging. *Trends in Endocrinology and Metabolism*, 27(4), 192–203.
- Miner, B., & Kryger, M. H. (2017). Sleep in the Aging Population. *Sleep Medicine Clinics*, 12(1), 31–38.
- Morin, C. M., Belleville, G., Bélanger, L., & Ivers, H. (2011). The Insomnia Severity Index: Psychometric Indicators To Detect Insomnia Cases and Evaluate Treatment Response. *Sleep*, 34(5), 601–608.
- Mukku, S. S. R., Harbishettar, V., & Sivakumar, P. T. (2018). Insomnia in Elderly: A Neglected Epidemic. *Journal of Geriatric Mental Health*, 5(2), 84–93.
- Purba, F., Hunfeld, J., Iskandarsyah, A., Fitriana, T., Sadarjoen, S., Passchier, J., & et.al. (2018). Quality of Life of The Indonesian General Population: Test-retest Reliability and Population Norms of the EQ-5D-5L and WHOQOL-BREF. *PLoS ONE*, 13(5), 1–20.
- Rodriguez, J. C., Dzierzewski, J. M., & Alessi, C. A. (2015). *Sleep Problems in the Elderly*. 99(2), 431–439. <https://doi.org/10.1016/j.mcna.2014.11.013.Sleep>
- Sateia, M. J. (2010). Introduction: History, Definition, and Epidemiology. In M. J. Sateia & D. J. Buysse (Eds.), *Insomnia, Diagnosis and Treatment* (p. 5). Informa Healthcare.
- Schober, P., & Schwarte, L. A. (2018). Correlation Coefficients: Appropriate Use and Interpretation. *Anesthesia and Analgesia*, 126(5), 1763–1768.
- Soósová, M. S. (2016). Determinants of Quality of Life in The Elderly. *Central European Journal of Nursing and Midwifery*, 7(3), 484–493.
- Suzuki, K., Miyamoto, M., & Hirata, K. (2017). Sleep Disorders in The Elderly: Diagnosis and Management. *Journal of General and Family Medicine*, 18(2), 61–71.
- Tel, H. (2013). Sleep Quality and Quality of Life Among The Elderly People. *Neurology Psychiatry and Brain Research*, 19(1), 48–52.
- Uchmanowicz, I., Markiewicz, K., Uchmanowicz, B., Kołtuniuk, A., & Rosińczuk, J. (2019). The Relationship Between Sleep Disturbances and Quality of Life in Elderly Patients with Hypertension. *Clinical Interventions in Aging*, 14, 155–165.
- World Health Organization. (1996). *WHOQOL-BREF, Introduction, Administration, Scoring and Generic Version of The Assessment*. Programme on Mental Health WHO.
- World Health Organization. (2006). *WHOQOL-OLD Manual*. WHO-European Office.



Performance of Papua Petanque Athletes Facing Covid-19

Kurdi¹✉, Rif'iy Qomarrullah, I Putu Eka Wijaya Putra

¹Department of Sport Science Cenderawasih of University, Jayapura, Papua Indonesia

Article Info

Article History:

Submitted July 2020

Accepted August 2020

Published November 2020

Keywords:

Covid-19, petanque, elite athlete

DOI

<https://doi.org/10.15294/kemas.v16i2.25444>

Abstract

This research is a new paradigm mix method by combining grounded theory and case study construction, which involved 11 elite Papuan petanque athletes, data taken from March to May 2020. Data instruments using physical test data, observations, questionnaires, documents, and interviews. Data analysis combines two elements, namely: qualitative, and quantitative. Then the results and discussion in this study are: (1) The health quality of athletes experiencing problems, this is marked by an increase in the proportion of body weight; (2) The physical quality of the athlete experienced a decrease in physical quality before the occurrence of a pandemic above 81.80% and dropped to below 72.70%; (3) Psychologically, when viewed from the aspect of motivation (institutions and extrinsic), it is categorized as high during the pandemic. This research empirically provides a description of the impact received as a result of the Covid-19 outbreak in sports achievements. Steps that can be taken, namely coaching and competition must continue to run based on applicable health protocols and the importance of maintaining health and physical activity for elite athletes.

Introduction

Clean and healthy air becomes the main estuary of the pulse of human life (Rochman, Nasrudin, Muslim, & Hermita, 2017), because with these prerequisites humans can have a prime and healthy life. Health is the degree to which humans are able to carry out activities without disease disorders, and perform stable mental states (Purcell, Gwyther, & Rice, 2019). The productivity of active human performance is strongly influenced by three main elements of health: (1) Physical, where humans can work optimally without feeling tired (Najib, Nisa, Nugroho, Widowati, & Yang, 2020); (2) Mental, when someone produces the best work with full awareness (Parnabas, Parnabas, & Parnabas, 2015); and (3) Spiritual, namely the vertical relationship between creator and creature, and horizontal between all creatures of the universe (Hanani, 2017). The three combinations are

then implemented in sports into the spirit of hard work, smart work, and sincere work. The whole series of work and human health on earth today is very disturbed by the emergence of a pandemic disease phenomenon. Covid-19 or (corona virus disease) horrendous at the end of 2019, the total world of this virus has infected more than 300,000 people with the percentage of mortality reaching more than 30%. The latest developments in Indonesia until June 7, 2020 the number of cases of Covid-19 reached 31,186. In addition to the continuing increase in numbers, there is something more important that this virus outbreak has not yet been found as a vaccine drug, and has had a wide impact on all sectors of the world community interaction. The characteristics of Covid-19 are still mysterious, where the virus can infect people through transmission of nasal or mouth splashes from infected people (Buana,

✉ Correspondence Address:

Department of Sport Science Cenderawasih of University, Jayapura, Papua Indonesia
Email: kurdi_pranata35@yahoo.com

2020). Objects around humans that have been exposed to Covid-19 radiation can then be a conduit of this virus and then be transmitted to people who touch it or are in the reach of the radius through the air gusts. Then people affected by this virus experience high fever, cough symptoms, influenza-like colds, sore throat and diarrhea (Hanoatubun, 2020). The active incubation period in the human body is approximately 14 days, and this virus is able to survive freely in the air for 3 hours before dying by itself (Pakpahan, 2020).

The impact of co-19 with social distancing also hit the elite of Papuan petanque athletes in welcoming the 2020 National Sports Week (PON) which was later postponed in 2021. Medal productivity as a means of achievement is greatly supported by maximum physical, mental, technical and tactical performance (Widowati, 2015). Some of the objectives in the organization of PON include: (1) As a manifestation of the unity of nationalism, within one country of Indonesia; (2) Equitable development, Indonesia is a unique country separated by inter-land seas in various islands with ethnic, cultural and religious diversity; (3) Participation as a global citizen who preserves sports value, medical devices and achievements, this is in accordance with its motto: "sport for all"; and (4) Reflections on entertainment, performing arts, and economic turnaround, where it is said that the success of the PON is the success of the match and the success of the host is a socioeconomic success.

Speaking of PON is the contingent of Papua as the host also did not escape the impact obtained. There are 1000 more Papuan athletes stagnated due to disruption of the registered training program. When dissected more deeply, the Papuan petanque sport (Cabor) is greatly affected by the limited access. After getting a fresh breath of hope that petanque as a sport that is starting to rise is finally allowed to compete in the competition as a series of PON outside Papua, but the bitter pill must be accepted when the reality that occurs at this time is an extraordinary event due to Covid-19. Petanque is one of the relatively new sports in Indonesia and especially Papua, this sport began to emerge and was popular in the late 2016's. At first petanque was introduced in

a limited circle within the scope of students and lecturers at the Faculty of Sports Science (FIK) at Cenderawasih University (Uncen). Furthermore, with the support of Uncen and KONI (Indonesian National Sports Committee) Papua Province Petanque developed into an increasingly well-known sport in Papua. This development has led to the formation of elite Papuan Petanque elite contingents. Towards the XX PON event in Papua, all preparations and programs have been carried out and arranged carefully. The research that has been carried out has the main objectives of: (1) Assessing the athlete's health status; (2) Assess the physical impact of the implementation of social distancing and the complexity of the athlete's programmed routine programmed movement activities; (3) Assessing athlete achievement motivation in pandemic situations; and (4) Providing data on the fact that economic, social and cultural impacts and policies have taken place. In depth, this study then provides a picture of the chaotic graphs of the combined stages of the training program that has been carried out for years. The value of the benefits of this scientific study is to provide a form of community awareness to be aware and have a human sensitivity to the disaster that occurred, then to provide an educational message for the community to submit to, discipline, and obey the rules of health and build empathy among humans.

Method

The research that has been carried out is a new paradigm in mix method, namely: First, referring to the steps of grounded theory (Khan, 2014), to uncover a phenomenal new fact; Second, patterned case study construction, in exploring the problems that occur; Third, descriptive qualitative-quantitative (Hu & Chang, 2017), in providing justification for the relationship of values and answers to research problems. This research was conducted in the scope of the Papua petanque sports community, with a distribution of subjects as many as 11 elite athletes. The implementation time is between March and May 2020. The research subjects were chosen based on several key criteria, namely: First, the top athletes who have high skill and ability to compete; Secondly, petanque sports have a high level of concentration and

physicality which must also be good; Third, this sport has become a sports icon driven by universities that can produce potential athletes as a provision of skills other than academic; Fourth, the emergence of petanque was initially considered a low class sport, so that through research related to petanque had an impact on people's views and stigma towards more massive specialization.

This study uses two main instruments: First, the main instrument is sourced from key informants and additional informants in the form of field notes, online interview observations of athletes and coaches, training performance documents and championship results at the end of 2019, photos or video of activities practice and competition; Second, supporting instruments namely questionnaire, data on physical strength results and periodic techniques at the end of 2019, as well as physical and technical testing data independently performed on each athlete's personal (Pelana, Irfansyah, & Setiakarnawijaya, 2019). The activities of this research data collection are as follows: First, in-depth observations and interviews related to the whole series of activities of elite Papuan athletes in preparation for the PON; Second, convert the physical test results at the end of the 2019 training period in the form of data description research sentences; Third, simultaneous physical, technical, and

motivation testing of personal participation in data collection in the field; Fourth, triangulation of research data. This research uses the Cresswell method in justifying data analysis, with component patterns used, namely: First, cluster collection, and Second, direct case interpretation.

Results and Discussion

The results of measuring the athlete's nutritional status reflect the level of health experienced, these are as shown in Table 1.

The data in Table 1 shows that between January and May 2020 there was a weight gain of 0,8 to 2 kg. Common obstacles faced by athletes regarding athlete health are related to: (1) Athletes spend more time at home, so routine training is reduced; (2) The pattern of food consumption as an athlete's nutritional intake is out of control, especially because of financial conditions and then looking for inexpensive supplementary foods that are not necessarily guaranteed to be clean and high in fat; (3) Athletes divert boredom by playing smartphones with a lot of digital play, this situation also increases the risk of weight gain; and (4) The resting pattern of the athlete becomes irregular, because more are staying at home and the training activities carried out are independent. Based on all the descriptions above, it can be concluded that the implementation of many activities carried out by athletes from

Table 1. Nutritional Status Data in December 2019 and Mei 2020

December 2019				Mei 2020				
Weight	Height	Index	Category	Weight	Height	Index	Category	Chart
54	172	18,25	Thin	56	172	18,93	Normal	+2
76,4	180,6	23,42	Normal	78,4	180,6	24,04	Normal	+2
50,4	159,3	19,86	Normal	51,2	159,3	20,18	Normal	+0,8
78	175,7	25,27	Fat	79,2	175,7	25,66	Fat	+1,2
57	162,6	21,56	Normal	58	162,6	21,94	Normal	+1
51	167	18,29	Thin	52	167	18,65	Normal	+1,6
50,4	151,6	21,93	Normal	51,5	151,6	22,41	Normal	+1,1
41,3	151,5	17,99	Thin	42,5	151,5	18,52	Normal	+1,2
50,4	150,5	22,25	Normal	51,3	150,5	22,65	Fat	+0,9
67	162	25,53	Fat	68,3	162	26,02	Fat	+1,3
45	150,6	19,84	Normal	46,1	150,6	20,33	Normal	+1,1

Source: Primary Data, 2020

residential homes as a result of the Covid-19 pandemic makes athletes experience irregular patterns of physical activity, rest, and especially food intake consumed. The most extreme effect of this situation is the reduction in productivity and disruption of achievement targets. Physical endurance is part of the performance picture of the athlete; the data in Table 2.

Based on the data in Table 2 can be seen how the athlete graph figures, there is 1 person who has increased. However, the majority of athletes experienced a decrease in physical quality of as many as 10 people, this can be seen from the Vo²Max test results. As a percentage of the performance figures, in December 2019 athletes who fall into the above category are sufficient to reach 81,80%. Then based on athlete performance data in May 2020, the percentage above the adequate category is 72,70%. How this phenomenon occurs, researchers then deepen the case by conducting interviews with athletes. Implicitly, the current event is both an extraordinary event and a rare moment. Plague has changed all aspects of life including athletes. The conclusion from the description of the physical quality is that with the amount of time the athlete is at home, then with the limited time spent training so that the impact on the percentage decrease in Vo²Max.

This questionnaire on motivation is used to measure the extent of motivation of Papuan

petanque elite athletes. The results of calculating the intrinsic dimension motivational answer questionnaire scores can be explained as below: (1) Indicator of desire: there are as many as 5 questions, while the results of the calculation of the score are a total score of 551, a maximum score of 700, a percentage score of 78.85%. Based on these results it can be said that the motivation of athletes to get a medal measured on the indicator of desire can be categorized high; (2) Indicators of need: there are as many as 3 questions, while the results of the calculation of the score are a total score of 361, a maximum score of 420, a percentage score of 85.71%. Based on these results it can be said that the motivation of athletes to get an award measured in needs indicators can be categorized very high; (3) Aspiration factors: there are as many as 4 questions, while the results of the calculation of the score are a total score of 418, a maximum score of 560, a percentage score of 74.83%. Based on these results it can be said that the motivation of athletes in getting decent work is measured in indicators of goals can be categorized high; (4) Talent indicator: there are 3 questions, while the score calculation results are total score of 337, maximum score of 420, percentage score of 80.05%. Based on these results it can be said that the motivation of athletes in choosing petanque measured on the talent indicator can be categorized very high;

Table 2. Physical Resistance Data in December 2019 and Mei 2020

December 2019				Mei 2020				Chart
Level	Shuttle	Vo2Max	Category	Level	Shuttle	Vo2Max	Categoriy	(Vo2Max)
5	5	31,4	Poor	6	5	34,8	Average	+3,4
6	8	35,8	Average	6	1	33,3	Average	-2,5
7	4	37,8	Good	7	3	37,5	Good	-0,3
6	1	33,3	Average	5	3	30,6	Poor	-2,7
7	1	36,8	Good	6	2	33,7	Average	-3,1
9	10	46,5	Excellent	7	9	39,5	Good	-7
5	2	30,3	Poor	5	1	29,9	Poor	-0,4
7	8	39,2	Good	7	2	37,1	Baik	-2,1
5	8	32,5	Average	5	7	32,1	Average	-0,4
6	1	33,3	Average	5	3	30,6	Poor	-2,7
7	1	36,8	Good	6	5	34,8	Average	-2

Source: Primary Data, 2020

and (5) Feeling indicator: there are as many as 2 questions, while the results of the calculation of the score are total score of 234, maximum score of 280, percentage score of 83.22%. Based on these results it can be said that the motivation of athletes to practice in a pandemic period measured in indicators of feeling can be categorized very high; (6) Overall indicators: the total score of the intrinsic dimension questionnaire answers overall indicator of 1350, the maximum score of 2380, the percentage score of 79.84%.

The results of calculating the extrinsic dimension motivation questionnaire answers can be explained as follows: (1) Indicators of family factors: there are as many as 4 questions, while the results of the calculation of the score are a total score of 415, a maximum score of 560, a percentage score of 73.94%. Based on these results it can be said that the motivation of athletes in achievement is measured in indicators of family factors can be categorized high; (2) Indicators of the training environment: there are 6 questions, while the results of the calculation of the score are the total score of 630, the maximum score of 840, the percentage score of 75.11%. Based on these results it can be said that the motivation of athletes in achievement is measured in indicators of the training environment can be categorized high; (3) Educational environment factors: there were as many as 5 questions, while the results of the calculation of the score were a total score of 610, a maximum score of 700, a percentage score of 87.05%. Based on these results it can be said that the motivation of athletes in achievement measured in indicators of the learning environment can be categorized high; and (4) Overall indicators: the total score of the extrinsic dimension questionnaire answers to the overall indicator is 1665, the maximum score is 2100, the percentage score is 78.76%. Based on these results it can be said that motivation in the extrinsic dimension can be categorized high.

First, the results of the evaluation showed that during the 3-month period of social distancing, the average athlete's body weight graph increased by 0.8 to 2 kg. Some potential causes are: (1) The pattern of consumption of high saturated fat foods with irregular

duration of time; (2) reduced training intensity; and (3) overload resting rhythm. Papuan petanque athletes from a strict regimens to an uncontrolled diet with a composition that is high in fat and low in fiber, causes an imbalance in nutritional intake and is a risk factor that contributes greatly to the emergence of various health problems namely: obesity, hypertension, dyslipidemia, and insulin resistance, known as metabolic syndrome. Fat has an important role for the body. Apart from being an energy source, fat is needed by the body as a fat soluble vitamin solvent, a component of cell membranes as a hormone, immune system, and thermoregulator (Budiono, I., 2013). However, if consumed in excessive amounts it will be dangerous because it builds up on blood vessels and causes atherosclerosis and blockages in blood vessels (Kang, Yang, & Xiao, 2020). The application of a balanced menu pattern by reducing the consumption of foods containing saturated fats and high cholesterol, and increasing the consumption of foods containing unsaturated fats such as fish, fish oil, vegetable oil, and nuts. Adequate and balanced fat intake between saturated, unsaturated, cholesterol and other fats will be able to fulfill the above functions. Suggested fat intake is not expected to exceed 25% of the total energy consumed a day, maximum saturated fat is 10% of total energy, and unsaturated fat ranges from 3 to 7% of total energy.

Second, empirical data of the Vo^2Max test results using the MFT test instrument (multi fitness test) shows that if the percentage of the performance index, in December 2019 athletes included in the above category is enough 81.80%, then in the athlete performance data in May 2020, the percentage in Top category is 72.70% enough. This means there is a decrease in the index percentage of 7.30% in the span of 3 months. The average graph decrease in the value of Vo^2Max is -0.3 to -7. The average decline in the performance index is an accumulation of 10 elite athletes, but there is an interesting phenomenon where there is 1 athlete who actually experienced an increase in the ability of Vo^2Max . After deepening the case, it was found that 10 athletes who experienced a decrease in the physical performance index were caused by: (1) weight gain as a result of

changing dietary patterns; (2) Discipline and reduced duration of exercise, while 1 person who experienced an increase in physical performance index is caused by: (1) Being able to maintain eating and resting patterns; and (2) motivation and discipline of the exercise. The research results obtained are related to several other studies, as below: (1) Physical activity and lifestyle of athletes every day have an impact on the physical performance of athletes; (2) There is a significant relationship between physical condition and the achievements of the West Java PON XIX martial arts athlete with a score of 0.494 (Yusup, Erawan, & Hermanu, 2017); and (3) Covid-19 pandemic for Japanese coaches and athletes and paralympic games has an impact on the cancellation of training schedules and postponement of the match, this has resulted in a decrease in physical performance, and added fear will contract Covid-19 (Taku & Arai, 2020). Excellent physical performance can support other aspects such as technique, tactics and mentality (Latorre-Román, García-Pinillos, & Mora-López, 2020). Good physical performance is very decisive in supporting the athlete's task in the match so that he can perform optimally. The physical condition training program must be well planned and systematic and aimed at improving the physical fitness and functional abilities of the body system so as to enable athletes to achieve better performance.

Third, the research results obtained can be explained as below: (1) The intrinsic motivation dimension consists of 5 indicators, namely: desires, feelings, needs, ideals, and talents. The results of the overall value of the indicator of 1350, the maximum score of 2380, the percentage score of 79.84%, and means that the results can be said that motivation on the intrinsic dimension is included in the high category; and (2) The dimensions of extrinsic motivation consist of 3 indicators (family factors, the environment of the training ground, and the educational environment. The overall score of the indicator is 1665, the maximum score is 2100, the percentage score is 78.76%, and means that the results can be said that motivation on the extrinsic dimension including the high category. There are several research results that provide reinforcement related to motivation and sports achievement,

among others: (1) There is a positive and significant relationship between motivation and the achievements of soccer athletes (Apriansyah, Sulaiman, & Mukarromah, 2017); and (2) Achievement for athletes who come from students majoring in sports has a higher level of correlation (Beckford, Poudevigne, Irving, & Golden, 2011), when compared to athletes with educational backgrounds outside of sports majors (Akyol & İmamoğlu, 2019). Psychological factors are very important in achievement sports such as petanque especially during matches, motivation is certainly very influential on the results to be achieved. McClelland stressed the importance of the need for achievement, because people who succeed in business and industry are people who have accomplished everything.

Conclusion

This research has three main subjects as outlined in the results and discussion chapter, while the conclusions are as follows: (1) The quality of athlete's health experiences constraints due to limited physical activity, over a period of 3 months the implementation of social distancing the average athlete's body weight graph has increased 0.8 to 2 Kg; (2) In terms of physical quality, look at the percentage of the performance index the average athlete was above 81.80%, then in the athlete performance data of physical performance of the athlete above the sufficient category was 72.70%; and (3) Psychologically when viewed from the aspect of motivation is still in good condition, based on intrinsic and extrinsic dimension data which are included in the high category. Recommendations that can be given from the results of this research study are: (1) Trainers and athletes to form new normalcy in making training programs both in the pandemic and post-pandemic periods; (2) Stakeholders can design future sports facilities and infrastructure that are safe with standard health protocol standards; (3) To the public at large, discipline must comply with rules set by the government relating to the prevention and treatment of epidemics or dangerous infectious diseases.

References

- Akyol, P., & İmamoğlu, O., 2019. The Relationship between Motivation and Flow States in Sports Faculty Students. *Asian Journal of Education*

- and Training, 5(3),pp.440-446.
- Apriansyah, B., Sulaiman., & Mukarromah, S., 2017. Kontribusi Motivasi, Kerjasama, Kepercayaan Diri terhadap Prestasi Atlet Sekolah Sepakbola Pati Training Center di Kabupaten Pati. *Journal of Physical Education and Sports*, 6(2),pp.101-107.
- Beckford, T., Poudevigne, M., Irving, R., & Golden, K., 2011. Mental Toughness and Coping Skills in Male. *Journal of Human Sport and Exercise*, 11(3),pp.338-347.
- Buana, D.R., 2020. Analisis Perilaku Masyarakat Indonesia dalam Menghadapi Pandemi Virus Corona (Covid-19) dan Kiat Menjaga Kesejahteraan Jiwa. *SALAM: Jurnal Sosial Budaya Syar-I*, 7(3),pp.217-226.
- Budiono, I., 2013. Pengembangan Model Indeks Pembangunan Gizi. *Jurnal Kesehatan Masyarakat*, 8(2),pp.166-175.
- Hanani, E., 2017. The Study on Value of Recreational Sports Activity of Urban Communities. *Jurnal kesehatan Masyarakat*, 12(2),pp.96-101.
- Hanoatubun, S., 2020. Dampak Covid -19 Terhadap Prekonomian Indonesia. *EduPsyCouns: Journal of Education, Psychology and Counseling*, 2(1),pp.146-153.
- Hu, C., & Chang, Y., 2017. John W. Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. *Journal of Social and Administrative Sciences*, 4(2),pp.205-207.
- Kang, Z., Yang, Y., & Xiao, B., 2020. Dietary Saturated Fat Intake and Risk of Stroke: Systematic Review and Dose-Response Meta-Analysis of Prospective Cohort Studies. *Nutrition, Metabolism and Cardiovascular Diseases*, 30(2),pp.179-189.
- Khan, S.N., 2014. Qualitative Research Method: Grounded Theory. *International Journal of Business and Management*, 9(11),pp.224-233.
- Latorre-Román, P., García-Pinillos, F., & Mora-López, D., 2020. Jump-Rope Training: Improved 3-km Time-Trial Performance in Endurance Runners via Enhanced Lower-Limb Reactivity and Foot-Arch Stiffness. *International Journal of Sports Physiology and Performance*, 15(7),pp.927-933.
- Najib, Nisa, A., Nugroho, E., Widowati, E., & Yang, C., 2020. Developing Reproductive Health Communication in Early Marriage. *Jurnal Kesehatan Masyarakat*, 15(3),pp.441-449.
- Pakpahan, A.K., 2020. Covid-19 dan Implikasi Bagi Usaha Mikro, Kecil, dan Menengah. *Jurnal Ilmiah Hubungan Internasional*, Special Edition,pp.59-64.
- Parnabas, V., Parnabas, J., & Parnabas, A., 2015. The Influence of Mental Imagery Techniques on Sport Performance Among Taekwondo Athletes. *European Academic Research*, II(11),pp.14729-14734.
- Pelana, R., Irfansyah, R., & Setiakarnawijaya, Y., 2019. Study of Correlation Between Power of The Arm Muscle and Rom (Range of Motion) of Shoulder With The Results of 9 Meters Distance Shooting in Petanque Athlete Faculty of Sport Science State University of Jakarta, Indonesia. *European Journal of Physical Education and Sport Science*, 5(9),pp.8-18.
- Purcell, R., Gwyther, K., & Rice, S., 2019. Mental Health In Elite Athletes: Increased Awareness Requires An Early Intervention Framework to Respond to Athlete Needs. *Sport Medicine-Open*, 5(46),pp.1-8.
- Rochman, C., Nasrudin, D., Muslim, M., & Hermita, N., 2017. Characteristics of The Ability of Physics Concept in Enrichment Teaching Materials of Natural and Mineral Resources (NMRs) Literacy. *Jurnal Pendidikan IPA Indonesia*, 6(2),pp.252-256.
- Taku, K., & Arai, H., 2020. Impact of COVID-19 on Athletes and Coaches, and Their Values in Japan: Repercussions of Postponing the Tokyo 2020 Olympic and Paralympic Games. *Journal of Loss and Trauma*, 25(5),pp.1-8.
- Widowati, A., 2015. Modal Sosial Budaya dan Kondisi Lingkungan Sehat dalam Pembinaan Prestasi Olahraga Pelajar. *Jurnal Kesehatan Masyarakat*, 10(2),pp.218-226.
- Yusup, U., Erawan, B., & Hermanu, E., 2017. Hubungan Kondisi Fisik, Tingkat Kesehatan, Psikologis dengan Prestasi Atlet Cabang Olahraga Beladiri Jawa Barat di PON XIX 2016. *Jurnal Keplatihan Olahraga*, 10(2),pp.74-84.



Improving Teenage Awareness of Healthy Behavior by Mapping Adolescent Programming and Measurement (MAPM) Framework

Nur Siyam[✉], Widya Hary Cahyati, Oktia Woro Kasmini Handayani, Lukman Fauzi

Public Health Departement, Universitas Negeri Semarang, Indonesia

Article Info

Article History:
Submitted July 2020
Accepted September 2020
Published November 2020

Keywords:
MAPM Framework, healthy behavior, teenage, school

DOI
<https://doi.org/10.15294/kemas.v16i2.25419>

Abstract

The improvement of healthy behavior awareness of teenagers is still a serious concern. There are three major problems in teenage: sexuality, drugs, and addictive substance and sexually transmitted diseases, especially HIV and AIDS. Among steps that can be taken to build teenage awareness to have healthy behavior is by applying Mapping Adolescent Programming and Measurement (MAPM) Framework. The objective of the research is to build an MAPM Framework model and obtaining a description of its effectiveness as an effort to improve teenage awareness of healthy behavior. The research conducted at Walisongo Kedungwuni Islamic Junior High School. Samples are students that have problem as mapped and measured from MAPM. A non-randomized one group pre-test- post-test design was implemented in this study. The results indicate that attitude towards counseling, cigarette, juvenile delinquency, smoking attitude, attitude towards drugs, and premarital sex after the application of the MAPM positively changed (p -value $< 0,05$). The attitude and behavior of students were improved. Teenage awareness of healthy behavior significantly increases (p value= 0,000) after the application of the MAPM framework. Further discussion will be discussed in the article below.

Introduction

Nowadays, more than half of world populations are below 25 years old, and 29% are between 10-25 years old. In Indonesia, the population relatively dominated by a young age. The population of young age in Indonesia is above 63 million, while the teenage population is more than 41 million. This is the reason of the teenage group required quite much attention. WHO defines the teenage period as the development period from the occurrence of secondary sexual sign towards the mature fo sexual and reproduction function, an achievement process of adult's mental and identity, as well as the shifting from socioeconomic dependence to independence (Hoover, Tao, Berman, & Kent, 2010).

A large number of teenagers with

increasingly complex issues should be concerned, whether by government, community, religious organizations, social, private, and education institutions (Mbizvo & Zaidi, 2010). The main concern is related to teenage behavior that tends to risk one. To become a quality generation, teenagers must be able to avoid and overcome complex adolescence problems along with the transition period (Daniels Ugochi, 2007). Thus, the teenagers need to be educated with knowledge and skills regarding reproduction health, includes the basic of three risks in teenage period - Teenage Reproduction Health (sexuality, HIV & AIDS, drugs and addictive substance), so that the adolescent be more responsible both on reproduction and environment (Kennedy, Gray, Azzopardi, & Creati, 2011; Muadz et al., 2008; Williams,

[✉] Correspondence Address:
Public Health Departement, Universitas Negeri Semarang, Indonesia
Email: nursiyam@mail.unnes.ac.id

Mullen Stephanie, Karim Ali, & Jessica., 2007).

Awareness of healthy behavior in adolescents is still lacking, this is indicated by the many health problems caused by risk behaviors in adolescents. The high risk behavior in adolescents is shown because of the unstable nature of adolescents, who still want to try something new, their high curiosity, limited adolescents' health knowledge, low moral values, and negative environmental conditions. Previous studies shows that health problems that occur in adolescents include smoking, drinking alcoholic beverages, drug abuse, engaging in risky sexual relations, fighting, and other unhealthy behaviors. For this reason, adolescent awareness is really needed to be improved to improve healthy life behaviors in adolescents so that they can create young and healthy and quality generations (Pratiwi, 2013).

This research contributes to increasing adolescent awareness in healthy behavior. Increased awareness of adolescents is an increase in the recognition skills of the dangers / health effects that can be caused if they do not maintain healthy behavior, able to recognize the factors that can cause hazards/health impacts that occur, able to identify what they must do to improve health in accordance with the abilities of those who are helped by the school. So they can foster awareness of healthy behavior in their daily lives.

Based on data from the Directorate of Teenage and Protection on Reproduction Right (2010), a number of teenagers age 10-19 years old are 43 million or 19.6% of the population and age 10-24 years are 60 million. 30.9% of male teenage and 34.7% of female teenage (15-19 years old) said that has a friend who had sexual intercourse experience (SI). While 8% of males age 15-24 years old had used drugs. A number of premarital SI on Jabotabek (Jakarta, Bogor, Tangerang, and Bekasi) is 51%, Bandung is 54%, Surabaya is 47%, and Medan is 52%. As many as 2.5 million abortion cases are recorded annually, with 27% of those are teenagers. For HIV/AIDS cases of 8194 infected, 54.7% are age 20-29 years old.

Juvenile delinquency and issues regarding teenagers are increasing in Central Java (Azmiyati, Cahyati, & Handayani, 2014). The trend is not only in the main urban region but

also spreads to the districts. Based on interview with the school representative, the headmaster of Walisongo Islamic Junior High School at Subdistrict Kedungwuni, the juvenile/student delinquency related to the habit of truanting, brawling and smoking; its are have become a general case. The students make a habit of smoking and brawling outside of the school area. Besides, from the initial observation, the guidance and counseling program at Walisongo Islamic Junior High School has not to function maximally. There are guidance and counseling room, yet does not well organized and utilized as a warehouse, as so does not comfortable for the program.

To avoid and overcome teenage problems, support and assistance needed, whether from parents, environment, education institution, and government as well (Burnhams, Dada, & Myers, 2012). However, one thing that should be remembered is the awareness of the individual itself. To actualize those all, certainly there will be many problems and challenges to be faced by all stakeholders, thus strong cooperation is required (Kothari et al., 2011). Viewing from cases happened, an effort is required to build teenage awareness of healthy behavior. It is not only in terms of motivation or willingness to have healthy behavior but also to implement it in daily life (Burnhams, Dada, & Myers, 2012; Kothari et al., 2011; Montgomery, Sanning, Litvak, & Peters, 2014).

It has been a common consciousness that behavior is one health determinant that becomes a target of the promotion to change it. The change towards healthy behavior as the objective of health promotion or education, at least consists of three dimensions: (1) To alter negative behavior (unhealthy) to positive (aligned with health values), (2) To develop positive behavior (the building or developing of healthy behavior), (3) To conserve positive behavior or behavior that has been aligned with health values/norms (healthy behavior) by stating to conserve current healthy behavior. One behavior can be changed if there is a disproportion between the two power within oneself. It is obligated to take a strategic step to overcome the problem immediately; thus, the next generation of the nation can be saved. The step can be taken to develop the teenage

awareness to have healthy behavior, one of it is by implementing Mapping Adolescent Programming and Measurement (MAPM) Framework method.

Previous study of MAPM framework method implementation is still rare. emphasizes the identification of health effects that have been happened in a group of communities, like in a school. The elements of MAPM Framework consist of health outcomes, behaviors, determinants and interventions. The completion of health outcomes on this method is through the framework of behaviors mapping affecting health outcomes, factors that influence the behavior, affects, health outcomes, and then determine proper intervention to solve, control, or overcome the factors. As so, to improve teenage awareness of healthy behavior, then the implementation of the MAPM Framework is important to be done in order to solve the health problem that occurred. The improvement of teenage awareness of healthy behavior will be able to increase life quality as the nation next generation, high achievement, and healthy physically and spiritually as the avoidance of three risks in the teenage period - Teenage Reproduction Health (sexuality, HIV & AIDS, drugs, and addictive substance).

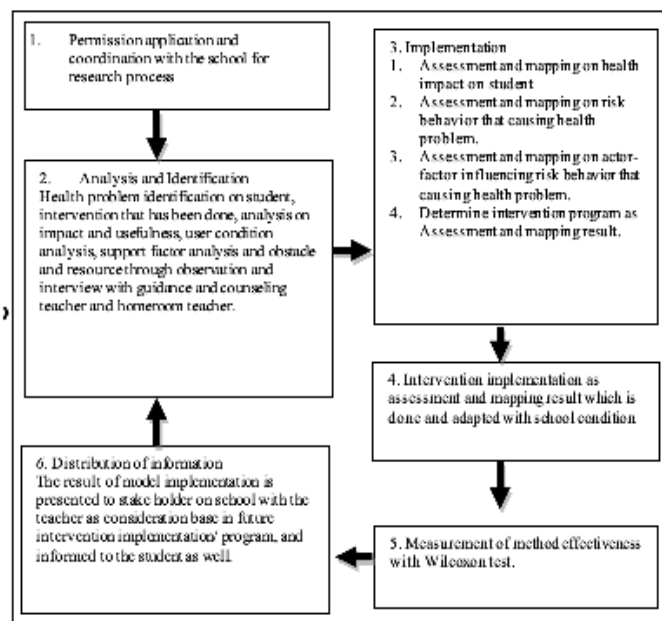
Method

The population in this research is 33

students in Walisongo Islamic Junior High School at Kedungwuni Subdistrict, District Pekalongan. The students who involved in this study are classes that have problem based on data from guidance and counselling teacher. Inform consent have been issued and sign in voluntariry. This research is *Quasi Experiment with Non Randomized One Group Pre-test-Post-test Design*. The measured variables are attitude to the importance of guidance and counselling, juvenile delinquency, attitude to smoke, smoking behavior, attitude to drugs, premarital sex.

The implementation of MAPM is conducted by a) assessment and mapping of health effect on students, b) assessment and mapping of risk behaviors resulting the health problems, c) assessment and mapping of factors influencing risk behaviors resulting the health problems, d) determine an intervention program aligned with the assessment and mapping result and school ability. The phases of MAPM Framework research can be viewed on Picture 1.

Research instruments are observation checklist, interview guide and questionnaire. The data is analyzed by univariate analysis (research result data is descrypted in table, graphic and naration) and bivariate analysis is used to find out method effectiveness, which is before



Picture 1. Flow Chart of Research Implementation

and after the implementation of the method by Wilcoxon statistic test. The research was conducted with coordination and permission application to the school, then followed by the interview with the headmaster and three homeclass teacher of Walisongo Islamic Junior High School, Kedungwuni, regarding the problems and efforts have been done by the school in order to increase teenage awareness of healthy behavior. The research has approval status by the institutional review board of health research ethics commission in Semarang State University.

Result and Discussion

Walisongo Islamic Junior High School is one of the junior high schools in District Pekalongan that has values on religion. It was established by a foundation under the Republic of Indonesia Education and Cultural Office and lead by a headmaster. Walisongo Islamic Junior High School consists of 15 classes with a number of students around 525 students, 56 teachers, and two school security. The school has 2 canteens, classrooms that being functioned as multifunctional rooms, including as School Health Unit (SHU).

The interview results showed that several health problems experienced by the students are stress, less enthusiastic when follows the lesson, sometimes some students often faint in the class, and during the lesson, the students are often sleepy. According to teacher explanation, the fainted students usually caused by a lack of awareness to have breakfast and aligned with the student's nutrition and less fit condition. Material debriefing regarding students' ways to solve the problem, whether at school nor home, is insufficient.

The counseling teacher only serve when there is a students that have problems. The material shared in the counseling class is one that related with behavior in daily life and directing the interest and talent of the student. Regarding the solving of health problem occurred at school is handed over to homeclass teacher of each student, only then when the homeclass teacher is unable to overcome, it will be escalated to school stake holder.

The intervention that has been done at school-related with the improvement of teenage awareness of healthy behavior is still

on the basic phase, by carrying on Sunday clean program once a month and scheduled classroom cleaning picket. The material shared in the guidance and counseling class is one that related with behavior in daily life, directing the interest and talent, handling of problem student.

Noble values that implemented in the school is modesty, togetherness, and mutual assistance. Student activity after school hour helps the parent, hanging out with friends and extracurricular activity. When the school finds out that there is a problem student, it tries to assist the student; then the student will be coached and, if necessary, followed up by calling the parent. Some students actively consult with guidance and counseling teachers, while others may keep the problem themselves.

Obstacle factor in the effort to improve student awareness to have healthy behavior is the lack of student awareness of health, this is due to lack of teacher's understanding in health matter. As so, the students are rarely exposed with health material they need. Meanwhile, the factor that supports the effort to improve student awareness of healthy behavior is the existence of the MoU with region's community health service center (CHSC), CHSC Kedungwuni I. It should be a real opportunity for the school to improve and distribute health-related material to the students regularly. Unfortunately, cooperation has not adequately managed. It can be viewed by insufficient health socialization on the school, health information media, etc. When an activity being held, it was a curative type.

Information obtained from the questionnaire that there is not any health attendant/cadre, a room designed for consultation of a problem student, nor sick while at school. Some utility available, like weigh scaling, microtoa, first aid kit box, and sports facility. However, posters, leaflets, nor health information media are not available. There is a fund for activity, yet does not particularly for SHU. Guidance and counseling service is conducted on multifunction rooms, as well as SHU activity though the room is not feasible for it. SHU service does not make always available every day, and no dedicated teacher is assigned. The room is more likely an

unpreserved warehouse. As so, the activities are not maximal.

The research is conducted on 33 students; the selection on the student is based on recommendation from home class teachers, which are having criteria that the students had a problem-related to drugs and premarital sex. The students need to be motivated to overcome the problem, whether at school or home.

Table 1. Research Subject Characteristics

Gender	Person	%
Male	23	69.70
Female	10	30.30
Total	33	100

Source: Primary Data, 2020

Implementation of mapping adolescent programming and measurement (MAPM) framework Method.

Table 2. Health impact on Walisongo Islamic Junior High School students

Variable	Average Value
Attitude to the importance of guidance and counselling	79.7
Juvenile delinquency	75.2
Attitude to smoke	65.2
Smoking behavior	68.7
Attitude to drugs	90.2
Premarital sex	81.4
Teenage Awareness of Healthy Behavior	75.5

Source: Primary Data, 2020

Research result and mapping health impact occurred to the students can be viewed from Table 2, lowest score is at students attitude to smoke (65.2) and smoking behavior (68.7). Risk behavior generating health problem is poor awareness of the students to follow the guidance and counseling program and describe the problem they faced whether to the teacher or friends (another student), and the problem students are less selective in choosing friends, so they follow to smoke. Factors influencing risk behavior generating health problem is lack of information and motivation to students is due to inadequate information and motivation

to the students regarding the health to support the student to improve the teenage awareness of healthy life (Kothari et al., 2011).

Intervention give to the students to improve teenage awareness of healthy behavior is by giving information and motivation regarding healthy and quality teenage. The material of healthy teenage consists of "who is healthy and quality teenage," Teenage and problems (smoking, drugs). The media used is power point presentation and exciting video. The method used in giving the material is presentation and question and answer session and sharing and discussion that allows the students to express their opinion to provoke their awareness to behave healthier for better and quality future.

The intervention that will be implemented is discussed with the school representatives. After it is approved, then it can be implemented soon. The consideration used to determine the intervention are school ability and program sustainability. The role of outside school party, like a researcher, is to contribute to required ideas. Also, facilitation to assist the school in determining necessary policy and alignment with school ability, like providing facility so that health attendants could conduct proper system and performance (Siyam, 2013; Siyam & Cahyati, 2018). So, it is determined to intervene information sharing and motivation to be a health and quality teenage. Below is the table resulted from Wilcoxon for each research variables before and after to improve teenage awareness of healthy behavior.

The result of Wilcoxon analysis indicates that result of all variables, which are attitude to the importance of guidance and counselling, juvenile delinquency, attitude to smoke, smoking behavior, attitude to drugs and premarital sex after the implementation of MAPM framework, is improved significantly (p -value <0,05), the attitude and behavior of the students are better or positive. Teenage awareness of healthy behavior significantly increases (p value= 0,000). Highest delta values on Smoking behavior (22,60%), the lowest delta value on Attitude to drugs (8,30%).

Implementation of the MAPM Framework method in schools has contributed positively to raising awareness of students

Table 3. Data process result before and after MAPM method implementation at Walisongo Islamic Junior High School

Variable	Characteristics			
	Mean (%)			<i>p-value</i>
	Pre	Post	delta	
Attitude to the importance of guidance and counselling	79.7	88,4	8.70	0,000
Juvenile delinquency	75.2	89.1	13.90	0,000
Attitude to smoke	65.2	85.1	19.90	0,000
Smoking behavior	68.7	91.3	22.60	0,000
Attitude to drugs	90.2	98.5	8.30	0,014
Premarital sex	81.4	92.5	11.10	0,001
Teenage awareness of healthy behavior	75.5	87.2	11.70	0,000

Source: Primary Data, 2020

in healthy behavior. The elements of success in the implemented MAPM framework in schools were consisted of health outcomes, behaviors, determinants, and interventions. The implementation of the MAPM framework is essential to solve the health problems that occur, also to increase adolescent awareness of healthy behaviors. The increasing adolescents' awareness of healthy behaviors will improve their quality of life, high physically and spiritually health dimension.

Behavior is one of the health determinants targets to change (Shin & Rew, 2010). Changes in healthy behavior as a goal of promotion of health education in schools consists of three dimensions: (1) changing negative (unhealthy) behavior into positive, (2) developing positive/healthy behaviors, and (3) preserving positive behaviors that are in accordance with school norms. In accordance with the results of the study, steps that can be taken to develop adolescent awareness to have healthy behavior is to implement MAPM Mapping and Measurement methods (Naomi A, 2010).

The education regarding prevention of drugs misuse at school based, become important to avoid students from the jeopardy of drugs misuse. Not only from doctor or health attendant, but also from student and parent, in this case caregiver and teacher, as well as government should be together in fight against drugs. The health attendant is highly required in assisting education in school regarding

the jeopardy of drugs misuse (Mensink, Schwinghammer, & Smeets, 2012).

Proper health service such as consultation/counseling center is important to them having a problem in substance misuse (alcohol, drugs, and smoke) (Burnhams et al., 2012). Counseling can also be useful for them who willing to know how to prevent and avoid substance misuse (Wijaya, Agustini, & Tisna, 2014). Fast service is necessary for them who have followed to try prohibited substances. They must be counseled so that they do not furtherly involve and finally difficult to be controlled (McCarty et al., 2014).

Creating student's perception or for them who like to improve toward the service school given is highly important, since without believe and faith that they can be better will be very difficult to make them truly change (Montgomery et al., 2014). Health education particularly in avoiding prohibited substances misuse could be an option in developing sense of needing to the students regarding the jeopardy and risk in it (Kothari et al., 2011).

School role and proper method to overcome teenage problem is very required by the student to guard themselves from environment influence and improper friendship (Laski & Wong, 2010). Teenage period is a susceptible time due to high curiosity (Telfair, Alleman-Velez, Dickens, & Loosier, 2005). Drugs usage in school nowadays is beginning to increase, more often in big cities. Environment and mobility that supporting drugs distribution

lately, make school is a strategic target for drugs distribution. Assessment and mapping of health problem in school will facilitate the school to find alternative of solution as school ability. Proper intervention program with requirement dan ability of the school will make the program sustainable (van den Berg, Mikolajczak, & Bemelmans, 2013).

Conclusion

The results indicated that attitude towards counseling, cigarette, juvenile delinquency, smoking attitude, attitude towards drugs, and premarital sex after the application of the MAPM was positively changed (p -value <0,05). The attitude and behavior of students were improved. Teenage awareness of healthy behavior was significantly increased (p value= 0,000) after the application of the MAPM framework. Attitude and behavior of students are positively changed. Teenage awareness of healthy behavior significantly increase after the implementation of MAPM framework method.

References

- Azmiyati., Cahyati, W.H., & Handayani, O.W.K., 2014. Gambaran Penggunaan NAPZA pada Anak Jalanan di Kota Semarang. *Jurnal KEMAS*, 9(2),pp.137-143.
- Burnhams, N.H., Dada, S., & Myers, B., 2012. Social Service Offices as a Point of Entry Into Substance Abuse Treatment for Poor South Africans. [Comparative Study] Research Support, Non-U.S. Gov't. *Subst Abuse Treat Prev Policy*, 7(22).
- Daniels, U., 2007. Improving Health, Improving Lives: Impact of The African Youth Alliance and New Opportunities for Programmes. *African Journal of Reproductive Health*, 11(3), pp.234-248.
- Hoover, K.W., Tao, G., Berman, S., & Kent, C.K., 2010. Utilization of Health Services in Physician Offices and Outpatient Clinics by Adolescents and Young Women in the United States: Implications for Improving Access to Reproductive Health Services. *Journal of Adolescent Health*, 46(4),pp.324-330.
- Kennedy, E., Gray, N., Azzopardi, P., & Creati, M., 2011. Adolescent Fertility and Family Planning in East Asia and The Pacific: A Review of DHS Reports. *Reprod Health*, 8(11).
- Kothari, D., Gourevitch, M.N., Lee, J.D., Grossman, E., Truncali, A., Ark, T.K., & Kalet, A.L., 2011. Undergraduate Medical Education in Substance Abuse: A Review of the Quality of the Literature. *Acad Med*, 86(1), pp.98-112.
- Laski, L., & Wong, S., 2010. Addressing Diversity in Adolescent Sexual and Reproductive Health Services. *International Journal of Gynecology & Amp; Obstetrics*, 110, Supplement(0),pp. S10-S12.
- Mbizvo, M.T., & Zaidi, S., 2010. Addressing Critical Gaps in Achieving Universal Access to Sexual and Reproductive Health (SRH): The Case for Improving Adolescent SRH, Preventing Unsafe Abortion, and Enhancing Linkages between SRH and HIV Interventions. *International Journal of Gynecology & Amp; Obstetrics*, 110, Supplement(0),pp.S3-S6.
- McCarty, D., Braude, L., Lyman, D.R., Dougherty, R.H., Daniels, A.S., Ghose, S.S., & Delphin-Rittmon, M.E., 2014. Substance Abuse Intensive Outpatient Programs: Assessing the Evidence. *Psychiatr Serv*, 65(6),pp.718-726.
- Mensink, F., Schwinghammer, S.A., & Smeets, A., 2012. The Healthy School Canteen Programme: A Promising Intervention to Make The School Food Environment Healthier. *J Environ Public Health*, 2012, pp.415746.
- Montgomery, L., Sanning, B., Litvak, N., & Peters, E.N., 2014. Preliminary Findings on the Association Between Clients' Perceived Helpfulness of Substance Abuse Treatment and Outcomes: Does Race Matter? Multicenter Study Randomized Controlled Trial Study. *Drug Alcohol Depend*, 139, pp.152-158.
- Muadz, M.M., Fathonah, S., Syarbaini, Mardiana, N., Utomo, B., & Salamah, U., 2008. *Modul dan Kurikulum Pelatihan Pemberian Informasi Kesehatan Reproduksi Remaja Oleh Pendidik Sebaya*. Jakarta: BKKBN.
- Naomi A.S., 2010. Confidentiality and Access to Adolescent Health Care Services. *Journal of Pediatric Health Care*, 24(2),pp.133-136.
- Shin, Y., & Rew, L., 2010. A Mentoring Program for the Promotion of Sexual Health Among Korean Adolescents. *Journal of Pediatric Health Care*, 24(5),pp.292-299.
- Siyam, N., 2013. The Facilitation of KD-RS and W2 DHF Report to Improve DHF Surveillance Report. *KEMAS Journal*, 8(2).
- Siyam, N., & Cahyati, W.H., 2018. Implementation of School Based Vector Control (SBVC) for the Prevention and Control of Disease Vectors in Schools. *Media Kesehatan Masyarakat Indonesia (MKMI)*, 14(1).
- Telfair, J., Alleman-Velez, P.L., Dickens, P., & Loosier, P.S., 2005. Quality Health Care for

- Adolescents with Special Health-Care Needs: Issues and Clinical Implications. *Journal of Pediatric Nursing*, 20(1),pp.15-24.
- Van den Berg, S.W., Mikolajczak, J., & Bemelmans, W.J., 2013. Changes in School Environment, Awareness and Actions Regarding Overweight Prevention Among Dutch Secondary Schools Between 2006-2007 and 2010-2011. *BMC Public Health*, 13,pp.672.
- Wijaya, I.M.K., Agustini., & Tisna, G.D., 2014. Pengetahuan, Sikap, dan Aktivitas Remaja SMS dalam Kesehatan Reproduksi Di Kecamatan Buleleng. *Jurnal KEMAS*, 10(1),pp.33-42.
- Williams, M.S., Karim, A., & Jessica, P., 2007. *Evaluation of The African Youth Alliance Program in Ghana, Tanzania, and Uganda, Impact on Sexual and Reproductive Health Behavior Among Young People* (A. Devison, Trans.). New York: United Nations Population Fund, UNFPA.



Family Function and Misuse of Drug in Adolescents in Indonesia

Oktriyanto^{1✉}, Hilma Amrullah¹, Anastasia Septya Titisari²

¹Badan Kependudukan dan Keluarga Berencana Nasional (BKKBN), Indonesia

²Community Development Program Murdoch University, Western Australia

Article Info

Article History:

Submitted February 2020

Accepted September 2020

Published November 2020

Keywords:

Family function,
Adolescents, drugs,
cigarette, alcohol

DOI

<https://doi.org/10.15294/kemas.v16i2.23304>

Abstract

In Indonesia drug in adolescents shows a number that tends to be high. This phenomenon is certainly an indication that there are character problems in children and adolescents in Indonesia, which certainly cannot be separated from the role of parents. In this case the function of parents and government support is needed in an effort to handle the use of drugs in teenagers in Indonesia. The results showed that the majority of adolescents who used drugs were more in adolescents who had heads of households with low education and had families with a low wealth index, were in whole families, and more in adolescents who lived in rural areas. Teenage boys tend to use drugs more than girls. Teenagers who use drugs have more characteristics of the 20-24 year age group, low education and are not working. The factors that significantly affect the use of drug use among adolescents include socio-cultural functions, place of residence, adolescence, adolescent sex, work status, adolescent access to PIK-R programs, and knowledge of the impact of drugs.

Introduction

Human resources (HR) are the most important aspects needed to advance a nation. Development carried out by a country will run optimally if it is supported by quality human resources. Quality resources can be seen from several aspects such as physical, intellectual, and psychological / social emotional abilities (Kulla, Rumapea and Tampongangoy, 2018). This quality can also be reflected in the behavior that is carried out on each individual.

According to (BPS, 2018), there has been an increase in criminal behavior, including drug use and abuse. Drug is the use of narcotics, psychotropic substances and other addictive substances. Starting from 2014-2017, there was an increase of 3.17 percent in the percentage of total drug use and abuse that was not only committed by adults but also by children and adolescents. In 2014 alone there were around 4 million drug users in Indonesia (BNN, 2015).

Meanwhile, globally, at least 5.6 percent of the world's population over the age of 15 has consumed drugs (UNODC, 2018).

Adolescents are prone to drug abuse because the socio-emotional conditions of adolescents are not yet stable so they are easily influenced into deviant behavior (Nur'artavia, 2017). Teens also have great curiosity so that they will seek information about drugs, and have the potential to use them, starting with trial and error. Because of this curiosity, adolescents tend to use risky behaviors such as smoking, drinking alcohol, using drugs, and free sex (Azmiyati, 2014; Shaluhiyah et al., 2020). Basically, smoking and drinking alcohol are the gateway to drug abuse (Hanifah and Unayah, 2011; BNN, 2015; Sari, 2019). More specifically, cigarettes are actually included in the definition of a drug. Smoking is now no longer a health problem, but it already has its own complexities.

✉ Correspondence Address:

Badan Kependudukan dan Keluarga Berencana Nasional (BKKBN), Indonesia
Email: oktriyanto@yahoo.com

The high level of criminal behavior such as drug use and smoking behavior in adolescence shows that there are still many deviant behaviors committed by adolescents in Indonesia. On the other hand, this fact also shows that there is a problem with the character of Indonesian adolescents. Character is one aspect of a person's development that is inseparable from the role of the family, one of which is parents (Rohmah and Athfal, 2018). The family is not only the basic or smallest unit of society, but also an important place for the physical and mental growth of the individual. At the same time, the family influences the growth of each member and plays an important role in the social system (Dai and Wang, 2015). Several research results show that family function affects the quality of life of family members including children and adolescents (Farajzadegan et al., 2013; Herawati and Endah, 2016; Desiningrum, Suminar and Surjaningrum, 2019; Yuan, Zhuo and Li, 2019). Optimization of family functions is expected to be the basis of the family to ensure adolescents are free from risky behavior (Gustiani and Ungsianik, 2016).

Method

This study was conducted to identify family functions in adolescent families, as well as knowledge and drug abuse in adolescents. The study design was a cross sectional study. This study uses secondary data from the results of the Performance Survey and Accountability for Population Program, Family Planning and Family Development (SKAP) in 2018.

The sampling in this survey was carried out in several stages, namely: Stage 1: Selecting a number of villages by Probability Proportionate to Size (PPS) sampling with the size of the number of households in the list of all villages / wards (or in the sample frame of all villages). The village sample was selected independently between urban and rural areas in a district / city. Stage 2: Selecting one cluster from each selected village by means of PPS sampling with the size of the number of households in the selected cluster. And Stage 3: Selecting 35 households using systematic random sampling based on the results of household listings conducted door to door by enumerators in each selected cluster.

The samples taken in this study were divided into two groups based on the type of

questionnaire, namely the family and adolescent questionnaires. From the survey conducted, 69,515 families who met the requirements as respondents for the family questionnaire and were successfully interviewed. Of the 69,515 families that were successfully interviewed, 22,721 unmarried women and men aged 15-24 were identified, then these adolescents became respondents for the youth questionnaire. There were 22,210 adolescents who were successfully interviewed, but the data on adolescents that could be analyzed were only 22,180 data. This is because the other 30 adolescents did not meet the sample criteria, namely the paired data with the family questionnaire data.

The data used in this study is secondary data, which is data from the results of the Population, Family Planning and Family Development Program (KKBPK) Performance Indicator Survey for the 2018 National Middle Development Plan (RPJMN). All measuring instruments / questionnaires in this study were compiled and developed by the BKKBN team. The data used include the age of the head of the family, the education of the head of the family, the wealth index, and the type of family, the place of residence, the teenage age, and the sex of adolescents, the education of adolescents, the work status of adolescents, adolescents' access to the PIK-R program, knowledge and use of drugs.

The family function variable in the SKAP 2018 BKKBN was obtained by asking respondents exploratively, meaning that the answers were obtained from the respondent's expression which was then summarized by the interviewer himself to match the answer choices with the respondent's answer. The function of religion consists of: worship (praying, pray, fasting, mass, etc.), tolerance for other religions, doing good things (helping others), being patient and sincere, others, and not know. The socio-cultural function consists of mutual cooperation, deliberation, preserving regional culture / customs, respecting between ethnic groups / races / religions / groups, others and not know. Love function consists of: loyalty / mutual trust, not favoritism / fairness, maintaining family harmony, showing affection, others, and not know. The protection function consists of: physical protection

(holding a child / partner, hugging, etc.), non-physical protection (not saying harshly), health protection, meeting family needs (clothing, food, and shelter), others, and not knowing. The reproductive function consists of: maintain cleanliness of body organs, provide reproductive health information, avoid promiscuity, marry off children at ideal ages, others, and not know. The functions of socialization and education consist of being a role model or example, sending children to school, teaching children to be independent, responsible and able to work together, training children's creativity, others and not know. The economic function of the answer choices consists of being frugal (not wasteful), resilient / hard working, able to save, being able to choose needs according to priority, others and not know. Environmental functions consist of: not littering, cleaning the surrounding environment, preserving the environment (afforestation), saving energy, etc. and not know.

Data processing carried out in this study includes the variables selected from the questionnaire as well as exploring the data in accordance with the research objectives. The first step is to check the data, clean the data, or delete data that are outside the analysis. Then recode the selected variables in accordance with the operational definition and questionnaire. After that, the calculation (scoring), composite or data combination of various variables in the questionnaire is carried out and categorize them according to the operational definition of the research. The final step is data analysis in accordance with the research objectives. Data analysis was performed using the SPSS version 15.0 program. Data analysis was carried out descriptively and inference (multiple logistic regression test). Multiple logistic regression tests were used to analyze the factors that influence drug abuse among adolescents in Indonesia.

The limitations of this analysis include the absence of a time frame in the drug use variable. There are several important factors that may be related to drug abuse among adolescents such as the main activity of adolescents during the survey (school student, not school student), smoking behavior, and peer influence. Data are also not available in this analysis.

Results and Discussion

The analysis found that there were more teenage families living in urban areas (55%). The education of parents, in this case is the education of the head of the family, shows that 64 percent are in the low category, from not going to school to completing junior high school, and most (89%) are in the middle-late age group (> 40 years). Meanwhile, the family wealth index shows a greater percentage in the low category, namely 56 percent.

Adolescents generally live in intact families (89%) or are in families with fathers and mothers. As for the characteristics of adolescents, it is known that the largest percentage of adolescents (67%) is in the 15-19 age group. Meanwhile, based on gender, male adolescents were more numerous than girls, namely 56 percent. 74 percent of adolescent education is in higher education (high school - university) and most of them have not worked (76%).

The family as a producer of human resources (HR) must carry out its functions properly in order to produce quality human resources. Government Regulation of the Republic of Indonesia number 87 of 2014 divides family functions into eight functions, namely functions of religion, socio-culture, love, protection, reproduction, socialization and education, economy, and environmental development. The function of the family must be the foundation and guidance of every family in order to create a prosperous and quality family. Family malfunctions such as in economic terms and the absence of protection in the family can cause negative behavior in children, especially adolescents (Putri, 2018).

The index value of family functions in this survey is in the range of 0-100 and is divided into two categories low (index value less than 50) and high (index value greater than or equal to 50). Based on the results of the analysis, the index values in each family function are: religious function (46), socio-culture (45), love (50), protection (46), reproduction (43), socialization and education (44), economics (54), and environmental development (44). This shows that the most dominant implementation of family functions is seen in the economic function and love. The economic function is

Table 1. Percentage of index value for implementation of eight (8) family functions, Indonesia 2018 (N = 22,180)

Application of the Eight (8) Functions of the Family	Family function index category	
	Low (index <50)	High (index > 50)
Function of Religion	60.1	39.9
Socio-Cultural Functions	63.2	36.8
Love Function	53.3	46.7
Protection Function	60.8	39.2
Reproductive Function	65.3	34.7
Education Socialization Function	64.3	35.7
Economic Functions	43.5	56.5
Environmental Functions	64.7	35.3
Total of Eight (8) Family Functions	59.4	40.6

Source: SKAP 2018 - Combining family data with adolescent data

considered the most vital function to carry out other functions.

Religion is a basic need of every human being. Family is the first place to instill religious values and give religious identity to every child born. The family fosters religious values, so that children become human beings with good character and piety. The family teaches all its members to carry out worship with full faith and devotion to God Almighty. Carrying out religious functions must not neglect religious tolerance because Indonesian families adhere to various beliefs and religions (BKKBN, 2017). The results of the analysis show that, the function of religion that is most widely applied in the family is carrying out worship such as: prayer, fasting, reciting the Qor'an, praying, mass, etc. (97%), doing good / helping others (55%), while religious values others less than 50 percent.

The family is the main vehicle for fostering and cultivating noble cultural values that have been role models in the system of life. The socio-cultural function provides opportunities for families and all members to develop the nation's diverse cultural wealth in one unit. The family is the first vehicle for children to learn to interact and adapt to the surrounding environment as well as learn the customs that apply around them (BKKBN, 2017). The results of the analysis show that the socio-cultural functions that are most widely

applied in the family are carrying out mutual cooperation (64%), preserving regional culture / customs (50%), while other socio-cultural values are less than 50 percent.

Love and affection are important components in shaping children's character. The function of love means that the family must be a place to create an atmosphere of love and affection in family, community, national and state life. The function of love can be manifested in the form of providing affection and security, as well as giving attention to family members (BKKBN, 2017). The results of the analysis show that the function of love that is most widely applied in the family is showing affection (72%), maintaining harmony (62%), not favoritism / being fair to each family member (50%), while other values of love with a percentage of less than 50 percent.

The family is a place of shelter or refuge for all its members, and a place to cultivate a sense of security and warmth. With an atmosphere of mutual protection, the family must be a safe, comfortable and reassuring place for all its members. If the family functions properly, the family will be able to provide a protective function for its members and can optimize children's growth and development. The family protects every member from bad actions, so that family members feel comfortable and protected from unpleasant things (BKKBN, 2017). The results of the analysis show that

the most common protection functions in the family are non-physical protection such as not saying harsh words (55%), health protection (55%), meeting the basic needs of the family (clothing, food and shelter) by 54 percent, physical protection such as holding, hugging, etc. (50%) while the value of other protection is less than 20 percent.

The family controls the reproduction of offspring in a healthy and planned manner, so that the children who are born become qualified future generations. The family is places to develop overall reproductive function including healthy and quality sexuality, and sexuality education for children. The family is also a place to provide information to its members about matters related to sexuality. Continuing the planned descent can support the creation of family welfare (BKKBN, 2017). The results of the analysis show that the reproductive function that is mostly applied in the family is avoiding promiscuity (73%), maintaining the cleanliness of the reproductive organs (54%), while other reproductive values are with a percentage of less than 50 percent..

Family is as the main and first place to provide education to all children for future provisions. The education provided by the family includes education to educate and shape children's character. Socialization and education functions also mean that the family is a place to develop interaction processes and a place to learn to socialize and communicate well and healthily. The interaction is very intensive in the family so the educational process runs very effectively. Families socialize to their children about values, norms, and ways to communicate with others, teach about good and bad things as well as wrong and right things (BKKBN, 2017). The results of the analysis show that the socialization and education functions that are most widely applied in the family are sending children to school or educating children (91%), teaching children to be independent, responsible and able to work together (53%), while the value of socialization and other education is less than 50 percent.

The family is the main place in fostering and instilling values related to finance and managing the use of finances to meet the needs of life and create a prosperous family. Family

as a place to obtain food, clothing, shelter, and other material needs as well as provides financial support to its members (BKKBN, 2017). The results of the analysis show that the economic functions that are most widely applied in the family are saving (93%), saving or not being wasteful in using money (75%), buying goods according to priority needs (50%) while other economic values with a percentage of less than 50%. percent.

The family has the role of managing life while maintaining the surrounding environment, both physical and social, and the micro, meso, and macro environment. The family plays a role in fostering the community and natural environment. Families and their members must know their neighbors and the community around them and care for the preservation of the natural environment. The family's caring attitude towards the environment is to provide the best for future generations (BKKBN, 2017). The results of the analysis show that the environmental functions that are most widely applied in the family are cleaning the surrounding environment (86%), not littering (72%) while other environmental values are with a percentage of less than 50 percent.

All adolescent respondents, both women and men were asked whether they had ever heard of the term NAPZA. Almost all adolescents (97 percent) have heard of drugs. From what they have heard, adolescents are asked about the impact of drug use. The knowledge index score on the impact of drug use was divided into two categories low (index value less than 50) and high (index value greater than or equal to 50) from the index interval 0-100. Overall, the knowledge index value on the impact of drug use from each dimension was in the low category, namely the physical impact index value of 26, the psychological impact of 25, the socio-economic impact of 20 and the total knowledge index of the impact of drug use was 24.

In general, female adolescents are better informed about the impact of drug use than young men. The results of the analysis showed that the knowledge index of drug use in adolescent girls was 26, while male adolescents were 23. Based on the knowledge

Table 2. Percentage of adolescents by gender and knowledge index on the impact of drug use, Indonesia 2018

Knowledge Index on the Impact of Drug Use	Gender						P-value
	Female (N=12.415)		Male (N=9.766)		Total (N=22.180)		
	N	%	N	%	N	%	
Physical Impact (A)							
Low (index < 50)	8.900	91.1	11.573	93.2	20.473	9,3	0.000
High (index >50)	865	8.9	842	6.8	1.707	7.7	
Psychological Impact (B)							
Low (index < 50)	8.476	86.8	11.036	88.9	19.512	88.0	0.000
High (index >50)	1.289	13.2	1.378	11.1	2.668	12.0	
Socio-Economic (C)							
Low (index < 50)	7.806	79.9	10.439	84.1	18.245	82.3	0,000
High (index >50)	1.960	20.1	1.975	15.9	3.935	17.7	
Impact (A+B+C)							
Low (index < 50)	8.583	87.9	11.315	91.1	19.897	89.7	0,000
High (index >50)	1.183	12.1	1.100	8.9	2.283	10.3	

Source: SKAP 2018 - Combining family data with adolescent data

index category on the impact of drug use (Table 2), the percentage of knowledge on the physical impact of drug use was the lowest in the high index category. (> 50) that is, with a percentage of 8 percent. Meanwhile, the psychological and socio-economic impacts that fall into the high category are 12 percent and 18 percent, respectively.

Adolescents who have heard of drugs are asked whether or not they have consumed drugs. The results of the analysis show that teenagers in Indonesia consume 8 percent of drugs, where male adolescents consume more drugs than female adolescents, namely 11 percent and 4 percent, respectively. Table 3 shows the percentage of adolescents according to family function and has ever consumed drugs. The statement of family function taken is a function item of each family function that is related to or can explain the use of drugs among adolescents. Religious functions are approached by families carrying out worship according to their religion or belief, socio-cultural functions, love functions, protection functions, reproductive functions, socialization & education functions, and economic functions. Meanwhile, the environmental function is not included in analyzing drug use because the answer options for environmental functions

are limited to the physical environment, such as not littering, cleaning the surrounding environment, preserving the environment (reforestation), saving energy, and others. Almost all adolescents who have ever consumed drugs mostly carry out various family functions, namely carrying out religious, socio-cultural, love, protection, reproduction, and economic functions. Meanwhile, the family carries out the socialization and education function with the same percentage for adolescents who consume or do not consume drugs.

According to (Çiftçi Demirci et al., 2015) the use of drugs in adolescents can be influenced by individual characteristics and family background factors. Based on the characteristics of the family background, adolescents who have consumed drugs in the age group of family heads <40 years with > 40 years have no difference, namely 7.7 percent. Next, adolescents who have consumed the most drugs in families with low education of the head of the family (8%), low wealth index (8%), the type of whole family (8%), and living in the village (9%). This result is in line with research (Nasution et al., 2019) which found that adolescents who have families with low wealth quintiles tend to be more prone to consuming drugs. Other factors such as age and gender can

Table 3. Percentage of adolescents according to family function and having consumed drugs, Indonesia 2018 (N = 22180)

Family function	Drug Consumption		N	P-Value
	Ever	Never		
Religious Functions				
No	5.2	94.8	310	0.093
Yes	7.7	92.3	21.869	
Socio-Cultural Functions				
No	7.2	92.8	12.205	0.003
Yes	8.3	91.7	9.974	
Love Function				
No	7.4	92.6	6.197	0.387
Yes	7.8	92.2	15.982	
Protection Function				
No	7.1	92.9	9.945	0.002
Yes	8.2	91.8	12.235	
Reproductive Function				
No	7.2	92.8	6025	0.124
Yes	7.9	92.1	16155	
Socialization & Education Function				
No	8.4	91.6	1.978	0.220
Yes	7.6	92.4	20.202	
Economic Functions				
No	6.9	93.1	1462	0.274
Yes	7.7	92.3	20718	

Source: SKAP 2018 - Combining family data with adolescent data

also contribute to the tendency for adolescents to use drugs. This research proves that based on the characteristics of adolescents, adolescents who have consumed the most drugs are in the characteristics of adolescents in the 20-24 year age group (10%), male adolescents (11%), low education (9%), work status (11%), access to the PIK R program (9%) and have high knowledge of the impact of drug use (10%).

Another interesting finding in this study shows that both adolescents who still have intact parents (mother and father) and adolescents who only have single parents (father or mother only) do not have a significant difference in drug abuse (the percentage is almost the same). This is likely the relationship satisfaction factor between adolescents and parents, not because the factor of adolescence is in a complete or incomplete family. Teens who are dissatisfied with their relationship with their father and mother tend to abuse drugs (Freitas and Souza,

2020).

BKKBN in accordance with the mandate of Law Number 52 of 2009 is to develop the Planning Generation Program. The Planning Generation Program is a program developed in the context of preparing family life for adolescents so that they are able to carry out a planned education level, have a career in a planned job, and marry in full planning according to the reproductive health cycle. The GenRe program is aimed at adolescents through the Youth Information and Counseling Center (PIK-R) and families who have teenagers through the Youth Family Development forum.

PIK Remaja is one of the platforms developed in the GenRe program, which is managed by and for adolescents in order to provide information and counseling services on maturity of marriage age, eight family functions, TRIAD KRR (sexuality, HIV-AIDS and drugs), and life skills. The existence and

Table 4. Percentage of adolescents according to background characteristics and having consumed drugs, Indonesia 2018 (N = 22,180).

Background Characteristics	Use of drugs		N	P-Value
	Ever	Never		
Family Characteristics				
Age of Family Head				
< 40 years	7.7	92.3	2.542	0.907
> 40 years	7.7	92.3	19.683	
Education of Family Head				
Low	8.1	91.9	14.122	0.002
High	6.9	93.1	8.058	
Wealth Index				
Low	8.2	91.8	12.331	0.002
High	7.1	92.9	9.850	
Family Type				
Incomplete	7.5	92.5	2.431	0.748
Complete	7.7	92.3	19.749	
Residence Location				
Village	8.5	91.5	9.997	0.000
City	7.0	93.0	12.210	
Characteristics of Adolescents				
Age				
15-19 years	6.6	93.4	14.873	0.000
20-24 years	9.9	90.1	7.307	
Gender				
Female	3.7	96.3	9.765	0.000
Male	10.8	89.2	12.414	
Education				
Low	8.6	91.4	5.717	0.002
High	7.4	92.6	16.464	
Working Status				
Not working	6.6	93.4	16.750	0.000
Working	11.2	88.8	5.431	
Access the PIK-R Program				
Never	7.6	92.4	20.288	0.042
Ever	8.9	91.1	1.892	
Knowledge of the impact of drugs				
Low	7.4	92.6	19.898	0.000
High	10.4	89.6	2.283	

Source: SKAP 2018 - Combining family data with adolescent data

role of PIK-R in the youth environment is very important in helping adolescents to obtain sufficient and correct information and counseling services about the preparation of family life for adolescents.

Adolescents who access the PIK-R

Program are expected to avoid risky behavior such as drug abuse. Teens who take PIK-R will be exposed to materials related to drugs, such as the types of drugs and the impact of drug use. The results of the analysis show that only nine out of one hundred adolescents in Indonesia

access the PIK-R Program, with details of which six percent access via online (internet) / social media and through participating in group activities (POKTAN) - PIK R is five percent. The results of the Chi-Square test showed that adolescents who had access to the PIK R program had a statistically significant effect on adolescents' knowledge of the impact of drug use ($\alpha = 0.000$). Similar results were also found in research (Sholihah, 2015), after counseling was carried out on the prevention and abuse of drugs, there was an increase in knowledge about the definition, type and content, and the impact of drug abuse.

Drug abuse is a significant problem among adolescents in many countries, this is indicated by its high prevalence (Mametja and Ross, 2020; Patterson et al., 2020). Adolescence is a period that is very vulnerable to risky behavior, including in the case of drug abuse, this is due to high curiosity accompanied by unstable behavior both socially and emotionally. Factors affecting drug abuse among adolescents in this article were analyzed using logistic regression tests. The independent variables used were family functions (religious, socio-cultural, love, protection, reproduction, socialization & education, and economic functions), family characteristics (age of the head of the family, education of the head of the family, wealth index, type of family, location. place of residence), the characteristics of adolescents (adolescent age, gender, education, work status, access to the PIK-R program, knowledge of the impact of drug use) with the dependent variable is the use of drugs among adolescents. The results of the regression test showed that the variables that were significantly related to the use of drugs among adolescents consisted of socio-cultural functions, location of residence, age of adolescents, gender of adolescents, adolescent work status, access to the PIK R program, and knowledge of the impact of drugs.

The active involvement of parents in developing skills, social competence, self-regulation and caring for adolescents is important in preventing adolescents from behaving negatively (Das et al., 2016). The results of the study (Asmoro and Melaniani, 2016) show that parents who are too busy and do not instill values and norms in children

have a significant effect on drug abuse among adolescents. There is a relationship between drug use in adolescents and unhealthy family functions (Bradshaw et al., 2016). The analysis showed that of the 7 family functions tested only the socio-cultural function had a significant effect. Families who carry out socio-cultural functions tend to have their teenage children consume drugs. This is possible even though the adolescents in the family are socially good, but there are other factors outside the family that affect adolescents using drugs, such as the influence of peers or a negative environment. (Indrawati and Rahimi, 2019) prove that drug use in adolescents can be significantly affected by family function and adolescent self-control factors.

The rules in the family regarding the inculcation of principles and character that are inconsistently taught in divorced families make adolescents disobey the existing rules in the family (Kusumastuti and Hadjam, 2017). According to (Nagarkoti, ShakuntlaPunia and Poonam, 2014), the family plays an important role in building and providing a basis for protection for the mental development of adolescents. Adolescents who are in a harmonious family environment and apply effective communication are shown to have a lower tendency to use drugs (Shin, Miller-Day and Hecht, 2019). The results of research (Mak, Leung and Loke, 2019) conducted on adolescents in Hong Kong found that the attachment between children and parents resulted in self-confidence for children so that it was not easy to fall into drug abuse.

The location of residence in this study has a significant effect on drug abuse. This is not in line with research (Patterson et al., 2020), that adolescents living in rural areas tend to be more likely to abuse drugs than adolescents who live in urban areas. These findings indicate that drug abuse does not only occur in big cities but has entered rural areas which can be caused by access to information from the internet.

Adolescent age has a significant effect on drug abuse among adolescents. Adolescents in the age group of more than or equal to 20 years are more likely to abuse drugs than adolescents in the younger age group (<20 years). Adolescents are prone to drug abuse

Table 5 Logistic Regression Coefficient Factors Affecting Drug Abuse among Adolescents

Variable	Coefficient		
	B	Exp (B)	Sig.
Family Functions			
Religious function (0 = no. 1 = yes)	0.386	1.472	0.140
Socio-cultural function (0 = no. 1 = yes)	0.137	1.146	0.014*
The love function (0 = no. 1 = yes)	-0.038	0.962	0.525
Protection function (0 = no. 1 = yes)	0.076	1.079	0.173
Reproduction function (0 = no. 1 = yes)	0.043	1.044	0.491
Socialization and education functions (0 = no. 1 = yes)	-0.136	0.873	0.127
Economic functions (0 = no. 1 = yes)	0.114	1.121	0.300
Family Characteristics			
Age of family head (0 = <40 years. 1 => 40 years)	-0.107	0.899	0.188
Education of family head (0 = low. 1 = high)	-0.010	0.991	0.874
Wealth Index (0 = low. 1 = high)	-0.083	0.920	0.152
Family type (0 = incomplete. 1 = complete)	0.128	1.137	0.126
Residence location (0 = village. 1 = city)	-0.170	0.844	0.002*
characteristics of Adolescents			
Age (0 = <20 years. 1 => 20 years)	0.212	1.236	0.000**
Gender (0 = female. 1 = male)	1.120	3.066	0.000**
Education (0 = low. 1 = high)	0.011	1.011	0.855
Work status (0 = not working 1 = working)	0.402	1.495	0.000**
Access the PIK-R program (0 = no. 1 = yes)	0.401	1.494	0.000**
Knowledge of the effects of drugs (0 = low. 1 = high)	0.373	1.452	0.000**

Description: * significant at P <0.05. ** Significant at p <0.001

Source: SKAP 2018 - Combining family data with adolescent data

because their emotional and mental levels are still very unstable, so they are easily influenced into deviant behavior. This can be due to several things, including a very large curiosity, imitating the behavior of friends, a strong sense of group solidarity to the lack of attention to family factors (Nur'artavia, 2017).

Gender has a significant effect on drug abuse among adolescents. Boys are more likely to abuse drugs than girls. The behavior of male adolescents is more susceptible to consuming drugs than female adolescents. It is possible that male adolescents smoke more than female adolescents, because smoking is one of the main gates for adolescents in drug abuse. (Astuti and Hastono, 2020) also found that compared to women, more male adolescents were committing drug abuse accompanied by smoking behavior since childhood. Not only

smoking, men are also more at risk of becoming alcoholics and using illegal drugs (Khan et al., 2014; Ansari-Moghaddam et al., 2016; Oroian, Nemeş and Cozman, 2018). Furthermore, based on work status, adolescents with working status have a greater risk of using drugs. One reason is that working youth can more easily obtain drugs because they already have their own income.

The PIK-R program is one of the government programs, in this case the BKKBN (National Population and Family Planning Board) which calls on adolescents to avoid drugs. Due to the popularity of adolescents with the PIK-R program both through online media and direct participation in group activities, it is hoped that teenagers can avoid drugs. However, the results of this analysis indicate that adolescents who have access to

the PIK-R Program are more likely to use drugs than those who do not. Some possibilities that occur are that adolescents who access the PIK-R program are those who have already consumed drugs, second are the possibility of trial and error behavior that previously did not know about drugs after participating in the PIK-R program became exposed to drugs so they were interested in trying them. A person who has good knowledge about drugs does not necessarily show a high resistance to drug use. The results of this study are not different from the research conducted by (Mametja and Ross, 2020), the results of their research show that adolescents who use drugs have a fairly good understanding of the impact of drug use. Another possibility is peer influence (Griffith and Jackman, 2019), by participating in the PIK-R program, adolescents meet friends of the same age and may have used and influenced other teenagers. Thus there needs to be control from older people in every activity that is followed by adolescents.

Conclusion

In this study, it is known that the family functions that are mostly applied by families with adolescent children are the economic function and the function of love, while only the socio-cultural function that affects drug abuse. Of all adolescents who were respondents in this study, it is known that almost all of them know or have heard of drugs. However, adolescents' knowledge of the impact of drug use is still in a low category. As for all adolescents who know about drugs, it is known that only eight percent have ever consumed drugs.

One of the factors that can significantly influence the use of drugs in adolescents is age, gender, work status, and place of residence. In this study it was also found that the PIK-R program is one of the factors that influence drug abuse among adolescents. This finding is a fact that adolescents who consume drugs basically already know the effects of using drugs. Therefore, to be able to prevent drug abuse among adolescents, it takes more than just adolescent knowledge of the dangers and negative effects of consuming drugs. It takes the role of the family in providing education, supervision, and creating a healthy environment and relationships in the family.

References

- Ansari-Moghaddam, A. *et al.* (2016) 'Prevalence and patterns of tobacco, alcohol, and drug use among Iranian adolescents: A meta-analysis of 58 studies', *Children and Youth Services Review*, 60, pp. 68–79. doi: <https://doi.org/10.1016/j.chilcyouth.2015.11.018>.
- Asmoro, D. O. S. and Melaniani, S. (2016) 'Pengaruh Lingkungan Keluarga terhadap Penyalahgunaan NAPZA pada Remaja', *Jurnal Biometrika dan Kependudukan*, 5(1), pp. 80–87. doi: 10.20473/jbk.v5i1.2016.80-87.
- Astuti, N. H. and Hastono, S. P. (2020) 'Is the Frequency of Smoking Affecting the Risk of Abusing Cannabis?', *KEMAS: Jurnal Kesehatan Masyarakat*, 16(1), pp. 44–52. doi: 10.15294/kemas.v16i1.18063.
- Azmiyati, S. (2014) 'Gambaran Penggunaan Napza Pada Anak Jalanan Di Kota Semarang', *KEMAS: Jurnal Kesehatan Masyarakat*, 9(2), pp. 137–143. doi: 10.15294/kemas.v9i2.2841.
- BKKBN (2017) *Penanaman dan Penerapan Nilai Karakter Melalui 8 Fungsi Keluarga*. BKKBN. Jakarta.
- BNN (2015) *Laporan Akhir Survei Perkembangan Penyalahgunaan Narkoba di Indonesia Tahun Anggaran 2014*. Jakarta: Puslitdatin BNN.
- BPS (2018) *Statistik Kriminalitas 2018*. BPS. Jakarta.
- Bradshaw, S. D. *et al.* (2016) 'Family Functioning and Readiness in Family Recovery From Addiction', *Journal of Groups in Addiction and Recovery*, 11(1), p. pp.21-41. doi: 10.1080/1556035X.2015.1104644.
- Çiftçi Demirci, A. *et al.* (2015) 'Sociodemographic characteristics and drug abuse patterns of adolescents admitted for substance use disorder treatment in Istanbul', *The American Journal of Drug and Alcohol Abuse*, 41(3), pp. 212–219. doi: 10.3109/00952990.2014.973961.
- Dai, L. and Wang, L. (2015) 'Review of Family Functioning', *Open Journal of Social Sciences*, 03(12), pp. 134–141. doi: 10.4236/jss.2015.312014.
- Das, J. K. *et al.* (2016) 'Interventions for Adolescent Substance Abuse: An Overview of Systematic Reviews', *Journal of Adolescent Health*. Elsevier, 59(4), pp. 61–75. doi: 10.1016/j.jadohealth.2016.06.021.
- Desiningrum, D. R., Suminar, D. R. and Surjaningrum, E. R. (2019) 'Psychological well-being among mothers of children with autism spectrum disorder: The role of family function', *HUMANITAS: Indonesian Psychological Journal*, 16(2), pp. 106–115. doi:

- dx.doi.org/10.26555/humanitas.v16i2.10981.
- Farajzadegan, Z. *et al.* (2013) 'The relationship between family function and women's well-being', *Iranian journal of nursing and midwifery research*, 18(1), pp. 9–13.
- Freitas, L. M. F. de and Souza, D. P. O. de (2020) 'Prevalence of drug use and family relationships among school adolescents in Cuiabá, MT, Brazil: a cross-sectional study, 2015', *Epidemiologia e servicos de saude*, 29(1), p. e2019118. doi: 10.5123/s1679-49742020000100020.
- Griffith, A. D. D. and Jackman, M. (2019) 'Peers or Parents?: An Examination of Risk and Protective Factors Influencing Use of and Curiosity about Marijuana among Adolescents in the Caribbean Island of Barbados', *Journal of Child & Adolescent Substance Abuse*. Taylor & Francis, 28(5), pp. 355–362. doi: 10.1080/1067828X.2020.1763884.
- Gustiani, Y. and Ungsianik, T. (2016) 'Gambaran Fungsi Afektif Keluarga dan Perilaku Seksual Remaja', *Jurnal Keperawatan Indonesia*. Faculty of Nursing Universitas Indonesia, 19(No 2), pp. 85–91. doi: 10.7454/jki.v19i2.459.
- Hanifah, A. and Unayah, N. (2011) 'Mencegah Dan Menanggulangi Penyalahgunaan NAPZA Melalui Peran Serta Masyarakat', *Sosio Informa*, 16(1). doi: 10.33007/inf.v16i1.42.
- Herawati, T. and Endah, N. Y. (2016) 'The Effect of Family Function and Conflict on Family Subjective Well-being with Migrant Husband', *Journal of Family Sciences*, 1(2 SE-Articles), pp. 1–12. doi: 10.29244/jfs.1.2.1-12.
- Indrawati, E. and Rahimi, S. (2019) 'Fungsi Keluarga Dan Self Control Terhadap Kenakalan Remaja', *IKRA-ITH HUMANIORA : Jurnal Sosial dan Humaniora*, 3(2), pp. 86–93.
- Khan, M. R. *et al.* (2014) 'Gender and racial/ethnic differences in patterns of adolescent alcohol use and associations with adolescent and adult illicit drug use', *The American journal of drug and alcohol abuse*. England, 40(3), pp. 213–224. doi: 10.3109/00952990.2014.892950.
- Kulla, T., Rumapea, P. and Tampongangoy, D. (2018) 'Kualitas Sumber Daya Manusia Dalam Meningkatkan Pembangunan Desa Tinggilbet Distrik Beoga Kabupaten Puncak Provinsi Papua', *JURNAL ADMINISTRASI PUBLIK*. Sam Ratulangi University, 4(58).
- Kusumastuti, H. and Hadjam, M. N. R. (2017) 'Dinamika Kontrol Sosial Keluarga dan Teman Sebaya pada Remaja Berisiko Penyalahgunaan NAPZA', *Gadjah Mada Journal of Psychology (GamaJoP)*, 3(2), pp. 70–85. doi: 10.22146/gamajop.43439.
- Mak, Y. W., Leung, D. and Lo, A. Y. (2019) 'The vulnerability to alcohol, tobacco, and drug use of adolescents in Hong Kong: a phenomenological study', *BMC Pediatrics*. BMC, 19(1), pp. 1–12. doi: 10.1186/s12887-019-1678-1.
- Mametja, M. and Ross, E. (2020) 'Decriminalized, Not Legalized: A Pilot Study of South African University Students' Views on the Use, Impact, Legalization and Decriminalization of Marijuana', *Journal of Drug Issues*. SAGE Publications Inc, 50(4), pp. 490–506. doi: 10.1177/0022042620931480.
- Nagarkoti, V., Shakuntla Punia and Poonam (2014) 'Status of Family Functioning of Adolescents in Diverse Ecological Regions', *Studies on Home and Community Science*. Routledge, 8(2–3), pp. 81–87. doi: 10.1080/09737189.2014.11885421.
- Nasution, S. L. *et al.* (2019) 'Pengaruh Pengetahuan Remaja tentang NAPZA dan HIV serta Pengetahuan Orang Tua tentang Program Pembangunan Keluarga terhadap Perilaku Penggunaan NAPZA pada Remaja', *Jurnal Ilmu Keluarga & Konsumen*. Department of Family and Consumer Sciences, 12(2), pp. 100–113. doi: 10.24156/jikk.2019.12.2.100.
- Nur'artavia, M. R. (2017) 'Karakteristik Pelajar Penyalahguna Napza Dan Jenis Napza Yang Digunakan di Kota Surabaya', *The Indonesian Journal of Public Health*, 12(1), pp. 27–38. doi: 10.20473/ijph.v12i1.2017.27-38.
- Oroian, R.-F., Nemeş, B. and Cozman, D. (2018) 'Risk and resilience factors for adolescent drug use in Romania', *Psihiatru.ro*, 54(3), pp. 22–25. doi: 10.26416/Psih.54.3.2018.1914.
- Patterson, A. *et al.* (2020) 'Motives for Alcohol and Marijuana Use as Predictors of Use and Problem Use Among Young Adult College Students', *Journal of Drug Issues*. SAGE Publications Inc, 50(4), pp. 359–377. doi: 10.1177/0022042620917101.
- Putri, D. D. M. (2018) 'Disfungsi Keluarga Pada Remaja Korban Penyalahgunaan Narkoba di Badan Narkotika Nasional Provinsi Kalimantan Timur', *eJournal Sosiatri/Sosiologi*, 6(1).
- Rohmah, U. and Athfal, A. (2018) 'Pengembangan Karakter Pada Anak Usia Dini (AUD)', *AL-ATHFAL : JURNAL PENDIDIKAN ANAK*, 4(1), pp. 85–102. doi: 10.14421/al-athfal.2018.41-06.
- Sari, N. (2019) 'Tinjauan Yuridis terhadap Upaya Pelajar/Mahasiswa dalam Memperoleh Narkoba', *Jurnal Penelitian Hukum De*

- Jure*, 19(1), pp. 121–136. doi: 10.30641/dejure.2019.V19.121-136.
- Shaluhayah, Z. *et al.* (2020) 'Health Risk Behaviors: Smoking, Alcohol, Drugs, and Dating among Youths in Rural Central Java', *Kemas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)*, 15(1), pp. 17–23. doi: 10.21109/kemas.v15i1.2864.
- Shin, Y., Miller-Day, M. and Hecht, M. L. (2019) 'Differential Effects of Parental "drug talk" Styles and Family Communication Environments on Adolescent Substance Use', *Health Communication*. Routledge, 34(8), pp. 872–880. doi: 10.1080/10410236.2018.1439268.
- Sholihah, Q. (2015) 'Efektivitas Program P4GN Terhadap Pencegahan Penyalahgunaan NAPZA', *KEMAS: Jurnal Kesehatan Masyarakat*, 10(2), pp. 153–159. doi: 10.15294/kemas.v10i2.3376.
- UNODC (2018) *Executive Summary Conclusions and Policy Implications: World Drug Report 2018*.
- Yuan, X., Zhuo, R. and Li, G. (2019) 'Migration patterns, family functioning, and life satisfaction among migrant children in China: A mediation model', *Asian Journal of Social Psychology*. John Wiley & Sons, Ltd, 22(1), pp. 113–120. doi: 10.1111/ajsp.12345.



Potency of Bioactive Compound of Rice Bran for Colon Cancer Prevention

Safrida¹, Slamet Budijanto^{1✉}, Lilis Nuraida², Bambang Pontjo Priosoeryanto³

¹Department of Food Science and Technology, Bogor Agricultural University, Bogor, Indonesia.

²Southeast Asian Food and Agricultural Science and Technology (SEAFAST) Center, Bogor Agricultural University, Bogor, Indonesia.

³Department of Veterinary Clinic Reproduction and Pathology, Bogor Agricultural University, Bogor, Indonesia.

Article Info

Article History:

Submitted September 2019

Accepted April 2020

Published November 2020

Keywords:

Rice bran, Bioactive compound, Colon cancer.

DOI

<https://doi.org/10.15294/kemas.v16i2.2133>

Abstract

Colon cancer is the second leading cause of death in the world. Bioactive compounds in rice bran have a very active role as antiproliferation of colon cancer cells such as ferulic acid, p-coumaric acid, caffeic acid, gallic acid, protocatechuic acid, sinapic acid, tricin, luteolin, apigenin, myricetin, rutin, isorhamnetin, γ -oryzanol, γ -tocopherol, δ -tocopherol, γ -tocotrienol, β -sitosterol, phytic acid, and hemicellulose. Mechanism of the bioactive compounds in cells varied, including modulation of a cell cycle, activation of immune cells, damage of a lipid layer and mitochondrial membrane, activation of caspase proteins, inhibition of protein cell tumor invasion, metastasis, and angiogenesis, and also acts as an antioxidant. Therefore, the existence of the scientific studies results of this review with the potential availability of adequate rice bran in Indonesia is very potential to be developed.

Introduction

Bioactive compounds are phytochemicals that can be found in food, serves to modulate metabolic processes to improve health. The bioactive compounds in rice bran have been widely known that have a role in reducing several diseases such as hyperlipidemia (Um et al., 2013), antiproliferation in cancer cells (Hui et al., 2010; Zulfafamy et al., 2018; Islam et al., 2017; Ghoneum & Agrawal 2011), antidiabetic (Ardiansyah et al., 2006; Noviasari et al., 2019; Kurniawati et al., 2016), chronic kidney disease and acute coronary syndrome (Rashid et al., 2015).

Rice bran is a by-product of the rice milling process. In the process of rice milling, 10% of rice bran will be produced. The potential of rice bran that produced was estimated at 5.65 million tons in Indonesia in 2018 (Badan Pusat

Statistik, 2018). However, the use of rice bran in Indonesia is generally still limited to animal feed (Tuarita et al., 2017).

Several bioactive compounds in rice bran had the potency to inhibit colon cancer cells, that were specifically reported, namely γ -tocotrienol (Xu et al., 2012), γ -oryzanol (Kim et al., 2012), and ferulic acid (Janicke et al., 2011). Inhibition of cancer cell proliferation by utilizing the potential of rice bran bioactive compounds is preventive prevention (Law et al., 2017), while curative prevention is a type of treatment that has long been applied, such as surgery, radiotherapy, and chemotherapy. Chemotherapy treatment is often reported to cause effects on other organs (Focaccetti et al., 2015). The chemotherapy agents have been commonly used, in patients with colon cancer are leucovorin, capecitabine, irinotecan,

✉ Correspondence Address:

Department of Food Science and Technology, Bogor Agricultural University, Bogor, Indonesia
Email: slamet.budijanto@gmail.com

oxaliplatin, and 5-fluorouracil (Nasrallah & Sibai, 2014).

Colon cancer itself was ranked the second highest cause of death in the world in 2018 (Bray et al., 2018). While in Indonesia, ranked the third highest (equivalent to the percentage of people with lung cancer), with the number of incidents in 2018 of 15.245 people, and will continue to increase until 2040 with an estimated number of 27.354 people, based on the 2018 Global Cancer Data (IARC, 2018). This disease is caused by two main factors, namely internal factors (5-10%) including genetic factors, and external factors (90-95%) such as stress, obesity, radiation, and bad dietary as the biggest contributing factor that is 30% to 35% (Anand et al., 2008). The effort of preventing cancer can be done, among others, by consuming functional food products. Rice bran which contains the bioactive compound can be used as ingredient for development of functional food products.

This article will review the potential of bioactive compounds in rice bran as the prevention of colon cancer. Scientific studies of bioactive compounds and their mechanisms for colon cancer will be reviewed in this article, which will be shown in the form of mapping. Furthermore, the development of rice bran as functional food will also be discussed to provide an illustration of the extent rice bran has been applied as a functional food.

Bioactive Compounds in Rice Bran and its Function

Even though rice bran is a byproduct of the rice milling process, it contains many essential nutrients such as vitamins, minerals, amino acids, antioxidants (Younas et al., 2011), bioactive compounds, fats (Alauddina et al., 2017), and dietary fiber such as β -glucan, pectin, and gum (Prasad et al., 2011). Fatty acids are dominated by linoleic (31-33%), oleic (37-42%), palmitic (21-26%), and also high in content of polyunsaturated fatty acids, which are known to be good for health (Oliveira et al., 2011).

Antioxidants have been reported that has a role in protecting cell damage due to oxidative stress resulting from the formation of free radicals, the oxidative stress is the main cause of cancer cases (Kumar, 2014). Groups

that act as antioxidant compounds are phenolic acids, anthocyanins, flavonoids, tocotrienols, tocopherols, γ -oryzanol, and phytic acid (Goufo et al., 2014). These groups are found in rice bran. The amount of bioactive compound and nutrient content in rice bran can be seen in Table 1.

Pigmented rice bran has been reported that is rich content in anthocyanin and proanthocyanidin. Both of them have a contribution to pigmented of rice, antioxidant (Limtrakul et al., 2019; Anggraini et al., 2015), anti-inflammatory (Limtrakul et al., 2016; Xia et al., 2006), and anthocyanin also act as cytotoxic activity (Pratiwi & Purwestri, 2017). Abdel-Aal et al., (2006) reported, the anthocyanin in black rice bran contained 3.276 mg/g and red rice bran contained 0.094 mg/g. While Hosoda et al., (2018) reported, that anthocyanin was only detected in black rice with the highest concentration, namely the Minenomurasaki cultivar (5.045,6 μ g/g), while red rice was dominated by the proanthocyanidin component in the Yuyakemochi cultivar (3.060,6 μ g/g). The variation in the amount of anthocyanin content is due to differences in rice cultivars and location of growth (Alauddina et al., 2017).

The compound of β -carotene and lycopene have been reported that it very contributes to the reddish-brown appearance, and both of them are precursors of vitamin A, which can act as antioxidants in the biological system (Lamberts et al., 2016). β -carotene and lycopene are part of the carotenoids. These carotenoids are able to bind singlet oxygen and to trap free peroxy radicals, and it is called photoprotective agents (Manickavasagan et al., 2017). Brown rice bran was reported that contains dietary fiber which was four times higher than the white rice (Sun et al., 2010; Limtrakul et al., 2019), contained essential amino acids such as lysine (Limtrakul et al., 2019), and rich in content of vitamins, such as niacin (3.5-5.3), riboflavin (0.04-0.14), thiamine (0.29-0.61), and tocopherol (0.90 -2.50), units of measurement were shown here as mg/100 g of flour (Manickavasagan et al., 2017).

The bioactive component of γ -oryzanol which is present in rice bran (black, red, brown) was reported that had an antioxidant activity of 10 times higher than tocopherol, while

Table 1. Groups of bioactive compounds in rice bran

Bioactive compound	Column Header Goes Here			Reference
	Black	Red	Brown	
Phenolic acids				
Protocatechuic acid (mg/100g)	6.18	5.31	2.87	Ghasemzadeh et al. (2018)
p-coumaric acid (mg/100g)	33.35	24.53	16.71	Ghasemzadeh et al. (2018)
Ferulic acid (mg/100g)	28.04	23.83	17.79	Ghasemzadeh et al. (2018)
Cinnamic acid (mg/100g)	25.53	15.33	9.61	Ghasemzadeh et al. (2018)
Syringic acid (mg/100g)	24.40	21.50	14.42	Ghasemzadeh et al. (2018)
Sinapic acid ($\mu\text{g/g}$)	252.10	209.80	258.7	Laokuldilok et al. (2011)
Gallic acid ($\mu\text{g/g}$)	161.10	39.00	25.10	Laokuldilok et al. (2011)
Hidroxybenzoic acid ($\mu\text{g/g}$)	443.30	52.50	68.90	Laokuldilok et al. (2011)
Vanillic acid (mg/100g)	36.930	13.83	0.98	Pang et al. (2017)
Isoferulic acid (mg/100g)	7.340	8.39	12.34	Shao et al. (2014)
Caffeic acid ($\mu\text{g/g}$)	16.900	24.20	-	Sumczynski et al. (2016)
Flavonoids				
Apigenin (mg/100g)	15.31	6.39	4.22	Ghasemzadeh et al. (2018)
Luteolin (mg/100g)	10.72	7.74	2.35	Ghasemzadeh et al. (2018)
Catechin (mg/100g)	22.05	15.90	8.96	Ghasemzadeh et al. (2018)
Myrecitin (mg/100g)	12.85	12.82	5.68	Ghasemzadeh et al. (2018)
Quercetin (mg/100g)	15.55	9.27	2.87	Ghasemzadeh et al. (2018)
Tricin ($\mu\text{g/g}$)	10.00	2.40	2.00	Poulev et al. (2017)
Rutin ($\mu\text{g/g}$)	2.80	4.10	-	Sumczynski et al. (2016)
Isorhamnetin ($\mu\text{g/g}$)	0.83	-	ND	Nakornriab et al. (2008)
Anthocyanins				
Cyanidin-3-glucoside ($\mu\text{g/g}$)	2316.7	179.0	ND	Laokuldilok et al. (2011)
Peonidin-3-glucoside ($\mu\text{g/g}$)	245.7	9.10	ND	Laokuldilok et al. (2011)
Cyanidin-3-rutinoside ($\mu\text{g/g}$)	0.70	ND	-	Huang & Lai (2016)
Steroidal compounds				
γ -oryzanol(mg/g)	9.12	8.58	1.52	Moongngam et al. (2012)
α -tocopherol($\mu\text{g/g}$)	43.57	44.00	41.36	Moongngam et al. (2012)
γ -tocopherol($\mu\text{g/g}$)	35.31	25.00	37.97	Moongngam et al. (2012)
δ - tocopherol($\mu\text{g/g}$)	4.28	4.30	0.25	Huang & Lai (2016); Min et al. (2014)
α -tocotrienol($\mu\text{g/g}$)	9.99	11.49	4.36	Huang & Lai (2016); Min et al. (2014)
γ -tocotrienol($\mu\text{g/g}$)	53.09	45.83	32.27	Huang & Lai (2016); Min et al. (2014)
δ - tocotrienol($\mu\text{g/g}$)	6.03	5.66	2.50	Huang & Lai (2016); Min et al. (2014)
Others				
Protein	13.27	12.93	12.07	Moongngam et al. (2012)
Fat	15.85	17.32	16.96	Moongngam et al. (2012)
Fiber	12.68	12.11	11.77	Moongngam et al. (2012)
Phytic acid	35.00	39.91	48.12	Moongngam et al. (2012)

Information: ND = Not Detected

tocotrienol had antioxidant activity 40-60 times higher than tocopherol activity (Alauddina et al., 2017). These are detected much more in black rice bran. However, all rice bran types contain 4-hydroxy-3-methoxycinnamic acid, which is known to have antioxidative effects and photoprotective (Garcia-Conesa et al., 1999).

The Mechanism of Bioactive Compounds in Rice Bran as a Colon Cancer Prevention

The prevention mechanism of colon cancer cells by bioactive compounds in rice bran is reported very diverse, starting from acting as an antioxidant so that it can protect against free radicals, changing the cell cycle, cell antiproliferation, modulating the immune system, inducing apoptosis in the cascade pathway, and protecting the layers mucosa by influencing microbial transformation through high fiber content in rice bran (Henderson et al., 2012).

These mechanisms were also known different, both of the same or different groups of bioactive compounds, such as ferulic and p-coumaric acid, even though both were phenolic compound group, and capable to delay development in the Caco-2 colon cancer cell cycle, but through a different inhibitory pathway. Ferulic acid delayed on the S phase pathway, affected the centrosome central regulatory genes, and DNA damage checkpoint genes such as CEP2, CETN3, and RABGAP1. While p-coumaric acid induced the G2/M phase pathway and affected other cell cycle regulating genes, such as MYC, CDKN1A, PCNA, CDC25A, ODC1, CCNA2, and CCNB1 (Janicke et al., 2011).

Bioactive compound of p-coumaric acid not only played a role in delaying the cell cycle, but it was also reported to have the inhibitory ability on other mechanisms. Supplementation of p-coumaric acid on albino male rats, which was given procarcinogens 1,2 dimethylhydrazine (DMH) could inhibit glucose-regulated protein (GRP78) which was an indicator of transformation into malignant cancer, besides that, p-coumaric acid was able to mediate apoptosis against unfolded protein response (UPR) activated, which was the key to the development of oncogenic by inhibiting the expression of p-p65 (NF- κ B) and p-I κ B α ,

and reduced inflammation characterized by the decreased cytokine expression, namely COX-2, IL-6, TNF- α and PGE2 (Sharma et al., 2018).

UPR activation was reported to be able to activate anti-apoptotic NF- κ B, thus inhibiting apoptotic signals from p53 and inducing angiogenic activity through increased vascular endothelial growth factor (VEGF) (Yadav et al., 2014). The increase of VEGF would cause cancer cells to receive nutrient and oxygen supply so that it was pushed to grow faster, inhibition of VEGF was also known to be regulated by COX-2, 5-LOX (Kim et al., 2012) and GRP78 enzymes through VEGFR-2 mediating signals (Katanasaka et al., 2010).

Another component that is also reported to play a role in inhibiting colon cancer is γ -oryzanol. Giving γ -oryzanol as feed to Balb/c mouse transplanted by colon cancer cells CT-26, was able to modulate the immune system by improving the function of phagocytosis in macrophages, released pro-inflammatory cytokines, tumor necrosis factor- α , IL-1 β , and IL-6 by macrophages, increased the activity of natural killer cells (NK), reduced the number of blood vessels in cancer, suppressed vascular endothelial growth factor (VEGF) which was a marker of angiogenesis, and suppressed the COX-2 and 5-LOX enzymes (Kim et al., 2012). Phagocytosis is very important for cells to protect hosts against harmful foreign particles by swallowing and destroying them, and this process is very important as a form of immune response (Pavlou et al., 2017).

Other mechanisms of colon cancer cell inhibition are also reported, namely through the caspase cascade apoptosis pathway. This pathway can kill cancer cells without inflammation and damage to surrounding cells, by mediating by caspase which will produce an active signaling molecule, which acts as the main link in the regulatory network within the cell, so as to control cell death and inflammation (McIlwain et al., 2013). Apigenin (flavonoid group) was reported to be able to increase caspase-8 expression (initiator caspase), and caspase-3 (caspase executor) in HT-29 colon cancer cells, and could reduce cyclin D1 and rapamycin expression. Cyclin D1 acted as a protein that regulated cell cycles, while rapamycin was used as a clinical

Table 2. Mechanism of inhibition of colon cancer cell proliferation by bioactive compounds in rice bran

Bioactive compound	Cell/Animal model	Mechanism	Reference
Ferulic acid	Caco-2	Delays the development of the cancer cell cycle especially in the S phase Inhibits the proliferation of cancer cells, inhibits the production of anion superoxide (O ₂ ⁻), decreases the cell adhesion, and movement of cancer cells	Janicke et al. (2011)
	HT29-D4		Bouzaiene et al. (2015)
p-Coumaric acid	F344 Rats	Reduces the formation of ACF (Aberant Crypt Foci), reduces the incidence of colon tumors, and increases the activity of quinone reductase (detoxification enzymes)	Kawabata et al. (2000)
	Caco-2	Delays the development of the cancer cell cycle especially in the G2/M phase Inhibits the production of superoxide anion (O ₂ ⁻) and proliferation of cancer cells, decreases the cell adhesion, and movement of cancer cells	Janicke et al. (2011)
	HT29-D4		Bouzaiene et al. (2015)
	HT29; HCT15	Damages the lipid layer and mitochondrial membrane of cancer cells, and increases the oxygen production of reactive species (cancer cells are shrinking)	Jaganathan et al. (2013)
	Wistar Rats	Inhibits the preneoplastic lesion, protects the colon from free radicals by acting as antioxidants and detoxifying.	Sharma et al. (2017)
Albino Wistar Rats	Induces the apoptosis by decreasing the expression of cytokines COX-2, IL-6, TNF- α , PGE ₂ , p-p65 and p-I κ B α , as well as inhibits GRP78 (Glucose Regulated Protein), and mediates apoptosis against active UPR (Unfolded Protein Response).	Sharma et al. (2018)	
Caffeic acid	HT29-D4	Inhibits cancer cell adhesion, cell movement, superoxide anion (O ₂ ⁻) production, and proliferation	Bouzaiene et al. (2015)
Gallic acid	HCT15	Damages the lipid layer and mitochondrial membrane in cancer cells, increases the oxygen production of reactive species, and induces apoptosis	Subramanian et al. (2016)
	Albino Wistar Rats		Griffon et al. (2010)
Protocatechuic acid	Colo320; SW480; Caco-2	Suppresses oxidative stress, significantly reduces lipid peroxide, and significantly increases the concentration of enzymatic and non-enzymatic antioxidants	Zheng et al. (2002)
	HCA7	Induces apoptosis, decreases cancer cell viability, and inhibits DNA synthesis	Cai et al. (2005)
Tricin	APC ^{MIN} Mouse	Inhibits the activity of the COX-1 and COX-2 cyclooxygenase enzymes (proliferation enzymes), reduces the production of prostaglandin E ₂ (PGE ₂)	Cai et al. (2005)
Sinapic acid	HT29; SW480	Increases the reactive production of oxygen species and lipid peroxides, damages the mitochondrial membrane in cancer cells, and induces apoptosis. Reduce the number of tumors; reduce PCNA, FASN, and MMP-9	Balaji et al. (2014)
	Xenograft Model Mouse		Chiang et al. (2014)
Caffeic acid phenethyl ester; caffeic acid phenylpropyl ester	Caco-2	Protects DNA from oxidative damage, and improves activity in cancer cells. Induces the cell cycle to delay in the G2/M phase	Ramos et al. (2010)
	SW480; Caco-2		Wang et al. (2004)
Luteolin	Balb/c Rats	Acts as an antimetastatic agent by suppressing the production of MMP-9 and MMP-2	Pandurangan et al. (2014)
		Reducing lysosomal enzyme activity, inducing apoptosis by modulating Bcl2, Bax and Caspase-3	Pandurangan & Ganapsam (2013)
		Reduces MDF (Mucin Depleted Foci) and glycoconjugates levels	Pandurangan et al. (2012)

	Balb/c Mouse		Reduces the number of tumors, controls the level of polyamines, and controls the proliferation of cancer cells through inhibition of wnt/ β -catenin and GSK-3 β pathways. (2011)	Ashokkumar & Sudhandiran (2011)
Isorhamnetin	HT29; HCT116; SW480		Delays the cell cycle in the G ₂ /M phase, inhibits the PI3K-Akt- mTOR (proliferation) pathway, decreases the protein phosphorylation of Akt (ser473), phosph-p70S6 kinase, and phosph-4E-BP1 (37/46), and increases the expression of Cyclin B1 protein.	Li et al. (2014)
Apigenin	SW480; HCT115		Inhibits the pathway signal of Wnt/ β catenin, thereby suppressing cell proliferation, migration, invasion, and tumor organoid growth.	Xu et al. (2016)
Myricetin	HT-29		Increases the expression of mRNA and caspase-3 and caspase-8 proteins, and decreases the expression of rapamycin (mTOR) and cyclin D1 (CCND1).	Turktekin et al. (2011)
Rutin	HCT115		Increases the expression of BAX/BCL-2 ratio, and BAK, and also releases AIF from the mitochondria into the cytosol.	Kim et al. (2014)
γ -tocopherol	Nude Mice (SW480 Cell Injection) HT29	Cell	Reduces VEGF production in rat serum that contains cancer.	Alonso-Castro et al. (2013)
	F344 Rats		Reduces the potential in the mitochondrial membrane in cancer cells, resulting in the release of cytochrome c compounds that cause activation of caspase 3 (apoptosis)	Rezaei et al. (2014)
			Reduces the amount of ACF (Aberrant Crypt Foci), decreases the amount of 4-hydroxynonenal, nitrotyrosine, and expression of cyclin D1 in the colon, decreases prostaglandin E2 and 8-isoprostane in serum.	Guan et al. (2012)
γ -tocotrienol	HCT116; HT29; Caco-2		Suppresses cIAP-1, cIAP-2, survivin (tumorigen protein) expressions; inhibits the expression of cyclin D1, c-Myc (cell proliferation protein) on HCT116 cells, inhibits expression of MMP-9, VEGF, ICAM-1, CXCR4 (tumor cell invasion protein, metastasis, and angiogenesis), and inhibits NF- κ B activation (regulates antiapoptotic protein) in HCT116 cells	Prasad et al. (2016)
	SW620;HCT8 HT29		Suppresses protein expression and Wnt/ β -catenin signal, cyclin D1, and c-jun	Zhang et al. (2013)
	Xenograft Model Mouse	Nude	Suppresses the β -catenin/Tcf signal (by suppressing the expression of c-myc, cyclinD1 and survivin target genes), thereby inhibits growth and induces apoptosis	Xu et al. (2012)
γ -tocotrienol δ -tocopherol	F344 Rats	Transplantation Cell)	Inhibits tumor growth, and decreases the expression of Ki-67, cyclin D1, MMP-9, CXCR4, NF- κ B/p65, and VEGF	Prasad et al. (2016)
	Balb/c Mouse (CT-26 cell transplantation) COLO 320 DM	cell	Reduces the amount of ACF (Aberrant Crypt Foci), decreases the amount of 4-hydroxynonenal, nitrotyrosine, and expression of cyclin D1 in the colon, decreases prostaglandin E2 and 8-isoprostane in serum.	Guan et al. (2012)
	Wistar Rats		Activates natural killer cells, activates macrophages, and inhibits angiogenesis.	Kim et al. (2012)
Phytic acid	Sprague-Dawley Rats		Increases DNA fragmentation and reactive oxygen production of species, suppresses expression of β -catenin and PCNA (marker of cell proliferation)	Baskar et al. (2010)
	F344 Rats		Reduces the amount of ACF (Aberrant Crypt Foci) and CM (crypt multiplicity), acts as an antioxidant, and suppresses the expression of β -catenin and PCNA	Baskar et al. (2010)
			Reduces the amount of ACF (Aberrant Crypt Foci)	Norazalina et al. (2010) Shafie et al. (2013)
Hemicellulose			Decreases β -catenin expression and COX-2	Kawasaki et al. (2008)
			Reduces the number of tumors	

pathological parameter in colorectal cancer patients (Turktekin et al., 2011).

The study of the potential of rice bran as an antiproliferation of colon cancer cells through the mechanism of bioactive compounds, can be seen more comprehensively from the results of in vitro and in vivo studies presented in Table 2. In vivo study studies are presented to strengthen the evidence that the bioactive component present in bran, also works effectively in inhibiting colon cancer cells in experimental animal.

The Development of Rice Bran as Functional Food

The development of functional food from rice bran in Indonesia is still very limited. Even though data collection of BPS-Statistics Indonesia, Rice production in 2018 was 56.54 million tons, which meant the availability of rice bran potential could reach 5.65 million tons (Central Bureau of Statistics, 2018), that matter make of the processing of rice bran into functional food, that will have a high economic value. Furthermore, the potential of health is also very promising because the content of bioactive compounds is varied, such as high phenolic acids content in nonpigmented rice (1.96 mg GAE/g), red rice bran (4.39 mg GAE/g), and black rice bran 6.65 (mg GAE/g), data were shown here as % dry weight (Moongngnam et al., 2012), and also contain other bioactive compound such as γ -oryzanol, tocopherol, tocotrienol, anthocyanins, and flavonoids.

Some countries in the world such as the United States, Australia, and Japan have developed rice bran processed products to the commercial stage, such as rice bran cereal, rice bran dessert or energy drinks, rice bran tortillas, rice bran flakes, and rice bran oil. This situation is very different in Indonesia, which are generally still found are traditional foods, such as *rice bran bangket*, *rice bran jenang* or *rice bran porridge* (Widowati, 2001). Lack of public awareness about the benefits of rice bran, rice bran quality that has not been standardized, and the lack of downstream industries interested in developing rice bran, become obstacles in the effort to develop rice bran as a functional food (Tuarita et al., 2017).

There were some processed rice bran

products that had actually been developed at a laboratory scale, such as tempe enriched by rice bran, so resulting in a total phenolic increased by 67% with a ratio of rice bran and soybean (4 :6)^a(Cempaka et al., 2018). Chips products with the main ingredient of wheat flour mixed with bran-enriched soybean had increased protein content by 73% with a ratio of soybean flour and wheat flour (3: 7)^b(Cempaka et al., 2018).

Rice bran cereal (rice bran puffed cereal) with the application of twin screw extrusion technology, could produce a crisp texture and crisp resistance time in milk almost the same as or longer than commercial breakfast cereal products (Budijanto et al., 2012). Food bar from a mixture of rice bran flour and corn flour (10:90), was able to replace food bars made from wheat flour with insignificant differences in nutritional quality (protein, fat, carbohydrates), and qualify as emergency food with a total energy of 232.43 kcal/50 g of the ingredient (Kusumastuty et al., 2015). Furthermore, extrusion products from a mixture of rice and rice bran were reported to contain sufficient nutritional value and had the potential to be developed into snack products (Hermanianto et al., 2000).

The introduction of rice bran as a functional food is important to do. One way is by highlighting its health benefits as a marketing strategy. Thus, it is hoped to open the community paradigm and increase interest in the downstream industry as an effort to develop functional food from rice bran.

Conclusion

The bioactive compounds in rice bran consist of several categories, such as phenolic acids, flavonoids, anthocyanins, and steroidal compounds. The mechanisms of the bioactive compound rice bran in preventing colon cancer was classified by its function as an antioxidant, damage of the lipid layer and mitochondrial membrane, activation of immune cells, modulation of the cell cycle, inhibition of protein invasion of tumor cells, metastases, and angiogenesis, and activation of protein caspase to encourage apoptosis. The development of rice bran itself as a functional food product in Indonesia is still on a laboratory scale, although some are developed into traditional foods. Educating the public about the benefits

of rice bran for health is a strategy for product development from rice bran raw material in the future.

References

- Abdel-Aal, El-S.M., Young, J.C., & Rabalski, I., 2006. Anthocyanin Composition in Black, Blue, Pink, Purple, and Red Cereal Grains. *Journal of Agricultural and Food Chemistry*, 54(13):pp.4696-4704. doi.org/10.1021/jf0606609
- Alauddina, M., Islama, J., Shirakawa, H., Kosekib, T., Ardiansyah, & Komaia, M., 2017. *Rice Bran as A Functional Food: an Overview of The Conversion of Rice Bran into A Superfood/ Functional Food : an Overview of The Conversion of Rice Bran into A Superfood/ Functional Food*. London : InTechOpen.
- Alonso-Castro, A.J., Domínguez, F., & García-Carrancá, A., 2013. Rutin Exerts Antitumor Effects on Nude Mice Bearing SW480 Tumor. *Arch Med Res*, 44(5):pp.346-351. doi: 10.1016/j.arcmed.2013.06.002
- Anand, P., Sundaram, C., Jhurani, S., Kunnumakkara, A.B., & Aggarwal, B.B., 2008. Curcumin and Cancer : An “Old-Age” Disease with an “Age Old” Solution. *Cancer Lett*, 267(1):pp.133-164. doi: 10.1016/j.canlet.2008.03.025
- Angraini, T., Novelina, Limber, U., & Amelia, R., 2015. Antioxidant Activities of Some Red, Black and White Rice Cultivar from West Sumatra, Indonesia. *Pak. J. Nutr*, 14(2):pp.112-117. doi: 10.3923/pjn.2015.112.117
- Ardiansyah, Shirakawa, H., Koseki, T., Ohinata, K., Hashizume, K., & Komai, M., 2006. Rice Bran Fractions Improve Blood Pressure, Lipid Profile, and Glucose Metabolism in Stroke-Prone Spontaneously Hypertensive Rats. *J Agric Food Chem*, 54(5):pp.1914-1920. doi:10.1021/jf052561l
- Ashokkumar, P., & Sudhandiran, G., 2011. Luteolin Inhibits Cell Proliferation During Azoxymethane-Induced Experimental Colon Carcinogenesis Via Wnt/ β -Catenin Pathway. *Invest New Drugs*, 29(2):pp.273-284. doi: 10.1007/s10637-009-9359-9
- Badan Pusat Statistik, 2018. *Luas Panen dan Produksi Beras di Indonesia 2018*.
- Balaji, C., Muthukumaran, J., Vinothkumar, R., & Nalini, N., 2014. Anticancer Effects of Sinapic Acid on Human Colon Cancer Cell Lines HT-29 and SW480. *International Journal of Pharmaceutical & Biological Archives*, 5(3):pp.176-183
- Baskar, A.A., Ignacimuthu, S., Paulraj, G.M., & AlNumair, K.S., 2010. Chemopreventive Potential of beta-Sitosterol in Experimental Colon Cancer Model-an In Vitro and In Vivo Study. *BMC Complementary and Alternative Medicine*, 10(24):pp.1-10. doi: 10.1186/1472-6882-10-24
- Bouzaiene, N.N., Jaziri, S.K., Kovacic, H., Chekir-Ghedira, L., Ghedira, K., & Luis, J., 2015. The Effects of Caffeic, Coumaric and Ferulic Acid on Proliferation, Superoxide Production, Adhesion and Migration of Human Tumor In Vitro. *Eur J Pharmacol*, 766:pp.799-105. doi: 10.1016/j.ejphar.2015.09.044
- Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R.L., Torre, L.A., & Jemal, A., 2018. Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *Ca Cancer J Clin*, 68(6):pp.394-424. doi: 10.3322/caac.21492
- Budijanto, S., Sitanggang, A.Z., Wiaranti, H., & Koesbiantoro, B., 2012. Pengembangan Teknologi Sereal Sarapan Bekatul dengan Menggunakan *Twin Screw Extruder*. *J. Pascapanen*, 9(2):pp.63-69. doi.org/10.21082/jpasca.v9n2.2012.63-69
- Cai, H., Al-Fayez, M., Tunstall, R.G., Platton, S., Greaves, P., Steward, W.P., & Gescher, A.J., 2005. The Rice Bran Constituent Tricin Potently Inhibits Cyclooxygenase Enzymes and Interferes with Intestinal Carcinogenesis in ApcMin Mice. *Mol Cancer Ther*, 4(9):pp.1287-1292. doi:10.1158/1535-7163.MCT-05-0165
- ^aCempaka, L., Eliza, N., Ardiansyah, D.D., Handoko, & Astuti, R.M., 2018. Proximate composition, total phenolic content, and sensory analysis of rice bran tempe. *Makara Journal of Science*. 2018 Jun 6;22(2):pp.89-94. doi/org/10.7454/mss.v22i2.9616
- ^bCempaka, L., Casa, N., & Asiah, N., 2018. Chemical Composition and Sensory Analysis of Simulated Chips Based Rice Bran Tempe Flour. *Current Research in Nutrition and Food Science*. 6(3):pp.826-34. doi.org/10.12944/CRNFSJ.6.3.25
- Chiang, E.P., Tsai, S.Y., Kuo, Y.H., Pai, M.H., Chiu, H.L., Rodriguez, R.L., Tang, & Feng-Yao., 2014. Caffeic Acid Derivatives Inhibit The Growth of Colon Cancer: Involvement of The PI3-K/Akt and AMPK Signaling Pathways. *PLoS One*, 9(6):e99631. doi.org/10.1371/journal.pone.0099631
- Focaccetti, C., Bruno, A., Magnani, E., Bartolini, D., Principi, E., Dallaglio, K., Bucci, E.O., Finzi, G., Sessa, F., Noonan, D.M., & Albini, A., 2015. Effects of 5-Fluorouracil on Morphology, Cell Cycle, Proliferation,

- Apoptosis, Autophagy and ROS Production in Endothelial Cells and Cardiomyocytes. *PLoS One*, 10(2):pp.1-25.doi: 10.1371/journal.pone.0115686
- Garcia-Conesa, M.T., Wilson, P.D., Plumb, G.W., Ralph, J., & Williamson, G., 1999. Antioxidant Properties of 4,4'-Dihydroxy-3,3'-Dimethoxy- β , β '-Bicinnamic Acid (8,8-Diferulic Acid, Non-cyclic Form). *J. Sci. Food Agric*, 79(3):pp.379–384.doi:10.1002/(sici)1097-0010(19990301)79:3<379::aid-jsfa259>3.0.co;2-v
- Ghasemzadeh, A., Karbalaii, M.T., Jaafar, H.Z.E., & Rahmat, A., 2018. Phytochemical Constituents, Antioxidant Activity, and Antiproliferative Properties of Black, Red, and Brown Rice Bran. *Chem Cent J*, 17;12(1):pp.17. doi: 10.1186/s13065-018-0382-9
- Ghoneum, M. & Agrawal, S., 2011. Activation of Human Monocyte-Derived Dendritic Cells In Vitro By The Biological Response Modifier Arabinoxylan Rice Bran (MGN-3/Biobran). *Int J Immunopathol Pharmacol*, 24(4):pp.941-948.doi:10.1177/039463201102400412
- Giftson, J.S., Jayanthi, S., & Nalini, N., 2010. Chemopreventive Efficacy of Gallic Acid, an Antioxidant and Anticarcinogenic Polyphenol, Against 1,2-Dimethyl Hydrazine Induced Rat Colon Carcinogenesis. *Invest New Drugs*, 28(3):pp.251–259. doi: 10.1007/s10637-009-9241-9
- Goufo, P., Pereira, J., Figueredo, N., Oliveira, M.B.P.P., Carranca, C., Eduardo, A.S., & Trindade, H., 2014. Effect of Elevated Carbon Dioxide (CO₂) on Phenolic Acids, Flavonoids, Tocopherols, Tocotrienols, γ -Oryzanol and Antioxidant Capacities of Rice (*Oryza sativa L.*). *J. Cereal Sci*, 59(1):pp.15-24. doi.org/10.1016/j.jcs.2013.10.013
- Guan, F., Li, G., Liu, A.B., Lee, M.J., Yang, Z., Chen, Y.K., Lin, Y., Shih, W., & Yang, C.S., 2012. δ - and γ -Tocopherols, but not α -Tocopherol, Inhibit Colon Carcinogenesis in Azoxymethane-Treated F344 Rats. *Cancer Prev Res (Phila)*, 5(4):pp.644-654.doi: 10.1158/1940-6207.CAPR-11-0521
- Henderson, A.J., Ollila, C.A., Kumar, A., Borresen, E.C., Raina, K., Agarwal, R., & Ryan, E.P., 2012. Chemopreventive Properties of Dietary Rice Bran: Current Status and Future Prospects. *Adv Nutr*, 3(5):pp.643-653. doi: 10.3945/an.112.002303
- Hermanianto, J., Syarief, R., & Wulandari, Z., 2000. Analisis Sifat Fisiokimia Produk Ekstrusi Hasil Sampung Penggilingan Padi (Menir dan Bekatul). *Bul. Teknol. dan Industri Pangan*, 11(1):pp.5-10.
- Hosoda, K., Sasahara, H., Matsushita, K., Tamura, Y., Miyaji, M., & Matsuyama, H., 2018. Anthocyanin and Proanthocyanidin Contents, Antioxidant Activity, and *In Situ* Degradability of Black and Red Rice Grains. *Asian-Australas J Anim Sci*, 31(8): pp.1213–1220.doi: 10.5713/ajas.17.0655
- Huang, Y.P., & Lai, H.M., 2016. Bioactive Compounds and Antioxidative Activity of Colored Rice Bran. *Journal of Food and Drug Analysis*, 24(3):pp.564-574. doi.org/10.1016/j.jfda.2016.01.004
- Hui, C., Bin, Y., Xiaoping, Y., Long, Y., Chunye, C., Mantian M., & Wenhua, L., 2010. Anticancer Activities of an Anthocyanin-Rich Extract From Black Rice Against Breast Cancer Cells In Vitro and In Vivo. *Nutr Cancer*, 62(8):pp.1128-1136. doi: 10.1080/01635581.2010.494821
- [IARC] International Agency for Research on Cancer, 2018. *Indonesia Source: Globocan 2018. The Global Cancer Observatory.*
- Islam, J., Koseki, T., Watanabe, K., Ardiansyah., Budijanto, S., Oikawa, A., Alauddin, M., Goto, T., Aso, H., Komai, M., & Shirakawa, H., 2017. Dietary Supplementation of Fermented Rice Bran Effectively Alleviates Dextran Sodium Sulfate-Induced Colitis in Mice. *Nutrients*, 9(7):pp.747.doi:10.3390/nu9070747
- Jaganathan, S.K., Supriyanto, E., & Mandal, M., 2013. Events Associated with Apoptotic Effect of *p*-Coumaric Acid in HCT-15 Colon Cancer Cells. *World J Gastroenterol*, 19(43):pp.7726-7734.doi: 10.3748/wjg.v19.i43.7726
- Janicke, B., Hegardt, C., Krogh, M., Onning, G., Akesson, B., Cirenajwis, H.M., & Oredsson, S.M., 2011. The Antiproliferative Effect of Dietary Fiber Phenolic Compounds Ferulic Acid and *p*-Coumaric Acid on The Cell Cycle of Caco-2 Cells. *Nutr Cancer*, 63(4):pp.611-622. doi.org/10.1080/01635581.2011.538486
- Katanasaka, Y., Ishii, T., Asai, T., Naitou, H., Maeda, N., Koizumi, F., Miyagawa, S., Ohashi, N., & Oku N., 2010. Cancer Antineovascular Therapy with Liposome Drug Delivery Systems Targeted to BiP/GRP78. *Int J Cancer*, 127(11):pp.2685-2698. doi: 10.1002/ijc.25276
- Kawabata, K., Yamamoto, T., Hara, A., Shimizu, M., Yamada, Y., Matsunaga, K., Tanaka, T., & Mori, H., 2000. Modifying Effects of Ferulic Acid on Azoxymethane-Induced Colon Carcinogenesis in F344 Rats. *Cancer Lett*, 157(1):pp.15-21.doi:10.1016/s0304-

- 3835(00)00461-4
- Kawasaki, B.T., Hurt, E.M., Mistree, T., & Farrar, W.L., 2008. Targeting Cancer Stem Cells with Phytochemicals. *Molecular Interventions*, 8(4):pp.174–184. doi: 10.1124/mi.8.4.9
- Kim, M.E., Ha, T.K., Yoon, J.H., & Lee, J.S., 2014. Myricetin Induces Cell Death of Human Colon Cancer Cells Via BAX/BCL2-Dependent Pathway. *Anticancer Res*, 34(2):pp.701-706
- Kim, S.P., Kang, M.Y., Nam, S.H., & Friedman, M., 2012. Dietary Rice Bran Component γ -oryzanol Inhibits Tumor Growth in Tumor-Bearing Mice. *Mol. Nutr. Food Res*, 56(6):pp.935-944
- Kumar, S., 2014. The Importance of Antioxidant and Their Role in Pharmaceutical Science-A Review. *Asian Journal of Research in Chemistry and Pharmaceutical Sciences*, 1(1):pp.27-44
- Kurniawati, M., Budijanto, S., & Yuliana, N.D., 2016. Karakterisasi dan Indeks Glikemik Beras Analog Berbahan Dasar Tepung Jagung. *J. Gizi Pangan*, 11 (3):pp.169-174. doi.org/10.25182/jgp.2016.11.3.%25p
- Kusumastuty, I., Ningsih, L.F., & Julia, A.R., 2015. Formulasi *Food Bar* Tepung Bekatul dan Tepung Jagung sebagai Pangan Darurat. *Indonesia Journal of Human Nutrition*, 2(2):pp.68-75. doi.org/10.21776/ub.ijhn.2015.002.02.1
- Lamberts, L., Bie, E.De., Derycke, V., Veraverbeke, W.S., Man, W.De, & Delcour, J.A., 2016 Effect of Processing Conditions on Color Change of Brown and Milled Parboiled Rice. *Cereal Chem*, 83(1):pp.80–85. doi.org/10.1094/CC-83-0080
- Laokuldilok, T., Shoemaker, C.F., Jongkaewattana, S., & Tulyathan, V., 2011. Antioxidants and Antioxidant Activity of Several Pigmented Rice Brans. *J. Agric. Food Chem*, 59(1):pp.193-199. doi: 10.1021/jf103649q
- Law, B.M.H., Waye, M.M.Y., So, W.K.W., & Chair, S.Y., 2017. Hypotheses on The Potential of Rice Bran Intake to Prevent Gastrointestinal Cancer Through The Modulation of Oxidative Stress. *Int J Mol Sci*, 18(7)pii: E1352. doi:10.3390/ijms18071352
- Li, C., Yang, X., Chen, C., Cai, S., & Hu, J., 2014. Isorhamnetin Suppresses Colon Cancer Cell Growth Through The PI3K/Akt/mTOR Pathway. *Mol Med Rep*. 9(3):pp.935-940. doi: 10.3892/mmr.2014.1886
- Limtrakul, D.P., Semmarath, W., & Mapoung, S., 2019. *Anthocyanins and Proanthocyanidins in Natural Pigmented Rice and Their Bioactivities : Phytochemicals in Human Health*. London : InTechOpen
- Limtrakul, P., Yodkeeree, S., Pitchakarn, P., & Punfa, W., 2016. Anti-Inflammatory Effects of Proanthocyanidin-Rich Red Rice Extract Via Suppression of MAPK, AP-1 and NF- κ B Pathways in Raw 264.7 Macrophages. *Nutr Res Pract*, 10(3):pp.251-258. doi: 10.4162/nrp.2016.10.3.251
- Manickavasagan, A., Santhakumar, C., & Venkatachalapathy, N., 2017. *Brown rice*. Switzerland : Springer Nature.
- McIlwain, D.R., Berger, T., & Mak, T.W., 2013. Caspase Functions in Cell Death and Disease. *Cold Spring Harb Perspect Biol*, 5(4):a008656. doi: 10.1101/cshperspect.a008656
- Min, B., McClung, A., & Chen, M.H., 2014. Effects of Hydrothermal Processes on Antioxidants in Brown, Purple and Red Bran Whole Grain Rice (*Oryza sativa* L.) *Food Chem*, 159:pp.106-115. doi: 10.1016/j.foodchem.2014.02.164
- Moongngnam, A., Daomukda, N., & Khumpika S., 2012. Chemical Compositions, Phytochemical, and Antioxidant Capacity of Rice Bran, Rice Bran Layer, and Rice Germ. *APCBEC Procedia*, 2:pp.73-79. doi.org/10.1016/j.apcbee.2012.06.014
- Nakornriab, M., Sriseadka, T., & Wongpornchai, S., 2008. Quantification of Carotenoid and Flavonoid Compounds in Brans of Some Thai Black Rice Cultivars Using Supercritical Fluid Extraction and High-Performance Liquid Chromatography-Mass Spectrometry. *Journal of Food Lipids*, 15(4):pp.488–503. doi.org/10.1111/j.1745-4522.2008.00135.x
- Nasrallah, A. & El-Sibai, M., 2014. Colorectal Cancer Causes and Treatments: A Minireview. *The Open Colorectal Cancer Journal*, 24(7):pp.1-4. doi: 10.2174/1876820201407010001
- Norazalina, S., Norhaizan, M.E., Hairuszah, I., & Norashareena, M.S., 2010. Anticarcinogenic Efficacy of Phytic Acid Extracted From Rice Bran on Azoxymethane-Induced Colon Carcinogenesis in Rats. *Exp Toxicol Pathol*. 62(3):pp.259-268. doi: 10.1016/j.etp.2009.04.002
- Noviasari, S., Kusnandar, F., Setiyono, A., Budi, F.S., & Budijanto, S., 2019. Profile of Phenolic Compounds, DPPH-Scavenging and Anti α -amylase Activity of Black Rice Bran Fermented with *Rhizopus oligosporus*. *Pertanika J. Trop. Agric. Sc*, 42 (2):pp.489 - 501.
- Oliveira, Mdos, S., Feddern, V., Kupsk, L., Cipolatti, E.P., Badiale-Furlong, E., de Souza-Soares, L.A., 2011. Changes in Lipid, Fatty Acids and

- Phospholipids Composition of Whole Rice Bran After Solid-State Fungal Fermentation. *Bioresour Technol*, 102(17):pp.8335-8338. doi: 10.1016/j.biortech.2011.06.025
- Pandurangan, A.K., & Ganapsam, S., 2013. Luteolin Induces Apoptosis in Azoxymethane-Induced Colon Carcinogenesis Through Involvement of Bcl-2, Bax, and Caspase-3. *J Chem Pharm Res*, 5(4):pp.143-148.
- Pandurangan, A.K., Dharmalingam, P, Ananda, SK, Ganapasam S., 2012. Effect of Luteolin on The Levels of Glycoproteins During Azoxymethane-Induced Colon Carcinogenesis in Mice. *Asian Pac J Cancer Prev*, 13(4):pp.1569-1573.doi:10.7314/apjcp.2012.13.4.1569
- Pandurangan, A.K., Dharmalingam, P, Sadagopan, S.K., & Ganapasam, S., 2014. Luteolin Inhibits Matrix Metalloproteinase 9 and 2 in Azoxymethane-Induced Colon Carcinogenesis. *Hum Exp Toxicol*, 33(11):pp.1176-1185.doi: 10.1177/0960327114522502
- Pang, Y., Ahmed, S., Xu, Y., Beta, T., Zhu, Z., Shao, Y., & Bao, J., 2017. Bound Phenolic Compounds and Antioxidant Properties of Whole Grain and Bran of White, Red and Black Rice. *Food Chemistry*, 240:pp.212-221.doi.org/10.1016/j.foodchem.2017.07.095
- Pavlou, S., Wang, L., Xu, H., & Chen, M., 2017. Higher Phagocytic Activity of Thioglycollate-Elicited Peritoneal Macrophages is Related to Metabolic Status of The Cells. *J Inflamm (Lond)*, 14(4):pp.1-6. doi: 10.1186/s12950-017-0151-x
- Poulev, A., Chen, M.H., Cherravuru, S., Raskin, I., & Belanger, F.C., 2017. Variation in Levels of The Flavone Tricin in Bran from Rice Genotypes Varying in Pericarp Color. *Journal of Cereal Science*, 79(7):pp.226-232. doi.org/10.1016/j.jcs.2017.11.001
- Prasad, M.N.N., Sanjay, K.R., Khatokar, M.S., Vismaya, M.N., & Swamy, N., 2011. Health Benefits of Rice Bran - A Review. *J Nutr Food Sci*, 1(3) :pp.1-7. doi:10.4172/2155-9600.1000108
- Prasad, S., Gupta, S.C., Tyagi, A.K., & Aggarwal, B.B., 2016. γ -Tocotrienol Suppresses Growth Andsensitises Human Colorectal Tumours to Capecitabine in A Nude Mouse Xenograft Model by Down-Regulating Multiple Molecules. *Br J Cancer*. 115(7):pp.814-824. doi: 10.1038/bjc.2016.257
- Pratiwi, R., & Purwestri, Y.A., 2017. Black Rice as A Functional Food in Indonesia. *Functional Foods in Health and Disease*, 7(3):pp.182-194. doi: 10.31989/ffhd.v7i3.310
- Ramos, A.A., Pereira-Wilson, C., & Collins, A.R., 2010. Protective Effects of Ursolic Acid and Luteolin Against Oxidative DNA Damage Include Enhancement of DNA Repair in Caco-2 Cells. *Mutat Res*, 692(1-2):pp. 6-11. doi: 10.1016/j.mrfmmm.2010.07.004
- Rashid, N.Y.A., Razak, D.L.A., Jamaluddin, A., Sharifuddin, S.A., & Long, K., 2015. Bioactive Compounds and Antioxidant Activity of Rice Bran Fermented with Lactic Acid Bacteria. *Malaysian Journal of Microbiology*, 11(2):pp.156-162. doi: 10.21161/mjm.12714
- Rezaei, M., Zeidooni, L., Hashemitabar, M., Razzazzadeh, S., Mahdavinia, M., & Ghasemi, K., 2014. Gamma-Tocopherol Enhances Apoptotic Effects of Lovastatin in Human Colorectal Carcinoma Cell Line (HT29). *Nutr Cancer*, 66(8):pp.1386-1393. doi: 10.1080/01635581.2014.956250
- Shafie, N.H., Mohd Esa, N., Ithnin, H., Md, Akim, A., Saad, N., & Pandurangan, A.K., 2013. Preventive Inositol Hexaphosphate Extracted From Rice Bran Inhibits Colorectal Cancer Through Involvement of Wnt/-Catenin and COX-2 Pathways. *Biomed Res Int*, 2013:pp.1-10. doi: 10.1155/2013/681027
- Shao, Y., Xu, F., Sun, X., Bao, J., & Beta T., 2014. Identification and Quantification of Phenolic Acids and Anthocyanins as Antioxidants in Bran, Embryo and Endosperm of White, Red and Black Rice Kernels (*Oryza sativa L.*). *Journal of Cereal Science*, 59(2):pp.211-218. doi.org/10.1016/j.jcs.2014.01.004
- Sharma, S.H., Chellappan, D.R., Chinnaswamy, P., & Nagarajan, S., 2017. Protective Effect of p-Coumaric Acid Against 1,2 Dimethylhydrazine Induced Colonic Preneoplastic Lesions in Experimental Rats. *Biomed Pharmacother*. 94:pp.577-588.doi: 10.1016/j.biopha.2017.07.146
- Sharma, S.H., Rajamanickam, V., & Nagarajan, S., 2018. Antiproliferative Effect of p-Coumaric Acid Targets UPR Activation By Downregulating Grp78 in Colon Cancer. *Chem Biol Interact*, 291:pp.16-28. doi: 10.1016/j.cbi.2018.06.001
- Subramanian, A.P., Jaganathan, S.K., Mandal, M., Supriyanto, E., & Muhamad, II., 2016. Gallic Acid Induced Apoptotic Events in HCT-15 Colon Cancer Cells. *World J Gastroenterol*, 22(15):pp.3952-3961. doi: 10.3748/wjg.v22.i15.3952
- Sumczynski, D., Kotásková, E., bíková, H.D., & Mlček J., 2016. Determination of Contents

- and Antioxidant Activity of Free and Bound Phenolics Compounds and In Vitro Digestibility of Commercial Black and Red Rice (*Oryza sativa L.*) Varieties. *Food Chem*, 211:pp.339-346.doi: 10.1016/j.foodchem.2016.05.081
- Sun, Q., Spiegelman, D., Van, D.R.M., Holmes, M.D., Malik, V.S., Willett, W.C., & Hu, F.B., 2010. White Rice, Brown Rice, and Risk of Type 2 Diabetes in US Men and Women. *Arch Intern Med*, 170(11):pp.961-969. doi: 10.1001/archinternmed.2010.109
- Tuarita, M.Z., Sadek, N.F., Sukarno, Yuliana, N.D., & Budijanto, S., 2017 Pengembangan Bekatul sebagai Pangan Fungsional: Peluang, Hambatan, dan Tantangan. *Jurnal Pangan*, 26(2):pp.167-176.
- Turktekin, M., Konac, E., Onen, H.I., Alp, E., Yilmaz, A., & Menevse, S., 2011. Evaluation of The Effects of The Flavonoid Apigenin on Apoptotic Pathway Gene Expression on The Colon Cancer Cell Line (HT29). *J Med Food*, 14(10):pp.1107-1117. doi: 10.1089/jmf.2010.0208
- Um, M.Y., Ahn, J., & Ha, T.Y., 2013. Hypolipidaemic Effects of Cyanidin 3-Glucoside Rich Extract From Black Rice Through Regulating Hepatic Lipogenic Enzyme Activities. *J Sci Food Agric*, 93(12):pp.3126-3128. doi: 10.1002/jsfa.6070
- Wang, W., VanAlstyne, P.C., Irons, K.A., Chen, S., Stewart, J.W., & Birt, D.F., 2004. Individual and Interactive Effects of Apigenin Analogs on G2/M Cell-Cycle Arrest in Human Colon Carcinoma Cell Lines. *Nutrition and Cancer*, 48(1):pp.106-114.doi: 10.1207/s15327914nc4801_14
- Widowati, S., 2001. Pemanfaatan Hasil Samping Penggilingan Padi dalam menunjang Sistem Agroindustri di Pedesaan. *Buletin AgroBio*, 4(1):pp.33-38.
- Xia, X., Ling, W., Ma, J., Xia, M., Hou, M., Wang, Q., Zhu, H., & Tang, Z., 2006. an Anthocyanin-Rich Extract from Black Rice Enhances Atherosclerotic Plaque Stabilization in Apolipoprotein E-deficient Mice. *The Journal of Nutrition*, 136(8):pp.2220-2225.
- Xu, M., Wang, S., Song, Y.U., Yao, J., Huang, K., & Zhu, X., 2016. Apigenin Suppresses Colorectal Cancer Cell Proliferation, Migration and Invasion Via Inhibition of The Wnt/ β -Catenin Signaling Pathway. *Oncol Lett*, 11(5):pp.3075-3080.doi: 10.3892/ol.2016.4331
- Xu, W., Du, M., Zhao, Y., Wang, Q., Sun, W., & Chen, B., 2012. γ -Tocotrienol Inhibits Cell Viability Through Suppression of β -Catenin/Tcf Signaling in Human Colon Carcinoma HT-29 Cells. *J Nutr Biochem*, 23(7):pp.800-807. doi:10.1016/j.jnutbio.2011.04.003
- Yadav, R.K, Chae, Soo-Wan., Kim, Hyung-Ryong., & Chae, H.J., 2014 Endoplasmic Reticulum Stress and Cancer. *J Cancer Prev*, 19(2):pp.75-88. doi: 10.15430/JCP.2014.19.2.75
- Younas, A., Bhatti, M.S., Ahmed, A., & Randhawa, M.A., 2011. Effect of Rice Bran Supplementation on Cookie Baking. *Pak. J. Agri. Sci*, 48(2):pp.129-134.
- Zhang, J.S., Li, D.M., Ma, Y., He, N., Gu, Q., Wang, F.S., Jiang, S.Q., Chen, B.Q., & Liu, J.R. 2013. γ -Tocotrienol Induces Paraptosis-Like Cell Death in Human Colon Carcinoma SW620 Cells. *PLoS One*.E57779. doi.org/10.1371/journal.pone.0057779
- Zheng, Q., Hirose, Y., Yoshimi, N., Murakami, A., Koshimizu, K., Ohigashi, H., Sakata, K., Matsumoto, Y., Sayama, Y., & Mori, H., 2002. Further Investigation of The Modifying Effect of Various Chemopreventive Agents on Apoptosis and Cell Proliferation in Human Colon Cancer Cells. *J Cancer Res Clin Oncol*, 128(10):pp.539-546. doi:10.1007/s00432-002-0373-y
- Zulfafamy, K.E., Ardiansyah, & Budijanto, S., 2018. Antioxidative Properties and Cytotoxic Activity Against Colon Cancer Cell WiDr of *Rhizopus oryzae* and *Rhizopus oligosporus*-Fermented Black Rice Bran Extract. *Curr. Res. Nutr Food Sci Jour*, 6 (1) :pp.23-34. doi.org/10.12944/CRNFSJ.6.1.03



Breastfeeding Patterns as a Determinant of Fertility in the Province of East Nusa Tenggara, Indonesia

Wahyu Utomo[✉], Robani Catursaptani, Dian Kristiani Irawaty, Muhammad Dawam, Mugia Bayu Rahardja

Badan Kependudukan dan Keluarga Berencana Nasional (BKKBN), Indonesia

Article Info

Article History:
Submitted September 2020
Accepted November 2020
Published November 2020

Keywords:
Fertility decomposition, breastfeeding, East Nusa Tenggara, IDHS.

DOI
<https://doi.org/10.15294/kemas.v16i2.26136>

Abstract

Eventhough the fertility level in East Nusa Tenggara had decrease slightly during the last 10 years' period, the fertility level in the area had still considered much higher than other provinces in Indonesia. However, the infertility index of breastfeeding in the Province had been the lowest in Indonesia, which revealed the breastfeeding duration in East Nusa Tenggara was the longest period in Indonesia. This study aimed to identify the association between maternal characteristics and breastfeeding behavior in East Nusa Tenggara Province in 2017. This study analyzed women who had children based on the 2017 Indonesian Demographic and Health Survey (IDHS). The analysis used in this study includes univariable, bivariable, logistic regression analysis. After controlling for maternal characteristics variables, age, education and work status of the mother were found as the most contributed factors to breastfeeding behavior in East Nusa Tenggara Province in 2017.

Introduction

NTT Province is ranked 33 nationally with an HDI value of 63.73 in 2017. The number of poor people in NTT is 1.13 million people with a poverty line of IDR 343,396 per capita per month. NTT is an archipelago province in eastern Indonesia which consists of the five large islands of Flores, Sumba, Timor, Alor and Lembata. The land area of NTT is 47,931.54 km², most of the area is mountainous and hilly (BPS, 2018).

The birth rate in East Nusa Tenggara (NTT) is always the highest among other provinces, except in the 2012 IDHS results where this province is in 4th place after Papua, West Papua, and West Sulawesi Provinces. Marriage rates, contraceptive use, intentional abortion, and breastfeeding are the most important immediate variables and have a direct effect on reducing fertility because together they account for nearly 96% of the

variation in fertility in a population (Bongaarts and Potter, 1983). The use and effectiveness of contraceptives are the main factors affecting the decline in fertility rates in Indonesia, compared to other factors, namely the pattern of marriage and breastfeeding behavior. The infertility index while breastfeeding in NTT is the best at the national level. This province has the lowest infertility index during breastfeeding among other provinces (Samosir, 2019). Breastfeeding has the effect of inhibiting ovulation and extending the birth interval, which in turn has an impact on decreasing natural fertility.

The factor of contraceptive use in NTT Province ranks the fourth lowest after Papua, West Papua and Maluku Provinces. The marriage pattern factor shows that NTT Province has the proportion of being married ($C_m > 0.6$), which means that women of childbearing age in this province spend a relatively long time in the status of marriage (Samosir, 2019).

[✉] Correspondence Address:
Badan Kependudukan dan Keluarga Berencana Nasional (BKKBN), Indonesia
Email: wahyu.utomo24@yahoo.com

In a study in NTT Province, there is a local culture that encourages couples to have children with the same full sex and number and is commonly referred to as 'belis' (Rahmadewi and Asih, 2011). The age at first marriage of women affects fertility because the younger the age at first marriage, the longer the woman's life is spent in marriage and the risk of having children (Bongaarts and Potter, 1983). A study in West Sumatra found that knowledge, employment status, husband's support and the role of health workers had a significant effect on the application of the lactational amenorrhoea method (MAL) (Rifdi, F. & Martika, 2019). A study in East Java stated that there was a relationship between exclusive breastfeeding and the return of menstruation as much as 75%, respondents who were not exclusively breastfed by returning to rapid menstruation were 29.2% (Muzayyaroh and Fatimah, 2012). Nursing patterns vary in Indonesia because they are related to the behavior of mothers, families and communities in following the modernization process (Wilopo, 2009).

Based on the results of previous studies above, the high fertility rate that occurs is of course not only caused by factors of marriage, use of contraceptives, deliberate abortion, and breastfeeding (Harrison, 2016; Glasier, 2019). Demographic, social, economic, and cultural factors affect fertility through proximate determinants that directly affect fertility rates (Davis and Blake, 1956; Oyekale, 2018). Therefore, it is important to carry out further analysis of trends or patterns of changes in determinants of fertility using data from the 2002/2003 and 2017 IDHS results in NTT Province, so as to get a picture of taking a more appropriate approach in reducing the fertility rate in this province. The purpose of this study was to determine the proximate determinants of the breastfeeding index using the fertility decomposition based on the 2002/2003 IDHS and 2017 IDHS results.

Method

This study uses quantitative research methods with a secondary data analysis approach. The data used in this study are sourced from the 2002/2003 and 2017 IDHS data. The selection of the 2002/2003 and 2017 IDHS data refers to the TFR in Indonesia

which began to experience fertility stalling for a period of 10 years from the 2002/2003 IDHS to the IDHS 2012, namely stagnating at 2.6 children per woman and experiencing a decline in 2017. The unit of analysis in this study was women aged 15-49 years who live in East Nusa Tenggara Province. Data analysis was performed using the fertility decomposition formula to determine the marriage index (Cm), the non-contraceptive index (Cc), and the infertility index during breastfeeding (Ci) (Bongaarts, 1978).

Breastfeeding has the effect of inhibiting ovulation, thereby extending the birth interval and reducing natural fertility (Bouchard, 2018; Lim, 2019). Quantitative estimation of the effect of reducing fertility from infertility during breastfeeding can be estimated by comparing the mean birth interval without and with breastfeeding (Samosir, 2019). The birth interval can be divided into four components. The first component is an infertile interval immediately after delivery. The second component is the waiting time for conception, which begins at ovulation after delivery and ends with a conception. The third component is the time added by accidental fetal death, a mean of two months per birth interval. The fourth component is the period of pregnancy for nine months (Samosir, 2019).

Furthermore, a univariate analysis was also conducted to see the percent distribution of WUS respondents who were breastfeeding as an intermediate determinant. Bivariate analysis was performed to see the percent distribution between the independent variables (age, education, place of residence and wealth quintile) and the dependent variable (breastfeeding) and at the same time to see the correlation between the two variables. Data analysis used the stata version 20.0 software systems by providing treatment to the data set in order to obtain weighted population estimates.

Results and Discussion

Figure 1. shows that the results of the 2002/2003 IDHS, the overall fertility rate (TFR) of East Nusa Tenggara is 4.10 children per woman. Meanwhile, the results of the 2017 SDKI East Nusa Tenggara TFR were 3.37 children per woman. From the two IDHS results, it means that there was a decrease in the TFR of

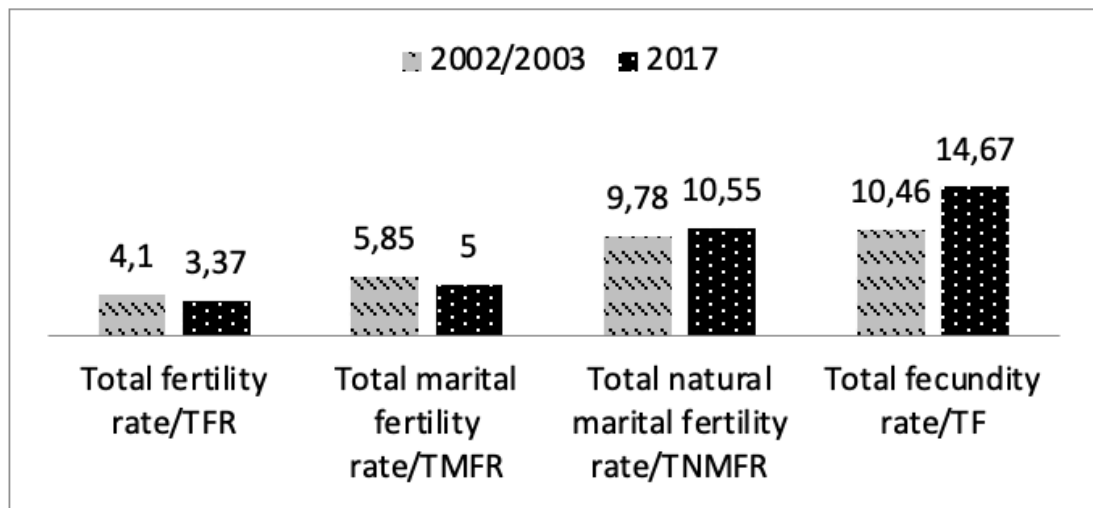


Figure 1. The results of comparison of the fertility decomposition variables for the 2002-03 and 2017 IDHS in NTT

around 0.73 births per woman from 2002/2003 to 2017. Although the overall fertility rate has decreased, the results of the IDHS in these two periods show that NTT has always been in one of the provinces with the highest TFR position at the national level. The 2002/03 IDHS results also show that a TFR of 4.10 children per woman resulted in TMFR, TNMFR, and TF of 5.85, 9.78 and 10.46, respectively. Meanwhile, the 2017 IDHS with a TFR of 3.37 resulted in TMFR of 5.00, TNMFR of 10.55 and a TF of 14.67 children per woman.

In Figure 1, the changes in fertility measures (TFR, TMFR, TNMFR, and TF) in NTT between 2002/03 and 2017. Data from the 2002/03 IDHS, found that the index of proportion of marriage (C_m), non-contraception (C_c), and infertility during breastfeeding (C_i) in NTT were 0.70, 0.60, and 0.93, respectively. Meanwhile, the results of the 2017 IDHS were the proportion of marriage (C_m) 0.67, non-contraception (C_c) 0.47, and infertility during breastfeeding (C_i) 0.72. Thus, between 2002/03 and 2017, in NTT, the index of the proportion of marriage (C_m) and infertility during breastfeeding (C_i), the index of non-contraception (C_c), decreased. This means that the effect of limiting fertility from marital patterns, infertility during breastfeeding and the use and effectiveness of contraceptives has increased respectively.

The fecundity rate (TF) in NTT in 2002/03 was 10.5 children per married woman with a TFR value of 4.1 children per married woman. While NTT's TFR value in 2017 increased higher than the previous one, namely 14.67 children per married woman, the final result of the TFR value was actually lower, namely 3.37 children per married woman. By decreasing the TFR value in NTT to 3.37 children per married woman, it reduces the range of achievement to the National TFR value of 2.42. The pattern of each marriage index (C_m), non-contraceptive index (C_c), and infertility index during breastfeeding (C_i) influenced the increase and decrease in TF value up to the TFR value.

From Figure 2. It can be seen that the non-contraceptive index (C_c) value has the most dominant relative influence in NTT in 2002/03 amounting to 61.8% and 2017 influencing 49.1%. Meanwhile, the relative effect on the marriage index (C_m) was 27.5% and 14.4% and the infertility index during breastfeeding (C_i) was 10.7% and 36.5%. There was a decrease in the relative effect of the contraceptive index (C_c) and the marriage index of around 12% to 13%, while the infertility index during breastfeeding (C_i) actually experienced a quite high increase of effect, namely 26%. In addition, after 15 years there was a significant increase in the median infertility during breastfeeding (i), from 2.9 months to 9.3 months.

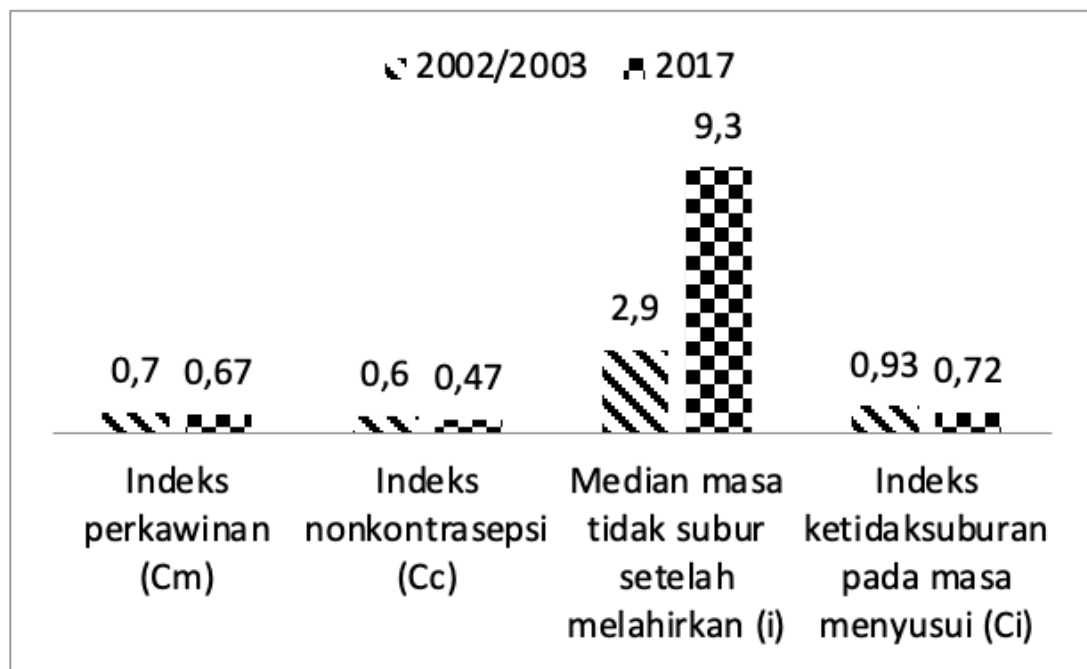


Figure 2. Comparison of the 2002-03 and 2017 IDHS fertility decomposition indexes in NTT

The NTT marriage index according to the 2002/2003 IDHS data is 0.70 and the 2017 IDHS is 0.67. This means that women of childbearing age in NTT in 2002-2003 spent 70% and 67% in 2017 of their reproductive period in the married status which exposed them to childbearing. This shows that the marriage pattern was able to reduce fertility by 70% in 2002-2003 and 67% in 2017. In addition, the marriage index in NTT province has increased by 0.03 against the TFR.

The non-contraceptive index (C_c) in NTT was 0.60 in 2002-2003 and 0.47 in 2017. This means that the fertility rate in marriage (TMFR) in NTT was, respectively, 60% and 47% lower than that of TNMFR. So, in 2002-2003 the contraceptive pattern (prevalence and effectiveness of contraception) had an effect on reducing fertility (fertility-reducing effect) in NTT, which was 60% and 47% in 2017. In addition, it can also be interpreted that women of reproductive age who are married and are not sterile protected by effective contraception by 40% in 2002/3 and 53% in 2017. There was an increase in the effect of using effective contraception by 13% over a period of 15 years.

In 2002-03 the value of the infertility index during breastfeeding (C_i) NTT was

0.93 and in 2017 it was 0.72. This means that the natural fertility rates (TNMFR) are 93% and 72% lower than the natural fertility rates without breastfeeding (TF), respectively. Thus, the pattern of breastfeeding in NTT has the effect of limiting fertility (fertility-limiting) by 93% and 72%, respectively. There is a decrease in the C_i value of 0.21, or it can be interpreted that the effect of the infertility index during breastfeeding has increased. Meanwhile, the median of infertility during breastfeeding in NTT also increased from 2.9 months to 9.3 months. The longer the median infertility during breastfeeding, the smaller the infertility index value during breastfeeding.

The analysis of changes in fertility measures between 2002/03 and 2017 shows that the difference between the overall fertility rate (TFR) and the fertility rate in marriage (TMFR) decreased from 1.75 births according to the 2002/03 IDHS to 1.63 births according to the IDHS 2017. Meanwhile, the difference between the fertility rate in marriage (TMFR) and the natural fertility rate (fertility rate in marriages without contraception and deliberate abortion / TNMFR) increased from 3.93 births according to the 2002-03 IDHS to 5.55 births according to the IDHS 2017.

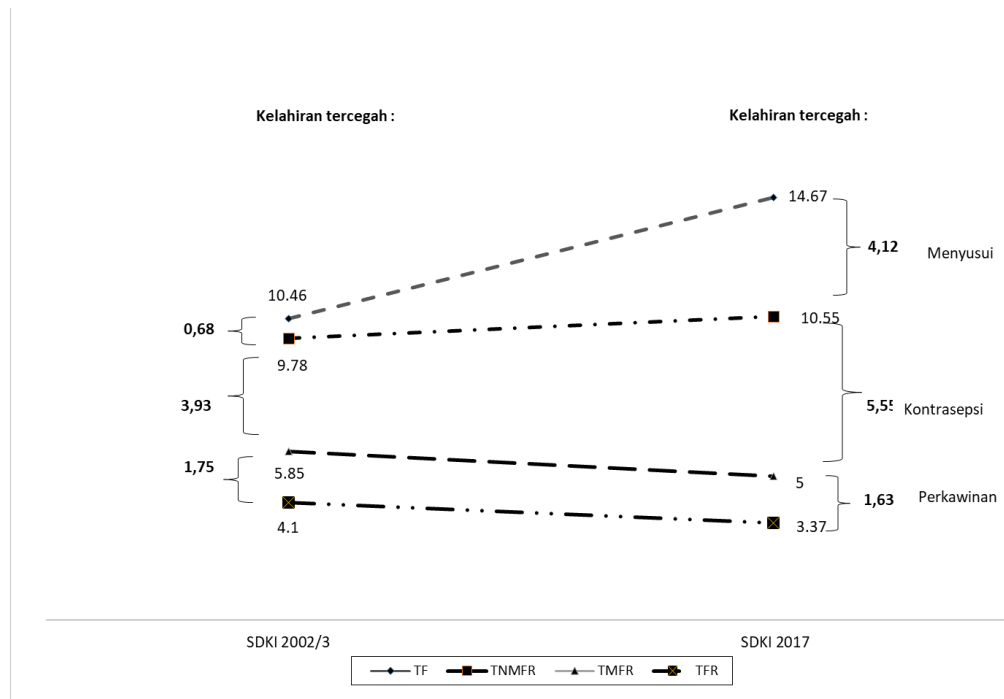


Figure 3. Change in fertility measures: NTT 2002/03 and 2017

Furthermore, the difference between the natural fertility rate (TNMFR) and the natural fertility rate without breastfeeding (TF) increased from 0.68 births according to the 2002/03 IDHS to 4.12 births according to the 2017 IDHS, meaning that according to the 2002/03 IDHS results, the pattern of marriages resulted in prevented births were as much as $TMFR - TFR = 5.85 - 4.10 = 1.75$ births per woman. Meanwhile, the pattern of marriage and the use and effectiveness of contraception resulted in preventable births as much as $TNMFR - TMFR = 9.78 - 5.85 = 3.93$ births per married woman. Furthermore, the pattern of marriage, use and effectiveness of contraception, and breastfeeding resulted in preventable births of $TF - TNMFR = 10.46 - 9.78 = 0.68$ births per married woman.

According to the results of the 2017 IDHS, the pattern of marriage resulted in prevented births as much as $TMFR - TFR = 5.00 - 3.37 = 1.63$ births per woman. Meanwhile, the pattern of marriage and the use and effectiveness of contraception resulted in prevented births of

$TNMFR - TMFR = 10.55 - 5.00 = 5.55$ births per married woman. Furthermore, the pattern of marriage, contraceptive use and effectiveness, and breastfeeding resulted in prevented births of $TF - TNMFR = 14.67 - 10.55 = 4.12$ births per married woman.

The results of further analysis of the fertility decomposition of the 2017 Indonesian Demographic and Health Survey (IDHS), the most dominant pattern is about the contraceptive index (Samosir, 2019). Compared to 33 other provinces, the components of breastfeeding in Indonesia from the 2017 IDHS found that breastfeeding as a proxy for infertility towards fertility was strong or dominant in the province of East Nusa Tenggara compared to 33 other provinces (Ci index 0.72). For women with children under 2 years, the determinants of amenorrhoea (no menstruation) after giving birth are one of them because exclusive breastfeeding, so that exclusive breastfeeding is associated with post partum amenorrhoea (Afifi, 2008).

Based on table 1, 92.1% of mothers aged

Table 1. Percent distribution of maternal characteristics variables with breastfeeding variable, East Nusa Tenggara, 2017

Variable	Breastfeeding	
	≤ 6 Months	> 6 Months
	%	%
<i>Ages</i>		
30-49	92.1	7.9
15-29	79.1	20.9
<i>Residence</i>		
City	87.9	12.1
Village	88.9	11.1
<i>Education</i>		
No School, Elementary School, Junior High School	89.7	10.3
High School +	80.3	19.7
<i>Wealth Quintile</i>		
Middle above and Top,	85.2	14.8
Lowest, Lower and Medium	88.9	11.1
Intermediate		
<i>Work Status</i>		
Not working	80.0	20.0
Working	93.4	6.6
<i>Place of Birth</i>		
Medical facility	89.6	10.4
Not a Medical Facility	84.5	15.5
<i>Childbirth Helper</i>		
Not a Health Officer	80.4	19.6
Health Officer	81.8	18.2

30-49 years who provide breastfeeding with a duration of 0-6 months, while those aged 15-29 are 79.1%. This suggests that more mothers who breastfeed children with duration of 0-6 months are those aged 30-49 years.

Based on the area of residence, it shows that mothers who live in rural areas have a greater proportion of breastfeeding practices with a duration of 0-6 months, namely 88.9% compared to mothers living in urban areas, 87.9%. Furthermore, the proportion of mothers who provide breastfeeding with a duration of 0-6 months is greater for those who do not go to school, SD and SMP by 89.7% compared to mothers who have graduated from high school and college, 80.3%. Based on the wealth quintile, the highest proportion of mothers who provide breastfeeding with a duration of 0-6 months are those who have the lowest, middle and middle quintile, reaching 88.9%. The results showed

that 93.4% of mothers with working status, while 80.0% of mothers who did not work or only became housewives, gave breast milk for 0-6 months. The place of delivery is a place of health care chosen by the mother to give birth to a child.

From table 1 it can also be seen that the mothers who chose to give birth in health facilities were 89.6%, while 84.5% were not in health facilities. Furthermore, based on birth attendants, 81.8% of mothers who were assisted in delivery by health workers provided breast milk with duration of 0-6 months. Meanwhile, 80.4% of mothers who were not assisted by health workers during childbirth gave breast milk for 0-6 months. Based on these data, besides the place of birth that can affect the success of a mother to provide breast milk to children is health workers such as doctors, midwives and nurses.

Bivariate analysis was carried out to see the distribution between the dependent variable (breastfeeding) and the independent variable (age, place of residence, education, wealth quintile, work status, place of delivery and birth attendant) and at the same time to determine the variables to be used in the next statistical test. Based on table 3, it is known that the number of women aged 15-29 years who breastfeed children with a duration of 0 - 6 months is 79.1% and women aged 30-49 years who breastfeed children with a duration of 0-6 months are 92.1%. The statistical test results obtained $p \leq 0.05$, it can be concluded that there is a significant relationship between

the age variable and the breastfeeding variable. The result of the Odds ratio (OR) analysis of the age variable was 0.322, meaning that women aged 15-29 had a 0.322 times greater chance of breastfeeding with a duration of 0-6 months than women aged 30-49 years. There are 88.9% of women who live in rural areas breastfeed their children with duration of 0-6 months. In the variable of residence, the statistical test results obtained by $p \geq 0.05$, meaning that there is no significant relationship between the variable of residence and the variable of breastfeeding. The OR value obtained from the variable of residence is 0.772, meaning that women in rural areas have a 0.772 times greater chance

Table 3. Bivariate Analysis Results between Moternal Characteristics and Breastfeeding Behavior, East Nusa Tenggara, 2017

Variable	Breastfeeding				Total		OR	P Value
	≤ 6 Months		> 6 Months		n	%		
	n	%	n	%				
Ages								
30 -49	399	92.1	34	7.9	433	100	0.322	0.000
15-29	121	79.1	32	20.9	153	100		
Residence								
City	87	87.9	12	12,1	99	100	1.103	0.772
Village	433	88.9	54	11,1	487	100		
Education								
Not school, Sekolah Dasar, Junior high school	462	89.7	53	10.3	515	100	0.466	0.019
Senior high school+	57	80.3	14	19.7	71	100		
Wealth Quintile								
Middle and Top	23	85.2	4	14.8	27	100	1.394	0.550
Lowest, Medium and Intermediate	497	88.9	62	11.1	559	100		
Work Status								
Not working	168	80.0	42	20.0	210	100	3.520	0.000
Working	351	93.4	25	6.6	376	100		
Place of birth								
Medical Facility	433	89.6	50	10.4	483	100	0.628	0.131
Not a Medical Facility	87	84.5	16	15.5	103	100		
Place of Birth								
Not a Health Officer	262	80.4	64	19.6	326	100	1.099	0,905
Health Officer	9	81.8	2	18.2	11	100		

of breastfeeding for a duration of 0-6 months compared to women living in urban areas. As many as 89.7% of women who provide breast milk with a duration of 0-6 months do not go to school, elementary school, junior high school. The results of statistical tests obtained $p \leq 0.05$, it can be concluded that there is a significant relationship between the education variable and the breastfeeding variable. Meanwhile, the OR value on the education variable is 0.466, which means that women with education who do not attend school, elementary school and junior high school have a 0.466 times greater chance of breastfeeding compared to women who have junior high school and college education. The length of breastfeeding in women with higher education tends to be shorter than in women with low education. And women who live in urban areas are shorter than women from rural areas (Wilopo, 2009).

The duration of breastfeeding for 0-6 months in women who have the lowest, middle, and middle wealth quintile is 88.9%. The results of statistical tests obtained $p \geq 0.05$, meaning that there is no significant relationship between the wealth quintile variable and the breastfeeding variable. From the analysis, the OR value on the wealth quintile variable is 1.394, which means that women with the lowest, middle and middle wealth quintiles have a 1,394 times greater chance of breastfeeding than women who have the upper and upper middle wealth quintiles. Women who belong to a low socio-economic level, work in the agricultural sector, housewives have a longer breastfeeding habit than women who work in the informal sector, civil servants and office employees (Wilopo, 2009).

The results of the analysis between work status and breast milk giving for 0-6 months showed that women who worked were greater than those who did not work, namely as much as 93.4%. From the results of statistical tests, it was revealed that there was a significant relationship between work status and the provision of breast milk as indicated by the acquisition of $p \leq 0.05$ while the OR value on the variable working

status is 3,520, which means that women who work have a 3.520 times greater chance of breastfeeding than women who do not work. The table above shows that 89.6% of women who had breastfeeding duration of 0-6 months gave birth to their children in health facilities.

From the results of statistical tests, it was obtained that the value of $p = 0.131$ $p \geq 0.05$ means that there is no significant relationship between the variable place of delivery and the variable of breastfeeding. The analysis also showed that the OR value was 0.628, meaning that women who gave birth to their children in health facilities had a 3.520 times greater chance of breastfeeding compared to women who gave birth not in health facilities.

The table above also shows that there were 81.8% of women who were assisted in childbirth. the relationship between the birth attendant variable and the breastfeeding variable was obtained $p \geq 0.05$, meaning that there was no significant relationship between the childbirth assistant variable and the breastfeeding variable. The result of the OR analysis of the birth attendant variable was 1.099, which explained that women who were assisted by health workers had a 1.099 times greater chance of breastfeeding with a duration of 0-6 months than women who were not assisted by health workers.

From the results of the statistical analysis above, it is obtained that the independent variable has a significant relationship with the dependent variable, namely the variable age, education and work status. The results of the analysis obtained are slightly different from the results of research conducted in Manipur, India which revealed that residence, education, employment status and parity had a significant effect on breastfeeding practice with a duration of about 20 months, which was below the Indian national figure of 25 months and WHO recommended 24-month rate (Sanajaoba Singh and Sharat Singh, 2011).

UNICEF and WHO recommend breastfeeding alone for the first 6 months, followed by solid food feeding after 6 months of age, continued breastfeeding until the child is 2 years old. Trending data show that the prevalence of exclusive breastfeeding for infants under six months in developing countries

increased from 33% in 1995 to 39% in 2010. Prevalence is increasing in almost all regions of developing countries, with the largest increases seen in West and Central Africa (Cai, Wardlaw and Brown, 2012). In line with that, according to Simondon 2009 in developing countries, women who are less educated breastfeed longer (K.B. Simondon, 2009).

The results of a study on the duration of breastfeeding in Manipur, India, inform that residence, education, employment status and parity have a significant effect on the duration of breastfeeding, which is around 20 months. The duration of breastfeeding is still below the Indian national figure of 25 months and the WHO recommended 24 months (Sanajaoba, Sharat, 2011). Whereas in Uganda people are encouraged to initiate early, exclusive breastfeeding and mothers are advised to give birth in hospital, so they can consult with professionals who can provide advice and help to start breastfeeding (Bbaale, 2014).

The movement for giving breast milk has been very intensively carried out by the government and breastfeeding activists in Indonesia. One form of government concern regarding breast milk is the issuance of a government policy regarding the exclusive breast milk program as outlined in the Government Regulation of the Republic of Indonesia Number 33 of 2012. Giving v to newborns can provide better immunity compared to babies who do not get Breast milk. Breastfeeding for six months after giving birth and supported by eating safe and nutritious amounts of food helps ensure good nutritional status and protects against disease (Xiaodong, et al, 2012). In addition, the longer a woman breastfeeds can affect the interval for giving birth to the next children. Breastfeeding itself has contraceptive effects and plays an important role in spacing children and limiting family size in developing countries (King, 2007).

Based on the 2002/03 IDHS data, the proportion of exclusive breastfeeding in Indonesia for infants aged <6 months is 39.5% and the average for all children who are exclusively breastfed is 3.2 months, while the median length of breastfeeding is 22.3 months (Ministry of Health, 2012). Meanwhile, the data for the 2017 IDHS showed that 52%

of children under 6 months of age received exclusive breastfeeding and the median length of exclusive breastfeeding was 3 months and the median length of breastfeeding was 21.8 months (Central Statistics Agency, National Family Planning Coordinating Board, Ministry of Health, 2019). There are 3 main factors related to the practice of breastfeeding, namely the cultural practice (tradition) of breastfeeding, adoption with modern culture such as the use of health services and the influence of the socio-economic background of the family (Siswanto, 2009).

From the sample of the Indonesian Demographic and Health Survey (IDHS 2017), East Nusa Tenggara (NTT) Province, 2,223 unweighted female samples were collected (the number of survey samples is based on selected households that were completed interview). The number of samples in order to represent the province of East Nusa Tenggara, a proper sample of 2,223 women is equivalent to 882 women, while 626 women are currently married so that the number of women in the weighted sample is the sample in the analysis explanation.

Multivariable results

This analysis aims to determine the most dominant relationship between the independent variables (age, place of residence, education, wealth quintile, work status, place of delivery and birth attendant) and the dependent variable (breastfeeding). From the results of the bivariate analysis, there are four variables that have a p value <0.25, namely age, education, work status and place of birth, then these variables can be included in the logistic regression analysis model.

Based on the results of the multivariate model in the table above, variables with a p value > 0.05 will be excluded and taking into account the Odds Ratio (OR) value. In this modeling stage, the variable of residence is issued.

Based on the table above, the results of the multivariate analysis between the independent and dependent variables show that the variables that have a contribution in influencing breastfeeding with a duration of 0-6 months are age, education and work status. These variables had a significant relationship with the

Table 4. Analyst Results of the Initial Model of Multivariate Logistic Regression Characteristics of Mothers with Breastfeeding Behavior, East Nusa Tenggara, 2017

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Ages	-.763	.283	7.263	1	.007	.466	.268	.812
Education	-1.027	.368	7.811	1	.005	.358	.174	.736
Place of Service	-.386	.329	1.370	1	.242	.680	.357	1.297
Work Status	1.238	.290	18.258	1	.000	3.449	1.955	6.086

Table 5. Analyst Results of the Final Model of Multivariate Logistic Regression Characteristics of Mothers with Breastfeeding Behavior, East Nusa Tenggara, 2017

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Ages	-.809	.280	8.339	1	.004	.445	.257	.771
Education	-.962	.363	7.043	1	.008	.382	.188	.778
Work status	1.245	.289	18.531	1	.000	3.472	1.970	6.118

duration of breastfeeding ($p < 0.05$) and the OR values were respectively 0.455, 0.382 and 3.472. Meanwhile, there was no significant relationship between breastfeeding practices and place of residence, wealth quintile, place of delivery and birth attendants. Women who decide to stop breastfeeding or weaning their babies before the age of 6 months because they feel they produce insufficient breast milk and this is influenced by biopsychosocial factors (Afiyanti and Juliastuti, 2012). Studies conducted in Eastern Indonesia show that higher levels of education and demand for health care services lead to better optimal practices of exclusive breastfeeding. Meanwhile, women who work in the non-traditional sector negatively affect the optimal pattern of giving exclusive breast milk (Bue and Priebe, 2018).

There is a correlation between the breastfeeding approach and one of the contraceptive methods of family planning. The government, through the BKKBN, has developed a program for hormonal and non-hormonal family planning methods aimed at controlling population growth. Natural contraceptive methods that can be used are by means of breastfeeding, in newborns by

giving exclusive breastfeeding. Breastfeeding is effective contraception in the first 6 months postpartum only if it is done exclusively and at regular intervals, including at night (King, 2007) where modern contraceptives consist of the female surgery method or female sterilization, the male surgery method or male sterilization, pills, IUDs, birth control injections, contraceptive implants, condoms and the Lactation Amenorrhea Method (LAM). LAM is a type of natural contraception that applies the principle of exclusive breastfeeding for 6 months and as long as a woman has not had her period after giving birth. LAM can be said to be a natural family planning method if it is not combined with other contraceptive methods (Central Statistics Agency, National Family Planning Coordinating Board, Ministry of Health, 2019). WHO states that the effectiveness of using LAM contraception reaches 98%. LAM is a transitional contraceptive method and is most appropriate for women who plan to fully breastfeed for 6 months after giving birth (King, 2007). Public knowledge about MAL is still rare, so the data on users of LAM contraception is very small. According to the 2017 IDHS data, the percentage of currently married women

using LAM in Indonesia is 0.1%. With the study of the strong decomposition of female infertility factors (calculated from the pattern of breastfeeding and sexual relations) in NTT, there is an opportunity to be considered as a factor that affects efforts to reduce fertility in NTT province.

Conclusion

It can be concluded that the index of the proportion of marriage (C_m) and infertility during breastfeeding (C_i), the index of non-contraception (C_c), decreased between 2002/03 and 2017. This means that the effect of limiting fertility on marital patterns, infertility during breastfeeding and usage patterns and contraceptive effectiveness of each has increased.

The strength of the fertility-inhibiting effect of infertility patterns during breastfeeding in NTT is the best because it is the strongest compared to other provinces in Indonesia, however the pattern of contraceptive use and effectiveness are still the main determinants of the most influencing fertility in NTT.

Based on the infertility index value during breastfeeding, the fertility rate in marriages without contraception, intentional abortion, and breastfeeding (TF) in NTT in 2002/03 was 10.5 children per married woman. This means that the pattern of breastfeeding has resulted in married women in NTT having TF - TNMFR = 10.5 - 9.8 = 0.7 births less. Whereas in 2017, 14.7 children per married woman, which means that the pattern of breastfeeding has resulted in married women in NTT having TF - TNMFR = 14.7 - 10.6 = 4.1 fewer births.

Breastfeeding behavior in women in NTT province has a strong relationship with the variables of age, education and work status. Policies are needed that can encourage and advocate for the community to provide breast milk during the breastfeeding period to their children, which can be started from early initiation, exclusive breastfeeding and longer. In addition, mothers must be given knowledge and information related to the benefits of breast milk for the growth and development of children.

References:

Afiyanti, Y. and Juliastuti, D. (2012) 'Exclusive breastfeeding practice in Indonesia', *British*

Journal of Midwifery, 20(7), pp. 484–491. doi: 10.12968/bjom.2012.20.7.484.

- Badan Pusat Statistik, Badan Koordinasi Keluarga Berencana Nasional, Departemen Kesehatan, M. I. (2019) *Survei Demografi dan Kesehatan Indonesia 2017*, BKKBN. doi: 10.1017/CBO9781107415324.004.
- Bbaale, E. (2014) 'Determinants of early initiation, exclusiveness, and duration of breastfeeding in Uganda', *Journal of Health, Population and Nutrition*, 32(2), pp. 249–260. doi: 10.3329/jhpn.v32i2.2619.
- Bongaarts, J. (1978) 'A Framework for Analyzing the Proximate Determinants of Fertility', *Population and Development Review*, 4(1), pp. 105–132.
- Bongaarts, J. and Potter, R. G. (1983) *Fertility, Biology, and Behavior: An Analysis of The Proximate Determinants*. New York: Academic Press, Inc.
- Bouchard, T., Blackwell, L., Brown, S., Fehring, R., & Parenteau-Carreau, S. (2018). Dissociation between Cervical Mucus and Urinary Hormones during the Postpartum Return of Fertility in Breastfeeding Women. *The Linacre quarterly*, 85(4), 399–411. <https://doi.org/10.1177/0024363918809698>
- BPS (2018) *Provinsi Nusa Tenggara Timur Dalam Angka 2018*. BPS Provinsi Nusa Tenggara Timur. Available at: <https://ntt.bps.go.id/publication/download>.
- Bue, M. C. L. and Priebe, J. (2018) 'Revisiting the socioeconomic determinants of exclusive breastfeeding practices: Evidence from eastern indonesia', *Oxford Development Studies*, 46(3), pp. 398–410. doi: 10.1080/13600818.2017.1397620.
- Cai, X., Wardlaw, T. and Brown, D. W. (2012) 'Global trends in exclusive breastfeeding', *International Breastfeeding Journal*, 7, pp. 2–6. doi: 10.1186/1746-4358-7-12.
- Davis, K. and Blake, J. (1956) 'Social Structure and Fertility: An Analytic Framework', *Economic Development and Cultural Change*. doi: 10.1086/449714.
- Glasier, A., Bhattacharya, S., Evers, H., Gemzell-Danielsson, K., Hardman, S., Heikinheimo, O., La Vecchia, C., Somigliana, E., & Annual Capri Workshop Group (2019). Contraception after pregnancy. *Acta obstetrica et gynecologica Scandinavica*, 98(11), 1378–1385. <https://doi.org/10.1111/aogs.13627>
- Harrison, C. L., Brown, W. J., Hayman, M., Moran, L. J., & Redman, L. M. (2016). The Role of Physical Activity in Preconception,

- Pregnancy and Postpartum Health. *Seminars in reproductive medicine*, 34(2), e28–e37. <https://doi.org/10.1055/s-0036-1583530>
- K.B. Simondon (2009) *Measuring trace immune factors in human milk, Early Breast-feeding Cessation and Infant Mortality in Low-income Countries: Workshop Summary*. doi: 10.1007/978-1-4020-8749-3_24.
- Kementrian Kesehatan (2012) *Survei Demografi dan Kesehatan Indonesia 2002-2003*. Available at: <http://demografi.bps.go.id/phpfiletree/sdki/BahanAjarSDKI2007/Lainnya/PublikasiSDKI2002-2003/RingkasanSDKI02-03.pdf>.
- King, J. (2007) 'Contraception and Lactation', *Journal of Midwifery and Women's Health*, 52(6), pp. 614–620. doi: 10.1016/j.jmwh.2007.08.012.
- Lim, A., van Schalkwyk, M., Maani Hessari, N., & Petticrew, M. P. (2019). Pregnancy, Fertility, Breastfeeding, and Alcohol Consumption: An Analysis of Framing and Completeness of Information Disseminated by Alcohol Industry-Funded Organizations. *Journal of studies on alcohol and drugs*, 80(5), 524–533. <https://doi.org/10.15288/jsad.2019.80.524>
- Muzayyaroh and Fatimah, L. (2012) 'Hubungan Pemberian ASI Eksklusif dengan Kembalinya Menstruasi pada Ibu Menyusui di Desa Ngumpul , Jogoroto, Jombang', *journal.unipdu*. Available at: <http://journal.unipdu.ac.id:8080/index.php/seminas/article/view/167/114>.
- Oyekale, A. S., & Maselwa, T. C. (2018). Maternal Education, Fertility, and Child Survival in Comoros. *International journal of environmental research and public health*, 15(12), 2814. <https://doi.org/10.3390/ijerph15122814>
- Rahmadewi, R. and Asih, L. (2011) 'Tingkat Fertilitas di Provinsi Nusa Tenggara Timur dan Yogyakarta', *Kesmas: National Public Health Journal*, 6(3), p. 117. doi: 10.21109/kesmas.v6i3.102.
- Rifdi, F. & Martika, S. (2019) (2019) 'Faktor-Faktor Yang Berhubungan Dengan Penerapan', *Maternal Child Health Care Journal*. 1(1), 1(1), pp. 1–9. Available at: [file:///C:/Users/MUSANG/Downloads/261-1762-1-PB \(2\).pdf](file:///C:/Users/MUSANG/Downloads/261-1762-1-PB%20(2).pdf).
- Samosir, O. B. (2019) *Dekomposisi fertilitas Indonesia: Analisis berdasarkan hasil SDKI 2017*.
- Sanajaoba Singh, N. and Sharat Singh, N. (2011) 'Determinants of duration of breastfeeding amongst women in Manipur', *Bangladesh Journal of Medical Science*, 10(4), pp. 235–239. doi: 10.3329/bjms.v10i4.9493.
- Wilopo, S. A. (2009) 'Pola, tren, dan perbedaan praktik menyusui di Indonesia: analisis deskriptif peran modernisasi dan budaya tradisional dari data Survei Demografi Kesehatan Indonesia 2007', *Jurnal Gizi Klinik Indonesia*, p. 42. doi: 10.22146/ijcn.17688.