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PSYCHOMETRIC EVALUATION OF A QUESTIONNAIRE FOR MEASURING FOOD WASTE BEHAVIOUR AND FOOD SECURITY AT THE HOUSEHOLD LEVEL

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ABSTRACT

Introduction: Food waste and food security are two concepts that are often linked together. This study was performed for the psychometric evaluation of a developed questionnaire for measuring food waste behaviour and food security at the household level. Five expert panels conducted content validation for the relevance, clarity, simplicity, ambiguity of each item. **Methods:** A cross-sectional quantitative research approach was employed for the questionnaire testing in 10 villages in the Samarahan district of Sarawak state. A total of 168 households were interviewed using face-to-face interviews. Data entry and analysis was undertaken using Microsoft Excel version 2016 and the statistical package for social sciences (SPSS, version 27.0), **Result:** respectively. Four items were improved, and one item was added to the English questionnaire after receiving feedback from the expert panel and respondents. Further refinement was also performed for the Malay version. Cronbach's alpha value varied from 0.713 to 0.961, indicating the reliability of the questionnaire. **Conclusion:** Overall, the respondents were able to comprehend most of the questions effectively. No problem was raised for the flow and sequence of the questions. Conclusively, the developed questionnaire is unambiguous in its reliability and validity. Nevertheless, further refinement is required before being used in future studies.

Keywords: Food waste, Food security, Theory of Planned Behaviour

INTRODUCTION

Food waste is the reduction in the quantity or quality of food due to decisions and actions taken by retailers, food service providers, and consumers (Food and Agriculture Organization, 2019). Globally, approximately one billion tonnes of food are wasted every year, representing either one-third of the entire food production in mass or one-fourth if measured in calories (High-Level Panel of Experts, 2014). Lipinski et al. (2013) reported that developing and developed countries accounted for 44% and 56% of global food loss and waste, respectively. Developing countries lost more than two-thirds of their food in the post-harvest and processing stages. On the flip side, almost two-thirds of food loss and waste occurred in developed countries at the retailer and consumer levels. Thi et al. (2016) revealed that more affluent living standards lead to more food waste production. Better living quality in developed countries was associated with easy access to quality food controlled by better food product standards. Subsequently, improvement in food access led to higher demand, higher food purchase, and the creation of food waste.

On the contrary, food security occurs when every people have physical and economic access to adequate safe, and nutritious food at all times. This food also meets their dietary needs and food preferences for an active and healthy lifestyle (Food and Agriculture Organisation, 2008). The Food and Agriculture Organisation of the United Nations reported that moderate or severe food insecurity was experienced by more than one-fourth (25.9%) of the world population in 2019 (Food and Agriculture Organisation, 2020). This percentage is equivalent to two billion of the world population having food insecurity. Africa

recorded the highest food insecurity (51.6%), followed by Latin America (31.7%) and Asia (22.3%), whereas the regions with the least food insecurity were Oceania (13.9%) and Northern America and Europe (7.9%).

Both food waste and food security concepts are often interconnected. Food waste is often reported to cause food insecurity (Jereme et al., 2017). Nonetheless, this relationship is not well explored as there is no substantial evidence that food waste will directly lead to food insecurity. Despite the lack of evidence, food waste awareness campaigns still use food security data to educate the public regarding food waste (Tielens & Candel, 2014). The presenters will initially inform the audience regarding global food loss, food waste, and its related statistics. Next, the presenters will present the statistics on food insecurity around the world. Finally, they will suggest that some forms of action are needed to address these issues.

After an extensive literature review, a questionnaire assessing food waste behaviours, household food security, and their associated factors was developed to understand the relationship between food waste and food security. For food waste behaviour, few studies utilised the theory of planned behaviour to explain the consumers' behaviour (Graham-Rowe et al., 2015; Russell et al., 2017; Stancu et al., 2016; Stefan et al., 2013; Visschers et al., 2016; Werf et al., 2019). The factors associated with food waste behaviour included the intention to reduce food waste, personal attitude toward food waste, the subjective norm regarding food waste, and perceived behavioural control over food waste. For household food security, a few factors were identified which may affect the food security of a household. Consumers' food choice motives, financial attitudes, food planning routines, and social cohesion influenced food security (Aktas et al., 2018; Brisson, 2012; Denney et al., 2017; Franchi, 2012). This study was performed to examine the psychometric properties of

the developed questionnaire for food waste behaviour and food security. The psychometric properties of a questionnaire refer to the validity and reliability of the measurement tool (Portney & Watkins, 2009). A questionnaire with good psychometric properties must be evaluated extensively to be reliable and valid. To achieve this objective, content validation of the developed questionnaire was investigated, followed by examining the internal consistency.

METHODS
Study settings

This cross-sectional study was designed to collect information on food waste behaviour and food security among rural households in the Samarahan district of Sarawak. The study was conducted from October 2020 until June 2021. The inclusion criteria were mentally sound adults in charge of food in their respective households, irrespective of gender and living in Samarahan district. Non-Malaysians were excluded from the study. According to the Department of Statistics Malaysia, rural areas were defined as areas outside the gazetted local authority areas with a population of fewer than 10,000 persons (Department of Statistics Malaysia, 2010). There are a total of 50 rural villages from Samarahan district, and the list was obtained from Samarahan District Office.

Data collection instruments and procedure

A total of 10 rural villages from Samarahan district was randomly selected for this study. A total of 168 households were chosen from the selected villages for interview. Systematic sampling was used for household selection, whereby the 5th interval, starting from the village headman's house in each village, was approached. For every 5th house visited, the selected household adults who meet the inclusion criteria were interviewed. Data were collected via face-to-face interview using

an interviewer-administered questionnaire consisting of three parts: Sociodemographic; Part A: Food waste behaviour and its associated factors; and Part B: Food security and its associated factors (**Table 1**).

Table 1 Components of the questionnaire

Questionnaire component	No. of Item	Reference
Part A Food waste	**31**	
Food waste behaviour	10	Rahman et al.(2018)
Food waste quantification	4	Rahman et al.(2018)
Intention	4	Aktas et al.(2018)
Personal attitudes	4	Aktas et al.(2018)
Subjective norm	4	Aktas et al.(2018)
Perceived behavioural control	5	Werf et al. (2019)
Part B Food security	**32**	
Food security	18	Hamilton et al.(1997)
Food planning routines	3	Aktas et al.(2018)
Food choice motives	3	Aktas et al.(2018)
Financial attitudes	3	Aktas et al.(2018)
Social cohesion	5	Sampson et al.(1997)

Questionnaire translation and face validity

The questionnaire was initially developed in the English version. Next, it was translated into Malay version by two translators whose mother tongue is the Malay language. After combining both Malay versions, the questionnaire was back-translated into an English version. The finalised Malay version proceeded for testing. To examine the face validity of the questionnaire, two general factors of difficulty level and ambiguity were examined. In examining the difficulty level, respondents identified items with the words or phrases they considered to be difficult. For the examination of ambiguity, the respondents specified the items that were misunderstood or had ambiguous meanings. Other factors such as grammar and appropriate wording were also identified.

Household food waste behaviour

The household food waste behaviour section consisted of three domains: food waste behaviour, food waste quantification, and the associated factors. The food waste behaviour domain consisted of 10 questions adapted from the food waste questionnaire by Rahman et al. (2018). A five-point Likert scale ranging from (1) *"always"* to five (5) *"never"* was applied in recording the respondents' responses. The food waste quantification domain consisted of four items from the food waste questionnaire by Rahman et al. (2018). Participants' responses were stated based on the percentage of self-reported food waste. The choices were none, ¼ of the total amount, ½ of the total amount, ¾ of the total amount and whole. The last domain comprised 17 items assessing the factors associated with food waste behaviour. These factors included respondents' "intention" to reduce food waste, "personal attitudes" toward food waste, "subjective norm" toward food waste and "perceived behavioural control" toward food waste. Statements for intention, personal attitudes and subjective norms are adapted from the questionnaire developed by Aktas et al. (2018). Statements for perceived behavioural control were adapted from the

questionnaire developed by Werf et al. (2019). The respondents stated their agreement using a seven-point Likert scale, ranging from (1) "*strongly disagree"* to seven (7) *"strongly agree".*

Household food security

The household food security section consisted of two domains: household food security and food security factors. Utilising 18 items adapted from the US Household Food Security Survey Module by Hamilton et al. (1997), the first domain assessed respondents' household food security for the past 12 months. The questionnaire comprised of two broad parts, adult food security and child food security. A household with children less than 18 years old was required to answer the child food security domain (eight items), whereas a household without children was exempted from answering the domain. Responses of "*yes*," "*often*," "*sometimes*," "*almost every month*," and "*some months but not every month*" were allocated the score of '1'; the remaining answers were allocated the score of '0'.

The second domain contained 14 items assessing the factors associated with food security. These factors included respondents' "food planning routines", "food choice motives", "financial attitudes", and "social cohesion". Statements for food planning routines, food choice motives, and financial attitudes were adapted from the questionnaire developed by Aktas et al. (2018) while those for social cohesion were adapted from the questionnaire developed by Sampson et al. (1997). Respondents stated their agreement using a seven-point Likert scale, ranging from (1) "*strongly disagree"* to seven (7) *"strongly agree".*

Statistical analysis

Collected data were checked and verified manually. Next, the data were entered into Microsoft Excel sheet (Cooper, 2015) with a validation check. The raw data were imported to the analytic tool Statistical Package for Social Sciences (IBM SPSS), version 27 for Windows (IBM SPSS, 2020). Data screening, coding, and verification for duplication were performed before analysis. Cronbach's alpha reliability analysis and corrected item-total correlation were used to assess the reliability of the questionnaire. A reliability coefficient of 0.7 and above is considered a reliable instrument for survey research (Hair et al., 2019). A cut-off value of 0.3 for corrected item-total correlation was used to identify poor discrimination of items (Cooper, 2015; George & Mallery, 2020).

Ethical issues

Concerning the possible ethical issues related to this research, respondents' participation in this research was voluntary. The respondents' identity and personal information were kept confidential. The ethics approval was obtained from the Institutional Review Board of Universiti Malaysia Sarawak (Ref: FME/21/65).

RESULTS

The results of the study are described in two sections viz. (a) content validation, (b) reliability analysis.

Content validation

The questionnaire's content was validated by five experts (nutritionists and public health practitioners) who have expertise in the topic to be studied. Each item was evaluated by rating a) its relevance to the respective domains, b) its clarity, c) simplicity and d) ambiguity. The four attributes of every item were rated on a four-point scale (1 = not relevant/not clear/not simple/doubtful; 4 = very relevant/very clear/very simple/meaning is clear) (Lynn, 1986; Waltz et al., 2010; Yusoff, 2019). The experts were also encouraged to provide comments for each item when necessary.

A content validity index was calculated for all four attributes at two levels, namely the item-level content validity index (I-CVI) and scale level content validity index (S-CVI) (Lynn, 1986; Waltz et al., 2010; Yusoff, 2019). The I-CVI was calculated as the total experts scoring 3 or 4 divided by the total experts (Yusoff, 2019). With five experts, the recommended I-CVI was 1.00 (Lynn, 1986). For S-CVI, two indices were calculated: S-CVI/UA (Universal agreement) by experts and S-CVI/Ave (average agreement) by experts (Yusoff, 2019). S-CVI/Ave was obtained by averaging the I-CVI scores for all items for each scale. S-CVI/UA was obtained by dividing the sum of the universal agreement score by the total item. Each item can only gain a score of 1 if all the experts agree (rating 3 or 4). The recommended standard for the S-CVI/Ave and S-CVI/UA was 0.8 (Polit & Beck, 2006; Waltz et al., 2010).

The S-CVI was calculated for all 11 domains, and the S-CVI/Ave ranged from 0.60 to 1.00. On the other hand, S-CVI/UA ranged from 0.00 to 1.00. All domains had a perfect relevance score of 1.00 in S-CVI/Ave and S-CVI.UA. For clarity score, only the food waste quantification domain scored below 0.8 based on S-CVI/Ave (0.75 and 0.60, respectively). However, S-CVI/UA revealed food waste behaviour (0.40), food waste quantification (0.00), intention (0.25), and social cohesion (0.60) domains did not achieve the acceptable S-CVI. For simplicity score, all domains scored above 0.8 for S-CVI/Ave, but food waste quantification (0.00), intention (0.50), and perceived behavioural control (0.40) domains score below 0.8 for S-CVI/UA. For the ambiguity score, the food waste quantification domain had low S-CVI/Ave (0.60) and S-CVI/UA (0.00). Only intention (0.25) and perceived behavioural control (0.40) domains had low S-CVI/UA. Based on the S-CVI indices, all the items for each domain were kept as they were deemed relevant. Items with low I-CVI in clarity, simplicity or ambiguity were reassessed and modified for improvement. Table 2 illustrates the S-CVI/Ave and S-CVI/UA for each questionnaire domain (**Table 2**).

Table 2 S-CVI/Ave and S-CVI/UA of the questionnaire

Domains	Relevance		Clarity		Simplicity		Ambiguity	
	Ave	UA	Ave	UA	Ave	UA	Ave	UA
Food waste behaviour	1.00	1.00	0.84	0.40	1.00	1.00	0.96	0.80
Food waste quantification	1.00	1.00	0.75	0.00	0.80	0.00	0.60	0.00
Intention	1.00	1.00	0.80	0.25	0.85	0.50	0.80	0.25
Personal attitudes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Subjective norm	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Perceived behavioural control	1.00	1.00	1.00	1.00	0.88	0.40	1.00	0.40
Food security	1.00	1.00	0.99	0.94	0.99	0.94	0.99	0.94
Food planning routines	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Food choice motives	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Financial attitudes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Social cohesion	1.00	1.00	0.92	0.60	1.00	1.00	1.00	1.00

Ave = average agreement; UA= Universal agreement

Reliability analysis

Reliability analysis allows examining the properties of measurement scales and the items that compose the scales. It calculates several commonly used scales that reliability measures and provides information. It also provides the relationships between individual items in the scale. In this study, we analysed and presented into two sub-sections viz. (i) Item analysis and (ii) Internal consistency.

Characteristics of respondents

A total of 168 households participated in this study. The respondents' mean age (SD) was 40.8 (13.3) years, with a minimum and maximum age of 20 and 68 years, respectively. A higher proportion of the respondents were females (69.6%) compared to male respondents (30.4%). The majority of the respondents were of Malay ethnicity and Islamic faith (Table 3). In total, 14 respondents (8.3%) were excluded from the final analysis due to missing data and incomplete responses to the questionnaire.

Table 3 Characteristics of the respondents (n = 168)

Characteristics	Frequency	%	Statistics
Age in years			Mean = 40.8 years SD = 13.3 years Min, Max = 20, 68 years
Gender			
Male	51	30.4	
Female	117	69.6	
Ethnicity			
Malay	70	41.7	
Iban	68	40.5	
Chinese	22	13.1	
Bidayuh	4	2.4	
Melanau	2	1.2	
Orang Ulu	2	1.2	
Religion			
Islam	76	45.2	
Christianity	70	41.7	
Buddhism	19	11.3	
Baha'i Faith	3	1.8	

Item analysis

Based on the feedback from experts and respondents, one additional item was added while 19 items were rephrased and refined. Overall, a total of 64 items were accepted compared to the previous or initial 63 items. Few items from the food waste quantification domain required question rephrase. Table 4 illustrates the summary of item analysis for each domain.

Table 4 Summary of item analysis

Domains	The initial number of Items	Edited Items					Total number of Items accepted
		Removed	Added Question	Added Answer	Rephrase	Rephrase Answer	
Food waste behaviour	10	0	0	0	0	0	10

Domains	The initial number of Items	Edited Items					Total number of Items accepted
		Removed	Added Question	Added Answer	Rephrase	Rephrase Answer	
Food waste quantification	4	0	1	0	4	0	5
Factors associated with food waste behaviour	17	0	0	0	0	0	17
Food security	18	0	0	0	0	0	18
Factors associated with food security	14	0	0	0	0	0	14
Total	63	0	0	0	4	0	64

Internal consistency

Initially, the food waste behaviour domain had a poor Cronbach's alpha of 0.525. After the removal of three negative items from analysis, Cronbach's alpha for the food waste behaviour domain improved to 0.781. The other domains reflected a good overall Cronbach's alpha ranging between 0.713 and 0.961. For corrected item-total correlation, one item in personal attitudes recorded a low value of less than 0.3 (Table 5). For the overall factors associated with food waste behaviour, one item in personal attitudes had a negative value of corrected item-total correlation. After deleting the item, the overall Cronbach's alpha improved to 0.776 while all the remaining items showed a positive corrected item-total correlation.

Table 5 Summary of reliability analysis

Parts	No. of items	Likert Scale	Cronbach's Alpha	Interpretation of Cronbach's Alpha	Corrected Item-Total Correlation
Food waste behaviour	7	1-5	0.781	Good	0.401 - 0.658
Food waste quantification	4	1-5	0.880	Good	0.638 - 0.827
Factors associated with food waste behaviour	17	1-7	0.749	Good	-0.136 – 0.756
Intention	4	1-7	0.731	Good	0.487 - 0.542
Personal attitudes	4	1-7	0.713	Good	0.126 - 0.749
Subjective norms	4	1-7	0.796	Good	0.503 - 0.714
Perceived behavioural control	5	1-7	0.863	Good	0.609 - 0.769
Food security – Adult	3	1-4	0.768	Good	0.451 – 0.763
Food security – Child	3	1-4	0.840	Good	0.570 - 0.822
Factors associated with food security	14	1-7	0.941	Excellent	0.541 – 0.790
Food planning routines	3	1-7	0.884	Good	0.732 – 0.812
Food choice motives	3	1-7	0.808	Good	0.602 – 0.694
Financial attitudes	3	1-7	0.905	Excellent	0.749 – 0.851
Social cohesion	5	1-7	0.961	Excellent	0.848 – 0.932

DISCUSSION

In this study, we reported on the questionnaire's psychometric properties (validity and reliability) for food waste behaviour and food security with samples of adults living in rural households. The final questionnaire retained 62 out of the 63 original items from the original articles and developed two new items (Aktas et al., 2018; Hamilton et al., 1997; Rahman et al., 2018; Sampson et al., 1997; Werf et al., 2019).

Food waste behaviour and quantification domains

The food waste behaviour domain achieved acceptable S-CVI/AVE in relevance, clarity, simplicity, and ambiguity score. Although the domain attained good reliability after deleting three negative items from the analysis, negative items in a scale are still important to help in reducing acquiescence bias. Solís Salazar (2015) reported that despite being able to reduce acquiescence bias, the negative item resulted in lower levels of consistency, evident by the improvement of Cronbach's alpha after the removal of negative items in this study. This situation might have occurred due to tiredness or fatigue when completing the questionnaire (Merritt, 2012). Nevertheless, the three negative items were retained for future studies as they are valuable in helping to reduce acquiescence bias.

Although the food waste quantification domain also achieved good relevance scores for validity and Cronbach's alpha for reliability, the clarity, simplicity, and ambiguity scores were poor (< 0.8 for each). In addition, the universal agreement was also 0 for the three scores. Items with poor clarity are difficult to understand, ambiguous and generate unnecessary burden to participants (Mercieca-Bebber et al., 2018). Some participants may become confused with the meaning of the item and not answer accordingly, whereas others may become

tired when answering these items. One item in this domain was also identified to be a double-barrelled question. A double-barrelled question could be dangerous as research has found that respondents understood such questions differently and independently compared to answering each component (Menold, 2020). Another observation noted by the experts regarding the items in food waste quantification in terms of the duration. The initial items assessed the respondents' total household food waste in the past one week in which the expert deemed too long. As such, each item in this domain was changed to quantify food waste for the past 24 hours. The estimation of food waste may be inaccurate, whereby respondents may be unable to remember the amount of food waste for the past one week as compared to the past one day (Resnicow et al., 2000).

In comparison, Gahamat (2019) used a similar scale adapted from Rahman et al. (2018) for food waste behaviour and reported an overall Cronbach's alpha value of 0.70. Two factors may explain the discrepancy with the current study. First, the present study separated the Cronbach's alpha value for food waste behaviour and quantification items. Gahamat (2019) on the other hand combined the Cronbach's alpha value of both domains, producing a good overall reliability value despite including the negative items. Second, the current study used a large sample size with 154 respondents. Appropriate sample size is important to obtain reliable, reproducible, and valid results. Results from a small sample size might lead to false results due to inadequate power and false-positive results due to biased samples (Blackford, 2017).

Factors associated with food waste behaviour

Personal attitudes and subjective norm domains had a good validity. The S-CVI/Ave and S-CVI/UA were 1.00 for all scores. For intention and perceived behavioural control domains, both had

good scores in relevance, clarity, simplicity, and ambiguity of more than 0.8 for S-CVI/Ave. However, the intention domain had poor clarity, simplicity, and ambiguity, while the perceived behavioural control domain had poor simplicity and ambiguity for their Universal Agreement. Few experts commented that certain items were not properly translated into the Malay version in the initial translation. These comments were discussed with the translators and the Malay version of the questionnaire was further refined for improvement.

The Cronbach's alpha for all of the domains was more than 0.7 which is good. However, the negative item in the personal attitude domain had a corrected item-total correlation of less than 0.3 (Cristobal et al., 2007). The same item also produced a negative corrected item-total correlation value for the overall factors associated with food waste behaviour. Low or negative corrected item-total correlation may suggest that the item is not related to the overall domain. However, the problematic item was kept since the item was deemed relevant by the expert panel. Moreover, the negative item can also help in reducing acquiescence bias in future studies (Solís Salazar, 2015). The overall Cronbach's alpha value for each factor was similar to the original questionnaires. Likewise, the adapted component from Aktas et al. (2018) and Werf et al. (2019) had Cronbach's alpha value greater than 0.7. The good reliability value from the current and original questionnaire indicate that these items are reliable in examining the individual factors associated with food waste behaviour.

Household food security

The content validity of the household food security domain was good, achieving a score of more than 0.8 in both S-CVI/Ave and S-CVI/UA for Relevance, Clarity, Simplicity, and Ambiguity. The reliability of this domain was also good with an overall Cronbach's alpha value higher than 0.7 and a corrected item-total

correlation of higher than 0.3 for each item. Hamilton et al. (1997) reported Cronbach's alpha values greater than 0.7 in adult and child domains for the household food security. The good Cronbach's alpha value obtained in both original and current studies indicates that the US Household Food Security Survey Module is reliable in assessing respondents' food security status.

Factors associated with household food security

Food planning routines, Food choice motives, and financial attitudes domains achieved good validity scores with the score of 1 in both S-CVI/Ave and S-CVI/UA for Relevance, Clarity, Simplicity, and Ambiguity. For Social cohesion, more than 0.8 scores in S-CVI/Ave was achieved for all four components but fell short on S-CVI/UA for Clarity. After reviewing all the experts' comments, the corrections needed were mainly from the translated Malay version. These comments were discussed with the translators and the Malay version of the items were further refined to improve the questionnaire.

The Cronbach's alpha for each domain in factors associated with household food security was higher than 0.7, indicating the consistency of each domain in measuring the respective domain. The corrected item-total correlation for each item was higher than 0.3, thus reflecting all the items were well-related to the overall scale (Cristobal et al., 2007). The overall Cronbach's alpha value for each factor in the current study was higher than the original study (Aktas et al., 2018). Specifically, Cronbach's alpha for food choice motives in the original study was 0.65, while the current study yielded 0.823. Despite the difference, the items in each domain were still reliable. In contrast, Financial Attitudes and Social Cohesion domains demonstrated Cronbach's alpha value higher than 0.9. High Cronbach's alpha value may suggest some redundancies in the domains (Tavakol & Dennick, 2011).

There were two limitations identified in this study. The results obtained are not generalisable since the study was conducted in one district of Sarawak. Respondents were also required to answer all the questions (64 items, thereby an in-depth response to the questionnaire might be lacking (Nederhof, 1985).

CONCLUSION

In conclusion, the current questionnaire has good validity and reliability in assessing food waste behaviour and household food security after refining unclear and ambiguous statements. As such, this questionnaire can be used to examine the relationship between food waste behaviour and household food security in future studies. Nevertheless, this study only focused on the rural population. Future research can include the urban population for comparison with the rural population.

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EXPRESSIONS OF PERCEIVED SUSCEPTIBILITY TOWARD NASOPHARYNGEAL CARCINOMA

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ABSTRACT

Introduction: Perceived susceptibility to diseases influences intentions to undertake health protective measures. **Methods:** The study investigated perceived susceptibility of nasopharyngeal carcinoma (NPC) among Malaysians, focusing on their expressions of disease susceptibility before and after reading an NPC health pamphlet. Method: A total of 65 participants in Kuching and Kota Samarahan, Malaysia, aged 13 to 65, were interviewed on their perceptions of their risk of getting NPC. **Results:** The thematic analysis of the interviews revealed several levels of perceived susceptibility to NPC, namely, 1) not susceptible to NPC, 2) may be susceptible to NPC, 3) susceptible to NPC, and 4) not knowing much about susceptibility to NPC. The expressions the participants used revolved around "living a healthy life", "second-hand smoker", "polluted air" and "eat preserved or salted food", indicating perceived risk factors of NPC. **Conclusion:** Some mentioned family history and ethnic background as risk factors. After reading the NPC pamphlet, the participants gave the same reasons but with more specific details on the symptoms and types of food associated with NPC. The study indicated that the NPC pamphlet can increase awareness of NPC because additional reasons given for NPC susceptibility after reading the pamphlet were signs of cancer, age, and NPC incidence in Malaysia.

Keywords: perceived susceptibility, nasopharyngeal cancer, nose and throat cancer, risk factors

INTRODUCTION

Perceived susceptibility is one of the five constructs of the Health Belief Model, an intrapersonal behaviour change theory designed to elucidate how beliefs predict commitment in adopting health-protective behaviours such as undertaking regular screening. Perceived susceptibility to diseases influences adoption of health protective behaviour to minimise risk of getting the disease. For example, in the case of cancer, the public can go for regular cancer screening to detect cancer early so that there would be better treatment outcomes.

Nose and throat cancer is also known as nasopharyngeal cancer (NPC). When NPC is diagnosed before Stage 3, it has good prognostic outcomes but most of the NPC cases in Malaysia were detected at Stages 3 and 4 (63% for males, 60% for females) (Azizah et al., 2019). This suggests a lack of awareness towards NPC susceptibility. Regular screening is important to reduce mortality considering that NPC is sensitive to chemo-radiotherapy and results in a two- and three-year survival rate of 84% and 78%, respectively, in cases of early detection (Fles et al., 2016). Worldwide, deaths due to NPC number 50,000 out of 86,000 cases while 71% of new NPC cases are from East and Southeast Asia (Chang and Adami, 2006). NPC is the fourth most common cancer in Malaysia. The lifetime risk for males was in 1 in 143, and it was 1 in 417 for females in the 2007-2011 period (Azizah et al., 2019). The latest data about NPC in Malaysia show 2,222 new cases in 2020 with 1,450 resulting in deaths (Sung et al., 2021).

Although causes of NPC cannot be definitely identified, reports show that Epstein-Barr virus infection, smoking, and frequent consumption of preserved food

and salted fish are associated with a high incidence of NPC (Zheng et al., 1994). Non-environmental risk factors of NPC include family history, ethnicity and gender (Fles et al., 2010). Certain ethnic groups such as the Bidayuh (Devi et al., 2005), Cantonese (Wee et al., 2010) and Malaysian residents in Sarawak, Penang and Labuan have higher incidences (Azizah et al., 2019).

It is generally believed that awareness of NPC susceptibility can lead to adoption of susceptibility-reducing behaviours such as screening and reduced intake of NPC-causing foods. Interestingly, Malaysians living in Sarawak who have higher perceived risk of getting NPC also reported weaker efficacy beliefs and intention to enact self-protective behaviour (Ting et al., 2021). This may be due to taboos surrounding cancer. Taboos have been found to discourage screening for early cancer detection in various settings (Banning and Hafeez, 2010; Ting et al., 2018).

Thus far, research on NPC in Malaysia is mostly clinical studies on the epidemiology of NPC (Aziz et al., 2017; Tarone et al., 1990). Some studies examined the social impact of NPC (Armstrong et al., 2000) and the knowledge of primary care doctors on NPC (Balachandran et al., 2012). The existing findings on NPC susceptibility-reducing perceptions indicate that factors that predict perceived susceptibility among Malaysians is still not well understood.

The present study investigates perceived susceptibility towards NPC among Malaysians living in Sarawak, an East Malaysian state on Kalimantan Borneo Island, focusing on their expressions of disease susceptibility before and after reading an NPC health pamphlet.

METHOD OF STUDY
Participants

This descriptive study involved data from 65 participants living in Kuching,

the capital of Sarawak. A demographic profile of the sample is provided in Table 1.

Instruments

The instruments used in the study were an NPC pamphlet and an interview guide.

The pamphlet on NPC produced by the Ministry of Health, Malaysia, was printed on an A4-sized paper and folded in half to produce four pages, as shown in Figure 1. Page 1 has the caption "*Kenali kanser nasofarinks*" ("Get to know nasopharyngeal cancer"). Page 2 has the headlines "*Kesan kanser pada peringkat awal*" ("Effect of cancer in the early stage") and "*Faktor Risiko*" (Risk factors").

The pamphlet informs the public that NPC is widespread in Asia and Southeast Asia and is number four cancer in Malaysia in terms of incidence. The risk factors are identified as practices (e.g., smoking, chewing of betel nut leaves, eating preserved food), family history, and Epstein Barr Virus infection. Page 3 shows six pictures of signs and symptoms accompanied by words: nosebleed, ringing sound in the ear, neck growth, numbness or pain on the face, double vision, and headache. At the bottom of Page 3, the public were cautioned to get their doctor's advice if they have any of these signs and symptoms. Page 4 extols the public to prevent cancer before it is too late and to practice a healthy lifestyle ("*Cegah Kanser Sebelum Terlambat*", "*Amalkan gaya hidup sihat*"). The logo and name of the ministry are placed on the first and last pages of the NPC pamphlet to show the authoritativeness of the information in the pamphlet.

An interview guide using the NPC pamphlet developed by Malaysian Ministry of Health was pilot tested on 10 participants to investigate if the interview questions were answerable by the public. The interview questions were as follows: (1) Have you heard of Nose and Throat Cancer? (2) Do you think you are susceptible to Nose and Throat Cancer?

Why? and (3) After reading this NPC pamphlet, do you think you are susceptible to NPC? Why? The 10 respondents read the pamphlet for an average of 31 seconds and they were given the flexibility to refer back to the pamphlet for information when answering the interview questions. All of the 10 respondents could answer the interview questions with two participants enquiring if the NPC pamphlets were available in Mandarin and Malays versions.

Data collection procedures

Ethical clearance for the study was given by the medical ethics committee of Universiti Malaysia Sarawak (Ref.: UNIMAS/NC-21.02/03-02 Jld.4(53). Data were collected from a few places in Kuching, such as Borneo Convention Centre Kuching, Batu Lintang Secondary School, King's Centre, Imperial Hotel Conference Hall, University Malaysia Sarawak, Kuching City Mall, Howdy's Restaurant and Park Lane residential area.

The first researcher approached potential participants and asked if they would participate in a study on nose and throat cancer. Those who agreed were told about the interview, their voluntary participation and preservation of anonymity in reports based on the study. They were also told that the interview would be audio-recorded. Participants who consented to participate in the study filled in the consent form, and a form with their demographic details.

Participants were asked Question 1 and 2 in the interview guide. Then they were shown the NPC pamphlet produced by the Malaysian Ministry of Health (Figure 1). Following this, participants were asked Question 3 to find out if their perceived susceptibility towards NPC had changed after reading the NPC pamphlet. The mean time taken by the participants to read the pamphlet was 48 seconds.

Data analysis procedures

The interviews which were audio-recorded were transcribed verbatim into Microsoft Word documents. Thematic analysis of the interview transcripts was carried out following Rubin and Rubin (2012).
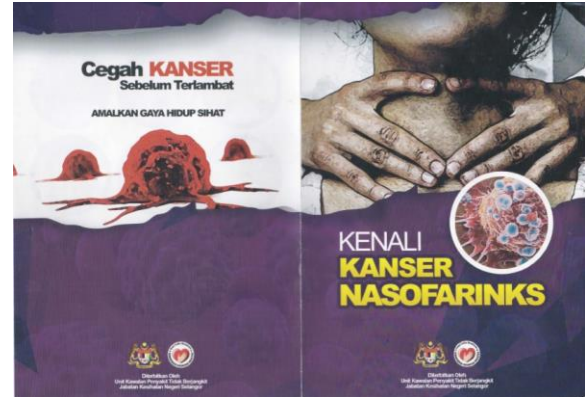

Figure 1. NPC pamphlet produced by the Malaysian Ministry of Health

RESULTS

In the results section, the participants are referred to as P1 for Participant 1 till P65 for Participant 65.

Table 1. Demographic characteristics of the participants (N=65)

Demographic Characteristic	n	%
Gender		
Male	37	56.9
Female	28	43.1
Age (years)		
13 - 20	14	21.5
21 - 30	20	30.8
31 - 40	14	21.5
41 - 50	12	18.5
51 - 60	3	4.6
61 - 70	2	3.1
Ethnic Background		
Malay	20	30.8
Chinese	29	44.6
Indian	1	1.5
Bidayuh	4	6.2
Iban	5	7.7
Others	6	9.3
Education		

Demographic Characteristic	n	%
Elementary school	4	6.2
Junior High School	6	9.2
Senior High School	4	12.3
College	8	4.6
Bachelor	23	35.4
Masters and PhD.	20	30.8
Monthly Income		
Not working	19	29.2
Less than RM2000	7	10.8
RM 2000 - RM 3999	13	20.0
RM 4000 - RM 5999	5	7.7
RM 6000 - RM 7999	5	7.7
RM 7999 - RM 9999	9	13.8
More than RM 10000	7	10.8

Perceived susceptibility to NPC

Table 2 shows the percentages of the participants' perceived susceptibility to getting NPC before and after reading the NPC pamphlet. Before reading the NPC pamphlet, 28 (43.08%) out of 65 participants stated that they were not at risk of NPC. A majority of the participants (18 or 27.69%) felt that they might be at risk of getting NPC. Only 12 (or 18.46%) participants were certain that they were susceptible to NPC while seven (or 10.77%) participants said that they did not know if they were at risk of getting NPC or not.

Table 2. Perceived susceptibility of NPC before and after reading the NPC pamphlet

Perceived susceptibility	Before reading the pamphlet	After reading the pamphlet
Not at risk	28 (43.08 %)	30 (46.15 %)
May be at risk	18 (27.69 %)	15 (23.08 %)
Yes, at risk	12 (18.46 %)	20 (30.77 %)
Don't know	7 (10.77 %)	0 (0 %)
Total	65 (100%)	65 (100%)

However, after reading the NPC pamphlet, there was an increased awareness of NPC risk, seen in none of the participants saying that they did not know if they were at risk of getting NPC. Before reading the pamphlet, 10.77% did not know much about their NPC risk (Table 2).

The NPC pamphlet was informative for the participants. Table 2 shows that the percentage who were sure that they were not at risk increased to 46.15% and those who were sure that they were at risk also increased (to 30.77%). Concomitantly, the percentage of participants who were unsure whether they were at risk decreased from 27.69% to 23.08%. The pamphlet was clear on the risk factors and signs of NPC, and from this information, the participants could assess their susceptibility to NPC more accurately. The NPC had clearly increased their general knowledge on the NPC disease.

Perceived risk factors of NPC

Figures 2 and 3 show the perceived risk factors of NPC given by the participants before and after reading the NPC pamphlet respectively. In this section, the risk factors are explained in connection to their assessment of their perceived susceptibility to NPC (not at risk, may be at risk, certain of risk, and not knowing risk).
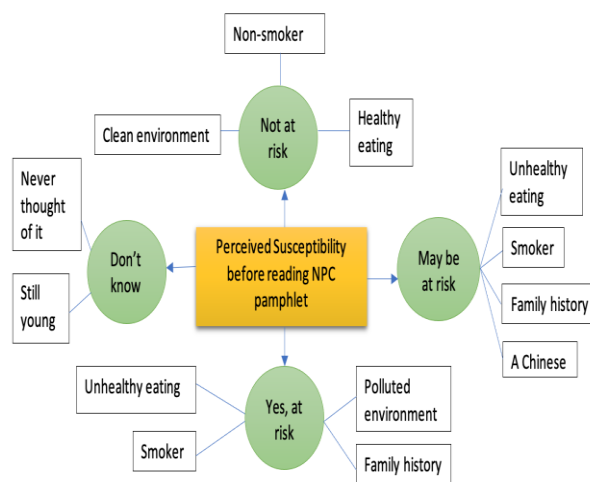

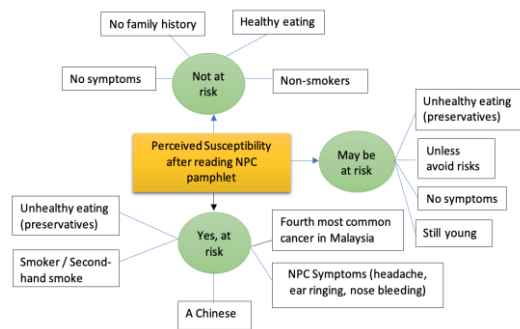**Figure 2.** Participants' perceived susceptibility of NPC before reading the NPC pamphlet

Figure 3. Participants' perceived susceptibility of NPC after reading the NPC pamphlet

Not susceptible to NPC

The reasons given by the participants for not being at risk of getting their NPC before and after reading the pamphlet were slightly different. Before reading the pamphlet, the participants mentioned clean environment to justify why they were not susceptible to NPC. After reading the pamphlet, the participants said that they were not susceptible to NPC because they had no symptoms of NPC and there was no family history of NPC, but they omitted mention of the environment. This is probably because the environment was not mentioned as a risk factor in the pamphlet.

However, two reasons for non-susceptibility to NPC were mentioned both before and after reading the NPC pamphlet, namely, healthy eating and not smoking. Smoking seems to be a widely known risk factor of NPC among the participants. P3, a retiree initially replied, "No [not susceptible to NPC], I don't smoke". However, after reading the NPC pamphlet, he changed his mind and replied, "Probably, probably. If you avoid [the risk factors], then it [NPC] won't happen. If you don't avoid, and continue, then it'll happen".

The participants also generally believed that healthy living minimised their risk of getting NPC and reading the pamphlet did not change their views. Healthy living is seen as living in a clean pollution-free environment and having a healthy diet. A researcher on NPC, P59, said that she was susceptible to NPC due to the environmental factor, dating back to the time when she was a child and exposed to a lot of wood dust when she was helping her dad at his factory. However, P59 said that she was not susceptible to NPC because she ate healthy food and exercised.

Excerpt 1
(Before reading the NPC pamphlet)
If I eat a healthy diet, I'm fine. And do regular checkup. Exercise more. Eat healthy food. Try to … if you're working in a carcinogenic environment, you try to follow the working procedures. (P59)

This educated participant also used the adjective "carcinogenic" to describe the environment based on her general knowledge of NPC. After reading the NPC pamphlet, P59 said that she was at risk of NPC because "Even though sometimes we lead a healthy lifestyle, there are still people who smoke, and there's family genetic issues". These are information present in the NPC pamphlet, and it added to what she already knew about NPC risk factors.

An unhealthy environment was perceived as one that had poor air quality. Excerpt 2 shows P22, a teenager, talking about the link between air pollution and NPC.

Excerpt 2
The air we're living in now. The quality of the air is not as clean as back then. So I may fear that the pollution that are happening around may cause nose and throat cancer. (P22)

There is a common perception that food is a risk factor for NPC. P49, a 13-year-old student, initially said, "No, because I seldom eat fried food". After reading the NPC pamphlet, he reasoned that he might be at risk of NPC as he "did consume food that contained preservatives, such as cheese." The word "preservatives"

under the heading of "Risk Factors" in the NPC pamphlet brought surprises to the participants as most of them consumed food that contain preservatives. Some preservatives are known to be harmful to the human body as some are classified as carcinogens or cancer-causing agents (Mirza et al., 2017).

The pamphlet also corrected some participants' misconceptions of NPC. For example, P62, a 14-year-old student gave a definite "No" when asked if she would be at risk of nose and throat cancer. She said, "I very take care of my nose". However, after she read the NPC pamphlet, she gained new understanding of what NPC meant. Excerpt 3 shows that P62 realised NPC was not about the cleanliness of the nose but a nose cancer. For this teenager, the pamphlet had succeeded in correcting her misconception of NPC.

Excerpt 3
My thinking is wrong. It's not about you can't smell and you can't breathe. Just that your … your nose … I don't know how to translate in English. 鼻喉炎 是吗? (Is it Nasopharyngeal Cancer? In Mandarin). I sometimes feel… (touches head) headache. 3 [some level of risk]. Because I usually eat the food that contains the preservatives and salted food. (P62)

The NPC pamphlet also alerted some participants to the early signs of NPC. Some of them gave the absence of NPC symptoms as a reason for not being susceptible to NPC. One of them was P25, a senior lecturer in her late forties, who said that she did not have the symptoms. The value of the pamphlet in alerting participants to the possible signs of NPC will be explained in the next section.

Possible susceptibility to NPC

As for participants who assessed themselves to be at some risk of getting NPC, Figures 2 and 3 show that the only reason that was mentioned by participants both before and after reading the NPC

pamphlet was unhealthy eating. However, they were more informed after reading the pamphlet because they were specific on what they meant by unhealthy food. They talked about preserved and salted food, showing that the NPC pamphlet had increased their general knowledge on the food factor. Excessive intake of preserved vegetables and salted eggs are commonly thought to be associated with NPC.

Other than unhealthy eating, before reading the NPC pamphlet, some participants mentioned smoking, family history and the predisposition of the Chinese to getting NPC. Some participants already knew about the hereditary cause of NPC and research findings on certain ethnic groups being more susceptible to getting NPC. However, some learnt of the genetic factor through the pamphlet which mentioned "*sejarah keluarga*" (family history).

After reading the pamphlet, three new reasons were given by participants for saying that they were currently free of NPC but might be susceptible to NPC in future. At the time of the interview, they were avoiding risk factors of NPC, and did not have symptoms of NPC. In addition, one teenager said that she was still young, indicating her belief that NPC risk is higher among older people.

Next, excerpts are shown to illustrate how the participants used the symptoms of NPC shown in pictures and words in the pamphlet to assess their risk. For example, before reading the pamphlet, P48 said that she did not know her risk but after reading the NPC pamphlet, she assessed her risk as low and rationalised that she did not exhibit the signs of NPC.

Excerpt 4
Erm, I don't really have these symptoms. And some of these also (pointing to risk factors), I don't smoke and take those food. (P48).

Another participant (P46) had vague ideas on the symptoms of nose and

throat cancer before reading the NPC pamphlet. Excerpt 5 shows that after he had read the pamphlet, he concluded that he had two signs of NPC but not the other signs, which is why he said he might be susceptible to getting NPC.

Excerpt 5
Oh, I'm afraid of that [risk of NPC]. Because I've sinus. (After reading the NPC pamphlet, the undergraduate circled 2, low risk of NPC). I've two [symptoms]. But I don't have this, bloody nose. It's always painful at the nose, nose block. I have headache but no blurry. And this one also, no numbness. (P46)

The pamphlet listed "bloody nose", "blurred vision" and "numbness" as signs. In addition, "headache" and "ringing ears" were shown in pictures on page three of the pamphlet. Participants like P9, P52 and P55 noticed them. For P9, an undergraduate in his early 20s, it was the first time he heard about NPC. After reading the pamphlet, he said, "No, I don't have all of these symptoms. I only have toothache". He added that he experienced ear ringing (which was stated as a sign of NPC in the pamphlet) when he was young but it disappeared after the doctor scanned his nose and removed the mucous from his nose.

Certain susceptibility to NPC

For participants who were certain that they were susceptible to NPC, Figures 2 and 3 show that unhealthy eating and smoking were mentioned both before and after reading the NPC pamphlet. Similar to participants in the category of possible NPC risk, the participants gave more specific reasons after reading the pamphlet. They talked about unhealthy food as those containing preservatives. Some participants showed more specific understanding of the danger posed by cigarette smoke in that second-hand smoke was mentioned as a risk factor for people who were constantly in the company of smokers. Smoking and food are the same factors given by participants for assessing themselves to be at various levels of susceptibility to getting NPC. This shows the common understanding of smoking and unhealthy food as possible causes of NPC.

Although less common, family history and the polluted environment were also given as reasons for high NPC risk. Figure 2 shows that before reading the NPC pamphlet, some participants were certain that they were at risk of getting NPC because of the genetic and environmental factors. However, after reading the pamphlet, they brought up Chinese ethnicity, NPC symptoms and cancer incidence as reasons to explain why they were at high risk of getting NPC (Figure 3). NPC symptoms were clearly shown in the pamphlet in text and visual form.

The pamphlet provided the NPC incidence statistics ("fourth most common cancer in Malaysia") in the Introduction section, page 2, third bullet point. This catch phrase changed some participants' assessment of their own risk of getting NPC (e.g., P30, P43). For example, before reading the pamphlet, P43, a senior lecturer in his late forties was "not sure" whether he was susceptible to getting NPC but he changed his mind after he had read the pamphlet. P43 said that he had a "50-50" chance of getting NPC "because this is the number four type of cancer in Malaysia". P30 felt that he could be susceptible to getting NPC, adding that he was at greater risk because he is a Chinese (Excerpt 6).

Excerpt 6
First thing, I'm a Chinese. Second thing, it's the fourth highest cancer in Malaysia. Even if I don't smoke, the risk is still high. You look at the genetic is also one of the important factors. In other words, Malaysians are susceptible to NPC. (P30)

Indeed, numbers are effective in creating fear of diseases. The information on the greater susceptibility of the Chinese

to NPC is not directly stated in the pamphlet, showing that P30 had general knowledge on this. They could have made an inference based on the statement that NPC occurs more frequently in Southeast Asia and South China than in Western countries.

In Excerpt 6, it is interesting how P30 switched from using the first personal pronoun "I" to "Malaysians" when assessing his risk of getting NPC ("Malaysians are susceptible to NPC"). He did not say "I am susceptible to NPC". By using a third person reference, he put a distance between himself and the NPC risk.

Susceptibility to cancer is not an easy topic for most people, and assessing personal risk of getting NPC may be a kind of taboo to some participants. From their interviews in urban and rural areas of Kuching, Sarawak, Ting et al. (2018) found hesitation among some people to estimate their risk of getting NPC. Some individuals believed that if they assessed their risk to be high, it is as if they have cursed themselves with the cancer but if they assessed their risk to be low, it is as if they did not believe in God's control over their lives.

Lack of knowledge on susceptibility to NPC

Before reading the NPC pamphlet, some participants said that they did not know if they were susceptible to NPC and had never thought of it. Most of them were relatively young. For instance, P2, a Malay executive in her twenties said that she did not know if she would be susceptible to NPC. She said, "I'm not sure. Ya, never thought of it. I hope I won't get it". Another participant, P13, an Indian investor relation who was in his mid-thirties admitted, "I don't know. I just don't know enough about this disease".

After reading the NPC pamphlet, both changed their views on their susceptibility to getting NPC as follows in Excerpts 7 and 8:

Excerpt 7
(laughs) Yes, because I think I … I surround with the … the people who are smoking. Like secondary smoker. Family members and friends. I usually hang out with friends, right. So they always …I'm just okay with them smoke in front of me. But okay, it's quite bad actually. (P2)

Excerpt 8
Er … to some degree, ya … I do have some level of headache, this one okay, this one okay (symptoms). Sorry, this means what ah? (double vision). Just a bit of headache, mild headache. (P13)

P64, a 16-year-old student explained that "I am not sure if I am at risk or not (of NPC) because I'm still young, but we should be aware of it". P27, a professor in a local university, did not give a definite answer when asked if he might be at risk of contracting nose and throat cancer. He said, "I'm scared of it, so that's why I think nowadays I'm having a healthier way of eating and living". The reasoning probably goes like this: If I take good care of my health now, then chances of me contracting the cancer will be lower.

Overall, the results showed that the participants used the information on the signs of NPC shown in images and text to assess their susceptibility to NPC. Some thought that they might have NPC but concluded that since they did not exhibit any of the symptoms, they did not have the cancer. On the other hand, some began to worry because they had one or two of those symptoms. Interestingly, the participants were first drawn to the images. However, they would read the captions to ensure they did not misinterpret the pictures.

DISCUSSION

The results showed that the participants had some general knowledge on the causes of NPC. Before reading the pamphlet, they assessed their susceptibility to NPC based on whether they were living

a healthy life, smoking (second-hand smoker included), breathing in polluted air and eating preserved or salted food. Leading a healthy life is too general to be of relevance in self-assessment of NPC susceptibility but smoking have been identified as possible causes of NPC by researchers (Kumar and Mydin, 2019).

The additional risk factors of NPC that were known to only some participants before reading the pamphlet were family history and ethnicity. Research have established that NPC is hereditary, and incidence is higher among some ethnic groups (Salehiniya et al., 2018) and the participants were right in identifying the Chinese as susceptible although NPC incidence among the Bidayuh of Sarawak has also been documented (Linton et al., 2021).

In the context of public health, we sought to investigate if health risk messages can educate the public on risk factors and health protective measures. The NPC pamphlet was found to be useful in creating awareness of NPC risk factors because it made participants more certain when assessing their own susceptibility to NPC and eliminated the cases of participants not knowing whether they were at risk. In addition, after reading the pamphlet, more participants were able to give specific risk factors such as food preservatives, NPC signs and cancer incidence, which were in the pamphlet. None mentioned the Epstein Barr Virus infection, probably because the information was too technical for the lay public to handle.

Health risk messages such as fact sheets and videos can increase intention to undertake health protective behaviours, for example, for HPV vaccination (Song et al., 2021). However, knowledge uptake is influenced by the information design in health risk messages. Pictorial health information moderately increase knowledge and understanding and overall recall of health information especially for the lower health literacy populations (Schubbe et al., 2020). Some of the changes made to improve text coherence were clearer agency, increasing argument overlap and adding connectors to draw attention to consequences of diseases. An effective health risk message is one that succeeds in increasing intention to detect or treat the disease, which would lead to better treatment and survival outcomes.

Researchers have moved into investigating the effectiveness of web-based tailored interactive interventions targeting HPV (Pot et al., 2018) and drug abuse (Arabyat et al., 2019). Nevertheless, brochures are still useful to reach the less information technology-savvy segments of the community. Mobile health approach was effective in encouraging breast cancer patients to perform an exercise intervention but its superiority over the conventional brochure was not evident (Uhm et al., 2017). Public responses may vary depending on format of health risk messages, the type of diseases and sociocultural context.

CONCLUSION

Considering the high incidence of NPC among Malaysians, further research involving experiments should be conducted to investigate knowledge uptake in response to a range of educational interventions with manipulations of information design. In addition, further studies should investigate perceptions of barriers that may prevent individuals from engaging in regular cancer screening or seeking cancer treatment.

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THE EFFECT OF SMOKING BEHAVIOR ON THE QUALITY OF LIFE AMONG FINAL-YEAR STUDENTS BY USING PRECEDE MODEL IN SARI MUTIARA INDONESIA UNIVERSITY, INDONESIA

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ABSTRACT

Introduction: The quality of life (QoL) of university students is an important aspect of creating the next leader in the future, developing strong human resources, and improving the quality of generation. Therefore it is important to understand the factors involved in improving the QoL of university students. **Methods:** This study intended to explore QoL among the final-year students and factors related to it in the University by applying the PRECEDE model through a cross-sectional study. A total sample size of 171 final-year students was drawn by using proportional sampling and probability proportional to size (PPS) for program selection and selected samples from each study program by accidental technique. Data were collected using the self-administered questionnaire, and WHOQOL-BREF was used to measure the QoL. **Result:** Data were analyzed by univariate and bivariate. The overall QoL was moderated (59.6%). There was a significant association between the availability of selling cigarettes around the university and QoL (p=0.019), ease to buy cigarettes, and QoL (p= 0.038). Enabling factors especially had a direct impact on the QoL. **Conclusion:** Providing regulations related to smoking to the academic community, giving moral responsibility to lecturers, and controlling the selling of cigarettes around the university would help increase the QoL.

Keywords: PRECEDE model, quality of life, final-year students

INTRODUCTION

Quality of life (QoL) of final-year students is an important aspect of creating the next leader in the future, as a benefit for developing strong human resources, improving the quality of generation, and as achievement indicators of many aspects such as health, economics, and education. Some factors that influence the QoL of university students like gender, income, education of parents, place of residence, and smoking (Sabbah *et al.*, 2013). On the other hand, social support from family, friends, and significant others also has an impact on the QoL of the students (Greimel *et al.*, 2016).

Lifestyle among the students was one of the shapes of behavior influenced by fraternization. Fraternization donated various lifestyle choices that have a big hand in changing the character and habits among students. Various lifestyles among students such as premarital sexual behavior, smoking behavior, and lack of physical activity were some negative impacts on the relationship that occur among students (Zhang, Y. *et al.* 2012). Not infrequently, students who previously did not have those behaviors eventually become involved due to the influence of fraternization. Conditions students who lived abroad or stay away from their families gave a great opportunity for fraternization influenced among students.

One of the fraternization's impacts on student behavior was the magnitude of the influence of close friends to smoke. They were hanging out with friends who smoked that were likely to smoke when compared with those who hang out with friends who did not smoke (Simons-Morton, B. and Farhat, T. 2010)). Peers group also had an association with

premarital sexual behavior but this study had not found the role of peers in adolescent sexual behavior.

Smoking was the cause of 6 million deaths per year in the world (WHO, 2016). In 2009 in Indonesia, 30.4% of students in Indonesia had ever smoked with percentages between genders as much as 57.8% for men and 6.4% for women. The percentage of smokers in adolescence in Indonesia amounted to 20.3% with the percentage of men amounting to 41.0% and 3.5% for women. Also, 22.5% of adolescents who used a variety of tobacco products amounted to 41.0% were men and 6.2% are women. At the end of 2014, the prevalence of smoking among men and women based on the use of tobacco among young people was 36.2% in men and 4.3% in women. The popularity of smokeless tobacco use among young people has a prevalence of 3.0% in men and 1.1% in women. Smoking causes decreased QoL and have a negative relationship between smoking and QoL (Goldenberg, Danovitch, and IsHak, 2014; SEARO, 2015). However, it was not focused on the QoL among the final-year students.

Based on the review of previous studies and the above problems, this study intended to explore what are the factors that associated with QoL among university students in Indonesia, especially in the final-year students in both three and four-year programs by applying PRECEDE model (Predisposing factors, reinforcing factors, enabling factors).

METHODS

The cross-sectional study was conducted to assess the QoL of the final-year students and the factors related to their QoL. The study was conducted at Sari Mutiara Indonesia University in the year 2017. The population in this study was the final year students from the four-year program consisting of the Study Program of Nursing, Study Program of Pharmacy, Study Program of Communication Science,

Study Program of Accounting and the three-year program consists of Study Program of Medical Laboratory Technician and Study Program of Biomedical Engineering. 175 samples were taken by proportional sampling. After the sample size from both programs was counted, the study program of each faculty was selected by using probability proportional to size (PPS). This technique is used to give a chance for the study program that has a larger population to have a greater probability of being selected as the sample compared to the study program that had a smaller population. Based on a logical basis and proportionally, six study programs were taken as the sampling target. Three study programs were taken from the Faculty of Pharmaceutical and Health Science, one study program from the Faculty of Science, Technology, and Information, and two study programs from the Faculty of Law and Social Science. After the study programs were selected, the study programs were separated based on the education program (four-year program or three-year program). 122 samples were taken from the four-year program and 53 samples were taken from the three-year program). Finally, the sample was selected by using a convenience sampling technique from each study program until the required sample was enough.

The primary data was obtained directly from final-year students through self-administered questionnaires to get information and additional answers. The WHOQOL-BREF was used to assess the QoL of final-year students. QoL of the final-year students was categorized into poor, moderate, and good. The researcher also carried out a pre-test among 30 students in Sari Mutiara Indonesia University among third-level students of the Study Program of Public Health, to actual data collection to check the validity and reliability of the research instrument. Secondary data were obtained from the internal University of Sari Mutiara Indonesia in the form of the number of

final-year students and others data needed. Independent variables in this study consisted of general characteristics, predisposing factors such as students' perception-related smoking behavior, reinforcing factors such as social support from family, friends, teachers, family behavior, peers group behavior, and teacher behavior, and also enabling factors such as availability, accessibility, and university activities. Whereas, the dependent variable in this study was the quality of life of final-year students. Data were processed by using SPSS 16 and analyzed by using linear regression.

The research protocol was submitted to the Ethical Review Committee for Human Research, Faculty of Public Health, Mahidol University before data collection. After getting approval from the Ethical Review Committee for Human Research, Faculty of Public Health, Mahidol University (COA. No. MUPH 2017-098), the researcher received approval from Sari Mutiara Indonesia University in advance before data collection.

RESULTS

The response rate of this study was 97.7% among the overall final-year students. However, the response rate for bachelor's degrees was 96.7% Which came from Study Program of Nursing, Study Program of Pharmacy, Study Program of Communication Science, Study Program of Accounting, and 100% for Diploma degrees that come from Study Program of Medical Laboratory Technician and Study Program of Biomedical Engineering. Among 171 final-year students, only 39.2% had a good level of QoL

Table 1. Number and percentage of 171 final year students by level of overall QoL and each domain

Domains	Level of QoL			Mean ± SD	Min	Max
	Poor	**Moderate**	**Good**			
	n (%)	**n (%)**	**n (%)**			
Physical health	1 (0.6)	106 (62.0)	64 (37.4)	25.51 ± 2.903	15	34
Psychological	2 (1.2)	86 (50.3)	83 (48.5)	22.18 ± 3.180	10	30
Social relationships	3 (1.8)	123 (71.9)	45 (26.3)	10.62 ± 1.766	3	15
Environment	2 (1.2)	129 (75.4)	40 (23.4)	27.06 ±4.275	8	40
Overall QOL	2 (1.2)	102 (59.6)	67 (39.2)	92.99 ± 10.94	38	125

Table 2. Association between general characteristics and QoL among the final-year students (n=171)

General characteristic	n	%	p-value per domain/ mean ± SD				
			Physical domain	Psychological domain	Social domain	Environmental domain	QoL
Gender			0.995[b]	0.627[b]	0.574[b]	0.696[b]	0.507[b]
Male	43	25.1	25.5±3.4	21.9±3.7	10.5±2.1	26.8±4.7	91.86 ±13.7
Female	128	74.9	25.5±2.7	22.2±2.9	10.7±1.7	27.1±4.1	93.4 ± 9.9

General characteristic	n	%	p-value per domain/ mean ± SD				
			Physical domain	Psychological domain	Social domain	Environmental domain	QoL
Parents education							
Father education			0.611[c]	0.840[e]	0.286[c]	0.144[c]	0.357[c]
Primary school	14	8.2	24.6 ±3.2		9.9 ±1.3	24.6 ± 2.3	88.1 ± 7.7
Junior high school	19	11.1	25.0 ±2.7		10.4±1.6	26.6 ± 3.0	91.8 ± 8.9
Senior high school and first associate's degree	99	57.9	25.6±3.2		10.7±1.9	27.3±4.8	93.4±12.5
Third Associate's and Bachelor's degree	33	19.3	25.9±2.1		11.0±1.5	27.8±3.6	94.9 ±7.7
Master and Doctoral Degree	6	3.5	25.5±2.3		10.2±1.2	25.8±4.6	90.8 ±7.7
Mother education			0.951[e]	0.947[c]	0.946[c]	0.155[c]	0.725[c]
Primary school	26	15.2		22.5±2.5	10.5±1.7	25.8±3.6	92.0 ± 9.6
Junior high school	24	14.0		22.3±3.1	10.5±1.5	26.0±2.9	91.1± 8.3
Senior high school	83	48.6		22.1±3.6	10.7±1.9	27.5±4.8	93.4±13.1
Third associate's and bachelor's degree	38	22.2		22.2±2.7	10.6±1.6	27.5±3.9	93.9±7.8
Money is given per month			0.023[b]	0.560[b]	0.637[b]	0.308[b]	0.258[b]
≤Rp 1,000,000.-	133	77.8	25.2 ±2.8	22.1 ±3.1	10.7±1.8	26.9±4.3	92.5 ±10.9
>Rp1,000,000.-	38	22.2	26.5±2.9	22.5±3.4	10.5 ±1.5	27.7 ±4.3	94.8 ± 11.1
(Mean = 1,023,391.81, SD = 42,0758.648, Min = 100,000, Max = 3,000,000)							
Place of residence			0.434[c]	0.346[c]	0.067[c]	0.142[c]	0.242[c]

General characteristic	n	%	p-value per domain/ mean ± SD				
			Physical domain	Psychological domain	Social domain	Environmental domain	QoL
Stay with parents	27	15.8	26.0±2.4	22.3±2.7	11.1±1.6	28.4±3.2	95.4± 7.9
Stay with family (uncle/aunty/ relatives but not with parents)	9	5.3	26.7±4.4	23.3±5.2	10.0±2.2	27.2±5.7	95.0±17.4
Stay in the boarding house	131	76.6	25.3±2.9	22.0±3.1	10.5±1.8	26.7±4.3	92.1±10.9
Others	4	2.3	26.0±1.4	24.3±3.3	12.3±1.0	30.0±5.6	100.3±10.4

p-value from independent samples t-test, p-value from ANOVA test, and p-value[e] from KruskalWallist test, *significance at p-value ≤0.05

Table 2 showed that money is given per month give an effect on the physical domain. The availability of seller cigarettes within 500 meters from the university gave the effect to quality of life of the students and also its domain such as physical domain, psychological domain, social domain and environmental domain. Other than that, ease in getting cigarettes also gave the effect on the QoL and physical domain. The availability cigarette shop within 500 meters from the residence gave the effect to physical domain and also to the psychological domain of quality of life. The availability of a smoking ban in residence gave the effect to the social domain and environmental domains. The details information can be seen in Table 3.

Table 3. The association between PRECEDE factors and QoL among final-year students (n= 171)

Variable	N		p-value/Mean ± SD				
			Physical domain	Psychological domain	Social domain	Environmental domain	Overall QoL
PREDISPOSING FACTORS							
Student's perceptions related to smoking behavior			0.492[e]	0.178[c]	0.421[e]	0.211[e]	0.408[c]
Positive perception	102	59.6		22.5±3.0			93.2±9.2
Neutral perceptions	60	35.1		21.9±3.2			93.3±11.7
Negative perceptions	9	5.3		20.6±4.6			88.2±21.1
REINFORCING FACTORS							
Social support related smoking behavior			0.335[b]	0.664[b]	0.967[b]	0.713[b]	0.385[b]

Variable	N		p-value/Mean ± SD				
			Physical domain	Psychological domain	Social domain	Environmental domain	Overall QoL
Low perceived social support	104	60.8	25.3±2.8	22.1±3.3	10.6±1.8	26.9±4.4	92.4±11.4
High perceived social support	67	39.2	25.9±3.0	22.3±2.9	10.6±1.6	27.2±4.0	93.9±10.2
Social behavior toward smoking behavior			0.245[b]	0.386[b]	0.627[b]	0.857[b]	0.34[b]
Social relationship at risk	166	97.1	25.5±2.9	22.1±3.2	10.6±1.8	27.1±4.3	92.9± 11.1
social Relationship not at risk	5	2.9	27.0±1.6	23.40±1.517	11.0±1.6	27.4±2.2	97.6± 3.6
ENABLING FACTORS							
Cigarette shop within 500 meters from the residence			<0.001[b]	0.002[b]	0.335[b]	0.273[b]	0.196[b]
Yes	167	97.7	25.6±2.8	22.3±3.0	10.7±1.7	27.2±4.0	93.5 ±10.1
No	4	2.3	20.3±4.1	17.3± 5.4	8.5±3.8	21.0±9.3	72.8 ±25.0
Cigarette shop within 500 meters from the university			<0.001[b]	<0.001[b]	0.022[b]	0.037[b]	0.019[b]
Yes	162	94.7	25.7±2.7	22.5±2.9	10.8±1.6	27.4±3.9	93.9 ± 9.6
No	9	5.3	22.0±3.7	17.3±4.3	8.1±2.8	21.7±6.8	75.9 ±18.5
The affordable of cigarette's price			0.640[c]	0.807[c]	0.375[c]	0.644[c]	0.780[c]
Expensive	61	35.7	25.6±2.7	22.3±2.9	10.9±1.9	27.5±4.7	94.1 ±10.7
Moderate	52	30.4	25.5±3.4	21.8±3.9	10.6±1.9	26.9±4.7	91.9±13.4
Cheap	10	5.8	26.4±2.1	22.20±2.9	9.90±1.4	25.9±3.0	92.6 ± 6.4
Don't know	48	28.1	25.2±2.8	22.4±2.9	10.5±1.4	26.9±3.4	92.9 ± 9.0
Ease in getting a cigarette			0.001[c]	0.071[c]	0.588[c]	0.214[c]	0.038[c]
Yes	149	87.1	25.7±2.8	22.2±3.1	10.7±1.8	27.2±4.3	93.4 ±10.5
No	7	4.1	21.7±2.9	19.9±4.7	10.0±2.7	24.3±4.5	82.7 ±15.3
I don't know	15	8.8	25.1±3.2	23.2±3.3	10.5±1.5	27.3±4.3	94.1 ±11.1
The available of education-related the dangers of smoking			0.926[b]	0.173[b]	0.265[b]	0.513[b]	0.341[b]
Yes	149	87.1	25.5±2.9	22.3±3.1	10.68±1.8	27.14±4.4	93.30±10.9
No	22	12.9	25.45±3.4	21.32±3.5	10.23±1.4	26.50±3.6	90.91±11.4
The available information in any media related anti-smoking			0.856[c]	0.141[b]	0.198[c]	0.180[c]	0.307[c]

Variable	N		p-value/Mean ± SD				
			Physical domain	Psychological domain	Social domain	Environmental domain	Overall QoL
Every day (20 – 30 times)	44	25.7	25.5±3.4	22.2±3.9	10.9±2.1	28.1±5.8	94.4 ±14.8
Often (10 – 19 times)	34	19.9	26.0±2.7	22.7±2.6	10.6±1.5	27.3±3.4	94.4 ± 8.2
1-2 times per week (5 - 9 times)	26	15.2	25.5±2.6	22.2±2.8	10.8±2.1	26.5±4.2	92.6 ±10.3
Less than once a week (1-4 times)	50	29.2	25.3±2.8	22.5±2.7	10.5±1.4	26.8±3.2	92.7 ± 8.3
Never (0 time)	17	10.0	25.2±2.6	20.35±3.6	9.8±1.9	25.4±3.7	88.1±11.5
The availability of a smoking ban in the university			0.086[b]	0.331[b]	0.619[b]	0.495[b]	0.243[b]
Yes	169	98.8	25.6±2.9	22.2±3.2	10.6±1.8	27.1±4.3	93.1 ±11.0
No	2	1.2	22.0±2.8	20.0±1.4	10.0±1.4	25.0±1.4	84.0 ± 0.0
The availability of a smoking ban in the residence			0.422[b]	0.536[b]	0.037[b]	0.028[b]	0.176[b]
Yes	73	42.7	25.3±2.6	22.4±2.7	10.9±1.7	27.9±3.9	94.3± 9.1
No	98	57.3	25.7±3.1	22.1±3.5	10.4±1.8	26.4±4.4	92.0 ±12.1

p-value from independent samples t-test, p-value from ANOVA test, and p-valu[e] from Kruskal Wallist test, *significance at p-value ≤0.05

Table 4. The significant association between PRECEDE factors and QoL among final-year students by using regression linear analysis (n= 171)

Variable	Unstandardized Coefficients	Beta (Standardized Coefficients)	t	Sig.
(Constant)	68.351		16.510	<0.001
Cigarette shop within 500 meters from university	20.594	.422	6.185	< 0.001
The availability of a smoking ban in the residence	3.358	.152	2.250	0.026
Money given per month	.000	.296	4.185	< 0.001
Stay in the boarding house	-5.452	-.212	-3.043	0.003

F = 13.872
R = 0.501
R Square = 0.251
Adjusted R Square = 0.232

Based on Table 4 above it shows the correlation between independent variable; Cigarette shop within 500 meters from university, the availability of a smoking ban in the residence, money is given per month and stay in boarding house and dependent variable (quality of life of the students) had strong correlation (R = 0.501). Those of variables above have 23.2% contribution to the quality of life of the final year students.

DISCUSSION

The majority (59.6%) of the final-year students had a moderate level of overall QoL according to the WHOQOL-

BREF. It is also supported by the domains item that also showed that the level of QoL among the final-year students in each domain was at a moderate level. However, when the students were asked to rate their QoL, 60.2% mentioned that they had good QoL, and only 19.9% neither poor nor good. The rate is given by the students about their QoL, and the scoring result by QoL measurements based on the domain of QoL and the overall QoL showed the opposite answer. It was due to factors in which the students perceived the QoL to the extent that they felt personal rather than considering that other factors such as environment, social, physical, and psychological are factors that also affect their QoL. However, when asked deeply about domains related to QoL such as physical, psychological, social and environmental factors, they,have other perceptions about this. It was supported by the claim that a positive environment did not necessarily impact a better QoL, but was determined by how individuals interpret their conditions and interact with their social and environment (Tonon, 2012). So that the different perspectives among their ownQoLand their QoL in each domain can be different, but it has not found the previous study that can explain this condition.

Concerning each question of WHOQOL-BREF, two parts had the majority answer in moderate and a little level such as about having enough energy for everyday life and the opportunity for leisure activities. Regarding having enough energy for everyday life, 54.4% of students had a moderate amount of energy, followed by 18.7% had a little energy for everyday life. Other than that, 42.1% of students said that they had an opportunity for leisure activity moderately, followed by 31.6% of students had little opportunity for leisure activity. It was supported by the condition of the students' status as final year students. All of them were busy with their research and field practice.

The association between general characteristics and QoL showed that money given per month had a significant association with the physical domain. It found that the mean score among the students had more than Rp 1,000,000,- per month was higher in the physical domain than the students that got money less than or equal Rp 1,000,000,- per month. It had the same result with the previous study that proved there was an association between financial status regarding the amount and physical domain. However, in this previous study, the significant association not only financial status but also gender.(Sabbah *et al.*, 2013) Other than that, another study found the association between the general characteristic and each domain of QoL by multivariate analysis to another item of general characteristics (Al-naggar, Osman and Musa, 2013).

The fact that there was no significant association between gender and QoL had proved by the previous study among university students in Hungary. It mentioned that, if we compare QoL within the group (among the students in the University) based on gender, it did not give a significant association (Edvy, 2013). However, the result showed that females had higher QoL than males. Other than that, QoL means score of the male was lower than the mean score of the overall QoL.

The previous study among medical students in China showed that there was a significantly different score between males and females regarding the physical and psychological domain (Zhang *et al.*, 2012). The score among the male medical students was higher than female students. The different proportional sample of male and females between both of study might be had an impact to the mean score of each domain among male and female students. Other than that, the different background of education and tension among medical students and the final-year students also impacted to the psychological domain. It needed to know about the level of tension between these two populations that might

be given different impacts to the psychological domain. At a certain level of tension may be will show a significantly different between male and female toward psychological domain. The large variety of educational program in the population of final-year students may be had a different impact on the psychological domain so that this can't bring up the same pressure conditions among final-year students. Even there were all in the final-year education, but the tension that each study program gave to them were different so it can not represent the same pressure condition (Zhang et al., 2012).

This study also showed that the QoL of the final-year students influenced by another factor such as family income and parents job that influenced the amount of money that students get per month. It can be seen from the result that the amount of money given by parents per month had a significant association to physical domain. Which was having enough money to meet their needs was also a part of the environmental domain. Even the number of money that parents give per month did not have a direct significant association to QoL, however the data showed that the students got money more than IDR 1,000,000.- per month had higher QoL mean score (94.8) than the students that got money less then IDR 1,000,000.- per month (92.5). It revealed that money got per month also as a factor to increase the score of QoL of the final-year students. The students that had enough money for their life will be able to get a more prosperous life. Regarding to the item of environmental domain, it told that the students that got money more than IDR 1,000,000.- per month had better healthy physical environment, feeling safe in their daily life and satisfied with their living place, having enough money to meet their needs, got a lot of information, satisfied with their access to health service and transportation. That is because they can choose a better environment and facilitation to meet everything their needs and finally will be feel satisfied with everything they

got. It is common that a better environment and amenities had a higher price.

Final-year students that live with parents and stay with family (uncle/ aunty/ relatives but not with parents) had a higher mean score in QoL than the students that stay in boarding house. The data showed that the mean score of QoL of the final-year students that live with parents was the highest (95.4), and followed by the students that lived with family (95.0). Eventhough the place of residence of the final year, students did not have a significant association, but it showed the difference mean score between the different place of residence. The role of parents in student life is very important. The existence of students who are as well as part of adolescents is inseparable from the process of development of life at the stage of adolescence. One of the most important stages of life in adolescence is the social-emotional development of them. One of the roles of parents in student life is to help the development of the social and emotional life of students. Socio-emotional development can be interpreted as the ability of students to manage their emotions with other people about the hearts and concerns among humans and the ability to manage the emotions themselves and others so that he can interact well with peers, parents or with people Mature in the surrounding environment.

The role of parents is very important in supervising and educating teenagers not to fall into a social environment that deviates and has positive emotions. It supports the findings of the study where students living with parents and families have a higher average QoLcompared to students living in boarding houses or rented house and away from families. Students living with families are seen as more supervised than those who are far from the family. Teenagers who experience many new things and new challenges are in dire need of a family role in providing social and emotional support, guidance and direction as well as guiding students in making the

right decisions in their life as adolescents. Various problems faced by students, they need the guidance and role of the family so that students can solve the problem in the right way and the right steps (Nadra, 2016).

There was no a significant association between students' perception related smoking behavior to QoL. Smoking behavior was one of many factors that gave influence to the behaviors. Besides the smoking behavior, the condition of environmental is needed to consider as another factor that gave influence to QoL. The percentage of students' perception related smoking behavior was on positive perception. However, students' perception was not enough to give the impact to QoL. Enabling factors is needed to be considered as the factors of QoL.

There was no an association significantly between social support toward smoking behavior to QoL and each domain. Even there was no significant association between social support and QoL, but the result showed that the mean score between low perceived social support and high perceived social support were different. The QoL mean score of the high perceived social support was higher than the mean score of low perceived social support. This result also happened between social behavior and QoL. In which the final-year students that had a social relationship at risk had a lower mean score of QoL than the students that did not have a social relationship at risk. The data showed that the QoL mean score of high perceived social support toward smoking behavior was 93.9. Other than that, the QoL mean score among the final-year students that had a social relationship at risk toward smoking behavior was lower than the final-year students that had no social relationship at risk.

Social support and social behavior had a big impact on students' lifestyles, and it was also will bring the impact to the QoL. The relationship between peers group, family, teachers and the students will bring the positive or negative impact to QoL. As it mentions before, peers group has a large position in influencing the behavior of the students (Tomé *et al.*, 2012). These behavior changes because the students try to adjust themselves to the environment especially for their relationship with their peer's group. The relationship that occurs between students inevitably affected the formation of the characters and their habits (Salvy *et al.*, 2009; Simons-Morton and Farhat, 2010; Fitzgerald, Fitzgerald and Aherne, 2012). Socially patterned habits of students will affect their lifestyles and had a major impact in shaping their personality to the fore (Reitz *et al.*, 2011). The previous study also mentioned that various lifestyle among students such as smoking behavior was a negative impact from the relationship that occurs among students (Jose C.León, José Carmona, 2010).

Adolescent smoking behavior was strongly influenced by peers and best friends. It supported this study result that revealed the majority of people that influenced the final-year students to smoke at the first time was a friend (57.1%). The role of peers and parents had a big hand in controlling the smoking behavior in adolescents. Teens were hanging out with friends who smoked was likely to smoke compared with those who hang out with friends who did not smoke. Parental and family supervision also had an important role in controlling the adolescent smoking behavior through providing oversight of friends interaction (Simons-Morton and Farhat, 2010). Other than that, smoking causes decreased QoL of the final-year students (Goldenberg, Danovitch and IsHak, 2014; SEARO, 2015).

Regarding enabling factors related to smoking behavior, the availability of selling cigarette around the university and easy to buy cigarette was significant factors to QoL. The availability of cigarettes around the university makes it easier for students to get cigarettes. Italso supported with the ease of getting cigarettes in Indonesia. There was no age limit or age ban for cigarette buyers. It also supported

by the result that showed the availability of selling cigarette within 500 meters from the university had a significant association with every domain of QoL. The availability of selling cigarette within 500 meters from residence had a significant association to the physical domain and psychological domain. Other than that, easy in getting cigarette had a significant association to physical domain. The availability of a smoking ban in residence had the significant association to the social domain and environmental domain.

One of the most striking differences of QoL means a score of the students related the association between enabling factors of smoking behavior, and QoL was in the availability information in any media related anti-smoking item. Even the study did not find a significant association among them. However, the mean score of the final-year students that never got information in any media related to anti-smoking had low QoL mean score than the final-year students that ever got information related anti-smoking. Even more than that, the QoL means score of them was lower than the overall QoLof final-year students.

Media is one of the information intermediaries that are expected to change someone from not knowing to know. Information is expected to provide the knowledge to someone and to achieve the goals of that information. It is related to the dissemination of information about anti-smoking in the media aims to change the knowledge and behavior of a person to cigarettes. As mentioned before, cigarettes had a negative impact on QoL. who receives information about anti-smoking is expected to stay away from smoking behavior. It was because those who received information about smoking behavior are aware and are less likely to have smoking behavior and ultimately result in good QoL (Durkin, Brennan and Wakefield, 2012).

CONCLUSION

The good level of quality of life in relationship domain and environmental domain were low, by increase the promotion to quit smoking and prevention students from smoking behavior and develop good perception related smoking behaviorwill help improve QoL of the students. Enabling factors especially had a direct impact on the QoLof the final-year students. By providing regulation related smoking to the students, teachers, and staff, giving moral responsibility to lecturers, and controlling the selling of cigarettes around the university would help increase the QoL of the final-year students. Because the limitation time for data collection, this study collect data from small sample size and using the quantitative technique so, it could not get depth interview to access and support more information. The future study is expected to research the larger sample size to get a more appropriate representative result and qualitative research is needed to get more reliable and better information. Multivariate analysis is needed to get a more appropriate result because QoL caused not only by one factor but many factors interrelated.

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ANALYSIS OF ACUTE APPENDICITIS CLINICAL PATHWAYS IMPLEMENTATION IN ROYAL PRIMA MEDAN GENERAL HOSPITAL YEAR 2020

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ABSTRACT

Introdution: Clinical pathway (CP) is a disease management tool used to reduce unnecessary variations in services, increase clinical outcomes, and control resources. Acute appendicitis is one cause of acute abdominal pain, where cases of appendix perforation range from 20-30% increasing to 32-72% at the age of more than 60. **Methods:** This research was conducted using mix method with case study design. Qualitative data were taken by interview and observation. Quantitative data were taken with a simple description from the acute appendicitis CP documentation in medical records and ICPAT (January - September 2020, n = 117). **Result:** According to the result of the research, the level of completeness for CP was 100% and form filling was 85%. **Conclusion:** ICPAT dimension 1 made sure that the form was the clinical pathway. The content and quality were good, and dimension 2 assesses the CP documentation process. The content is lacking and the quality is moderate, dimension 3 assess the CP development process which content was good, and quality was moderate, and dimension 4 assesses the CP implementation process. The content was moderate, and the quality was good. Dimension 5 is to assess the maintenance of clinical pathways in which content was lacking and quality was moderate. Dimension 6 serves to assess the role of the organization that content was good and quality was moderate where the obstacles were due to lack of understanding and time constraints.

Keywords: Analysis of clinical pathways implementation, acute appendicitis, ICPAT

INTRODUCTION

Health is a fundamental right of each individual, as stated in the WHO constitution. In realizing the right of individual health, health services must be able to place resources and organization efficiently with the advancement of the medical world (Romeyke T, 2012). Excellent quality health care depends on the correlation between the good structure or input, process, and output. Structures are an organization, management, finance, personnel, facilities, and infrastructure. Processes are all activities of health workers who interact with patients professionally. Meanwhile, the output is the final results or services that have been provided by health workers to patients (Arief and Dewi, 2017).

Clinical pathway (CP) is a disease management tool used to reduce unnecessary variations in services to improve clinical outcomes and also to control the use of resources (financial). The CP document provides in detail every important stage of health care, for the majority of patients with specific clinical problems (diagnosis or procedures), as well as the expected results. (Djasri, 2013; Eka F, 2016).

The United States applies clinical pathways to almost 80% of all health services there. In Indonesia, the application of clinical pathways related to the application of INA-DRG (Indonesian Diagnosis Related Groups) is expected to increase the efficiency and quality of health services in hospitals. This document is also one of the requirements that must be met in the 2012 KARS version of the accreditation standard for hospitals. CP also plays a role in improving quality control and hospital costs, for example, such as shortening the length of stay, reducing the risk of recurrence, complications and patient

mortality, and overall hospital costs. (Eka F, 2016).

Based on the results of a study by Yasman (2012) regarding the benefits of clinical pathways, it was found that there was an increase in service, implementation of evidence-based practice, monitoring of service standards, more directed documentation, increased collaboration between divisions, improved risk management and provision of care patient (Yasman, 2012). As well as from a study conducted by comparing clinical pathway treatments and normal care performed by Kinsman et al., in 2010, the results showed a decrease in disease-related complications and an increase in documentation with clinical pathways (Kinsman et al., 2010).

Acute appendicitis is one of the most common causes of acute abdominal pain. Appendicitis can be found in both men and women with the risk of suffering from appendicitis in their lifetime reaching 7-8%. The highest incidence is reported in the age range of 20-30 years. The cases of appendix perforation in acute appendicitis range from 20-30% and increase by 32-72% at the age of more than 60 years. (Sjamsuhidajat, 2010; Omari et al., 2014).

Royal Prima Medan General Hospital is one of the hospitals accredited with B type hospital which serves public health both the general and BPJS patients and has implemented CP. One of them is acute appendicitis CP, which is the case of acute appendicitis patients at the Royal Prima Medan General Hospital each year continued to increase from 357 cases in 2018 and 447 cases in 2019. Therefore, it is necessary to do further studies regarding the implementation of CP to analyze the implementation system, monitoring, and evaluation of CP as a means of service quality control and hospital cost control.

METHODS

This research was conducted using a mixed method with a case study design. Qualitative data were taken by interview and observation to get more in-depth information about the implementation of the clinical pathway for acute appendicitis at Royal Prima Medan General Hospital. Quantitative data were taken with a simple description from the acute appendicitis CP documentation in medical records and the Integrated Clinical Pathway Assessment Tool (ICPAT). The population of this study were medical records with a diagnosis of appendicitis during the past 9 months and informants who were directly related to clinical pathways.

Quantitative samples were taken from all acute appendicitis medical records and selected by total sampling with the inclusion criteria, namely acute appendicitis CP used in Royal Prima Medan General Hospital, including medical records with acute appendicitis diagnosis from January 2020 to September 2020, with the exclusion criteria of missing, illegible and damaged patient medical records. The qualitative sample information that will be taken through interview are informants who are directly related to the clinical pathway consisting of Case Manager, Medical Services Committee, and Head Nurse of Inpatient Rooms with purposive sampling technique (n = 5).

The type of validation of research results was data sources triangulation. In quantitative data that taken descriptively through the documentation of acute appendicitis CP in medical records and ICPAT. ICPAT form was not tested for validity and reliability because it used a validated ICPAT form. This form is commonly used for assessing clinical pathways in the United Kingdom. The CP assessment consists of 6 dimensions which are Dimension 1 accessing the CP format, Dimension 2 accessing the CP documentation, Dimension 3 accessing the CP development, Dimension 4 accessing the CP implementation, Dimension 5 accessing the CP maintenance, and Dimension 6 accessing the organizational roles (Whittle, 2009).

The results of qualitative and quantitative research were triangulated by confirming respondents through interviews and observations of research subjects. The triangulation sources were carried out by processing and preparing data, re-reading the whole, and analyzing data obtained from sources and medical records so that conclusions could be drawn about the results of the action in the form of narrative or qualitative reports. Quantitative analysis was carried out by descriptive analysis of the ICPAT checklist, and the data was processed using a computer program. Qualitative analysis was carried out by collecting data then the data that has been obtained was reduced by combining and grouping similar data into one written form according to their respective format with the stages of open coding, axial coding, themes and finally drawing conclusions and, or verification stage. (Ethics Test Number: 002/KEPK/UNPRI/VIII/2020)
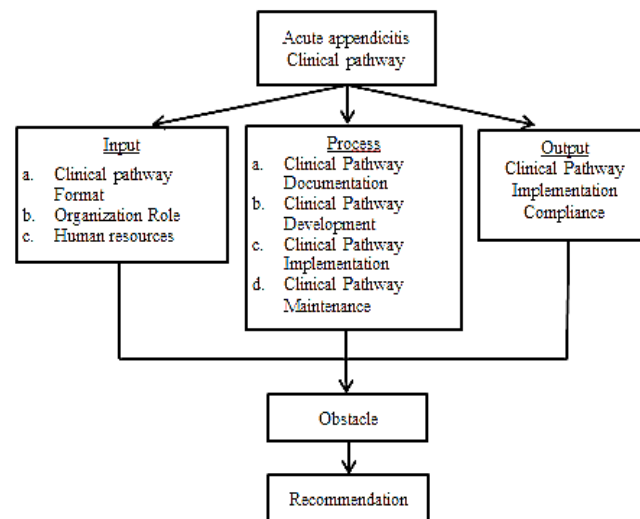

Figure 1. Research conceptual framework

RESULT
Hospital Profile

Royal Prima Medan General Hospital is one of the types- B accredited hospitals that serve public health both the general public and the BPJS, which has implemented CP. One of them is acute appendicitis CP which is one of the biggest diseases that is often found in the past few months. Which is the case of acute appendicitis patients at Royal Prima Medan Hospital continues to increase every year from 357 cases in 2018 and 447 cases in 2019.

ICPAT Evaluation Results

The ICPAT evaluation result on acute appendicitis CP is shown in Figure 1 below. Based on the literature of Whittle et al "Assessing the content and quality of pathways" (2008), the ICPAT assessment classification obtained, if the assessment results in a percentage of >75%, the clinical pathway form that assessed is in good criteria, 50-75% is included in moderate criteria, and <50% is in poor criteria (Whittle, 2009).

From the results of Figure 2, the assessment of dimension 1, content, and quality was good. Assessment on dimension 2, content was poor, and quality was moderate. Dimension 3, the content was in good criteria, and the quality was moderate. For dimension 4, the content was moderate, and the quality was good. In dimension 5, the content was poor, and the quality was moderate, while in dimension 6, the content was included in the good assessment, and

the quality was included in the moderate category.

Input

Based on the observations and interview results, there were 4 general surgeons at the Royal Prima Medan General Hospital. At the same time, the number of nurses focused on the 5th floor was 21 people, 4 male, and 17 female. Based on interviews conducted by the researcher related to clinical pathways, the coding results based on the nurse's understanding of the clinical pathway serve in Table 1.

The entire respondent stated that the clinical pathway is a guideline in clinical care services to determine the uniformity of service standards and reduce the time and treatment cost.
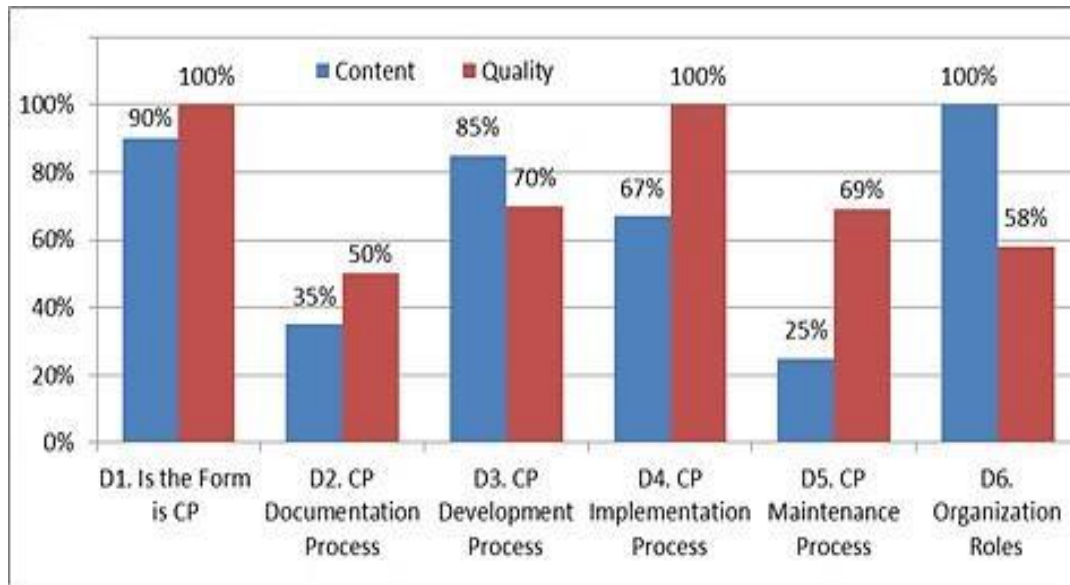

Figure 2. The ICPAT evaluation result

Tab1e 1. *Coding* of Nurses' perspective Clinical Pathway Understanding

Variable	Method	*n*	Result	Conclusion
The clinical pathway definition	Interview	6	a. Clinical path b. Service guide c. Patient care guidelines	A clinical pathway is a guideline for clinical care services.
The function of a clinical pathway	Interview	6	a. Quality and cost control b. Focus more on handling the patient c. Reduce the risk of mishandling	The clinical pathway function is to establish uniform service standards as quality control, time and cost.

Based on the interviews, all inward staff contribute to patient services, this was supported by a statement from an interview with informant C that,

> *"... who use CP are all parties involved in patient care."*

and from informant P's statement in the interview, *"... filling in is the doctor on duty and/or the case manager."*

Based on this statement, it is known who filled out the clinical pathway sheet.

Table 2. Number of Hours on Hospital Care for Floor 5b Inward in Royal Prima Medan General Hospital

No	Category	Patient/day	Nursing hours	Total
Effective Nursing Care Hours/Day				
1.	Minimal care	20	2	40
2.	Moderate care	12	3,08	36,96
3.	Heavy care	3	4,15	12,45
4.	Maximal care	0	6,16	0
Total		35	15,69	
Total number of care per day				89,41

Table 3. Number of Nursing Staff Working on Floor 5b Inward in Royal Prima Medan General Hospital

A = Number of Nursing staff working

$$\frac{\text{Number of nursing hours/ day}}{\text{Number of hours working/ shift}} = \frac{89,41}{7} = 13 \text{ person}$$

Table 4. Number of Off Shift Nursing Staff on Floor 5b Inward in Royal Prima Medan General Hospital

B = Number of Off Shift Nursing Staff (*Loss Day*)

$$\frac{\text{Num. of off-shift/ wk/yr + Num. of leave days + Num. of holiday /yr}}{\text{Num. of effective workday/yr}} \times A = \frac{82 \times 13}{8} = 4 \text{ person}$$

Table 5. Non-Nursing Staff on Floor 5b Inward in Royal Prima Medan General Hospital

C = Non-Nursing Personnel

(A + B) x 25% = (13 + 4) x 25% = 4 person

Table 6. Nursing Labor Need on Floor 5b Inward in Royal Prima Medan General Hospital

Nursing Labor Need in Inward

A + B + C	= (13+4+4)	= 21Person
Inward Head		= 1Person
Number of Labor Needed		22 Person

The table above is an interpretation of the needs of nursing personnel based on the guidelines for calculating the needs of nurses according to the Directorate of Nursing Services Directorate General of Indonesian Medical Care Health Department. From the calculation of the table below, it was found that the need for nurses on the 5th floor of the Royal Prima Medan General Hospital numbered 22 people, while there were 21 nurses occupied.

Process

Based on the results of interviews and observations, the acute appendicitis clinical pathway created in 2016 did not provide access to its patients to CP both for filling and developing variations also implementation. Following informant K's statement,

"..cannot access, the clinical pathway restricted only for us, paramedic .."

Based on this statement and observation of the CP form, the revision number had not been included. There was no input or review from the patient because patients did not have access to their CP. Besides, there was no individual staff in charge of being responsible for internal CP storage. This was supported by the statement that the content has not been fulfilled is that there is no individual staff responsible for maintaining CP, supported by a statement from informant K,

"...still being saved at Medical Record Department at the moment. there is still nothing written who is responsible, the procedure just verbally being told."

In addition, there was no training for current staff when there were any changes in the content of the CP and there was no training on the use of CP for the new staff involved, this was in accordance with the statement from informant K which stated,

"... there, every year, usually at the beginning of the year or at the end of the year ..."

Meanwhile, the quality aspects that had not been met, namely, the contents and documentation of clinical pathways had been regularly reviewed based on variations. This was based on the observation form in which the revision number had not been included and there was no input or review from the patient because the patient did not have access to their CP.

Output

Based on medical record observations, compliance in attaching the CP form for acute appendicitis, there were 117 out of 117 medical records (100%) that were observed attaching the clinical pathway form for acute appendicitis and also from the statements of informant K and informant P's that,

"...if the patient stays inward with diagnosed exactly same with the existing clinical pathway, and which is a single diagnosis, then the clinical pathway form will be put in the patient record status..."
"... will be given in the inward room.."

Then, from the completeness of the filling in medical records from 117 medical records, there were 12 medical records (15%) that had not been filled in, for example, the time of entry, date of exit, ICD code, and the plan of the ward, this is based on direct observation of the contents of the CP in the medical records. Based on these results, the researchers coded the interview results regarding the obstacles in implementing the clinical pathway in Table 8 below.

Table 7. The Obstacle in Clinical Pathway Implementation

Variable	Method	Result	Conclusion
1. Attitude	Observation	a. Limited time b. Lack of cooperation in implementation form filling c. Lack of understanding of the clinical pathway	Lack of understanding of the importance of filling the clinical pathway.
2. Documentation	Observation	Less thorough in filling in details	Limited time makes it less thorough to fill the document.

This is also supported by the statement of one of the informants P who stated,

"sometimes not discipline enough, because there are so many other works to do..but all the instruction already being done, but sometimes the documentation medical record with.. err.. clinical pathway missed one to two small things because quite busy.."

The lack of understanding factor on the importance of filling the clinical pathway, one of which is because the implementer is accustomed to delaying filling in the clinical pathway or not reminding each other or checking to fill it in the patient's medical record before the status returned, this results in incomplete filling of the clinical pathway plus with the business of the implementer such as case manager and the doctor in charge of the patients, so that the filling of the form is incomplete, even though the medical record staff will re-check once every quarter before it is given to the medical committee for auditing so that the CP form will be returned to the case manager to be filled back.
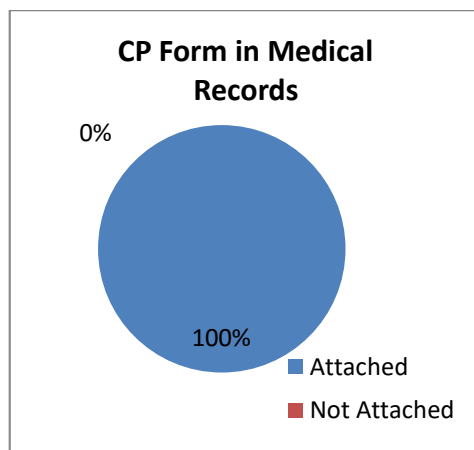

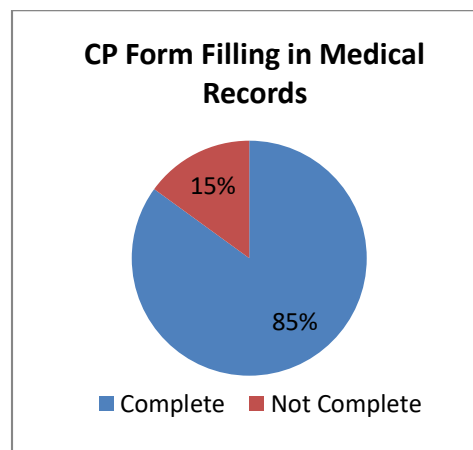**Figure 3**. Compliance in attaching the CP form

Figure 4. Completeness in filling CP Form

DISCUSSION

Based on the literature of Whittle et al "Assessing the content and quality of pathways" (2008), the ICPAT assessment classification is obtained, if the assessment results in a percentage of > 75%, the clinical pathway form that is assessed is include in the good criteria, 50-75% is include in the moderate criteria, and <50% are in the poor criteria (Whittle, 2009).

Based on the ICPAT assessment, dimension 1 obtained 100% content percentage and 100% quality. Based on these results, the content and quality are in a good category. Assessment of this dimension is to ascertain whether the form being assessed is clinical pathways (CP). Judging from the results obtained, it is true that the form being assessed is a right clinical pathway. To improve service quality, one way is to redesign the health service process by establishing a clinical pathway (Olsson, 2009). CP detailing what to do in certain clinical conditions and provides a management plan with appropriate service standards. CP also plays roles in improving quality control and hospital costs, such as shortening the length of stay, reducing the risk of recurrence, complications and patient mortality, and overall hospital costs (Eka F, 2016). Based on the previous data analysis, dimension 1 has met the good criteria.

Based on the ICPAT assessment, in dimension 2, the content percentage was 35% and the quality was 50%. Based on these results, the content falls into poor criteria and the quality is in the moderate category. Assessment of this dimension is to assess the CP documentation process. There are various CP document formats, depending on the type of disease or problem based on the agreement of the professionals. Generally, the CP format contains a table where the column consists of time. The row contains the results of observations, examinations, and actions. The filling out of the form consists of patient history data, physical examination, and screening studies according to the agreement made (KARS, 2015; Croucher and Michelle, 2005). The CP document is also one of the requirements that must be met in the Hospital Accreditation Standard, where the CP document provides in detail every critical stage of health care, for most patients with specific diagnoses or clinical procedures, and with the expected results (Djasri, 2013; Eka F, 2016). It can be concluded that the documentation process is not detailed on the form which is considered affecting on communication among service staff, and also a lack of evidence related to the audit that will be carried out by the medical committee.

Based on the ICPAT assessment, in dimension 3, the content percentage was 85% and the quality was 70%. Based on these results, the 3rd dimension content included good criteria, and moderate quality. Assessment of this dimension is to assess the CP development process. Multidisciplinary professions involved in contributing to provide care can be in the form of nursing, medical, nutritional, and pharmaceutical care (KARS, 2015). The problem is that patients are not involved in the development of clinical pathways. The goal of the CP is the right person, the right instruction, the right place, at the right time doing the right thing with the right results, and all focusing on the patient experience. (Davis and Nicola, 2005). The evaluation carried out on CP is seen not only by the team that made it but also from the party receiving the care treatment, namely the patient (Widyanita, Arini and Dewi, 2016). Based on this, it can be concluded that the participation of patients in the development of clinical pathways will reduce the occurrence of problems such as contradiction over medical actions in the future.

Based on the ICPAT assessment, dimension 4 obtained 67% content percentage and 100% quality, where dimension 4 assessed the CP implementation process. In dimension 4, the content is moderate, and quality is good

evaluation criteria. The implementation of CP is related to clinical governance to improve and maintain the quality of service at an affordable cost as estimated. In contrast, in simple words, clinical governance is an efforts system to improve the quality of health care organization service systematically in an efficient and secure way. CP detailing what should be done in specific clinical conditions and provides a plan of action with service standards that considered in accordance with evidence-based medicine (Mnistry of Health, 2005). According to Mater, the first thing to do is to improve the quality of medical staff with knowledge related to CP before implementing a good clinical pathway implementation (Mater and Ibrahim, 2014). So it can be concluded that content still needs to be improved, especially by determining the allocation of resources to train staff in using the CP forms.

Based on the ICPAT assessment, in dimension 5, the percentage of content was 25%, and quality was 69%. Assessment of this dimension is to assess the maintenance of clinical pathway. Content is in poor criteria, and quality is moderate. From the results of the study, it is known that there is no written operational procedure standard about the individual responsible for maintaining CP. Hence, there is a need for staff responsible for maintaining CP. According to Davis, the identification of leaders and responsible teams is essential to forming a CP team that encourages and sustains changes (Davis and Nicola, 2005). Besides, new and current staff training when there is a change in the content or format of the CP in close intervals, especially during revisions or changes, only once a year. Davis also stated that there are 8 stages in the development of a clinical pathway, one of which is the need for regular reviews where there is a record of variation and whether the staff understands how to record the variation (Davis and Nicola, 2005). Apart from the quality side, there are no reviews based on the variations

that arise. Analysis of variations in ICP allows for an ongoing assessment of the process and results of guidelines or standards, thus providing an evaluation of the practices performed (Croucher and Michelle, 2005). From the study results, there is also no input from patients who change their practice because the patient has not been involved and related has not been updated code of clinical pathway variation used. Therefore, patient involvement and variation arising in the field need to be done and recorded so that the maintenance process can be increased.

Based on the ICPAT assessment, in dimension 6, the percentage of content was 100%. The quality was 58%, based on those results, the content is included in the good criteria, and the quality is in the moderate category. Dimension 6 serves to assess the role of the organization. Based on research, it is known that the management has done the CP socialization. However, the implementation of the clinical pathway is still considered less even the thing that they missed is small problems. This is because there has been no punishment or training conducted no more than once a year. There is also no commitment from each medical personnel who realize the importance of filling CP in detail. Hence the need for re-examination before submission to the quarterly audit section by the medical committee team. Devitra said that doctors should form a clinical commitment and leadership as one of the roles in organizing (Devitra, 2011). According to Widyanita et al, the main thing that can be done to enhance the organization's role is to strengthen the commitment of each officer involved (Widyanita, Arini, and Dewi, 2016). From this, it can be concluded that the role of the organization in the application of existing clinical pathways is supported by commitment with the staff continuously in the long terms

Furthermore, from the results of medical record observations, from 117 medical records with acute appendicitis diagnosis, all of them were attached with the

CP forms. Only in filling out the CP form, from 177 medical records, 12 medical records were not completely filled-in in details. Hanevi stated that CP documentation in detail, is an essential stage of health care, for most patients with some clinical issues (diagnosis or procedures), and with the expected results (Djasri, 2013). The Hospital Accreditation Committee stated that one of the effectiveness of CP documentation could save on the use of facilities, increase clinical outcomes, increase patient and practitioner satisfaction, and reduce treatment costs (KARS, 2015). Based on the above statement, it can be concluded that it is necessary to increase accuracy in the documentation process and implementation of clinical pathways to reduce medical negligence.

From the interviews with case managers and nurses, regarding data that is not written entirely, some informants stated that a large number of activities in the hospital and a large number of patients caused the filling of the forms to be imperfectly recorded in detail. Usually, they will be reminded by the medical record when they are discharged to fill it so sometimes it is missed because there is not one individual who is responsible for CP. Also, it is known that in the discussion of the need for nursing staff basically on the 5b floor there are 22 people, but currently, there are only 21 nurses. According to Devitra, human resources are the central pillar of success in applying the clinical pathways, therefore the need for ability and availability to manage existing potential (Devitra, 2011); Therefore, the management of existing resources, which is directly related to clinical pathways effectively, is needed.

CONCLUSIONS

From the input aspect, the clinical pathway form assessed was acute appendicitis clinical pathway following the ICPAT assessment and met good criteria.

Facilities and infrastructure, including inpatient rooms and equipment, are available to function correctly and follow the standards set by the hospital. The number of general surgeons is 4 people, nursing staff, especially on the 5th floor, currently less than 1 person.

From the process aspect, the CP has been put into the medical record with a 100% rate. CP development has involved all staff related, but still not optimal yet. In the process of CP implementation, there are still obstacles such as a lack of awareness of the importance of filling the CP and the time limit for filling in the CP form thoroughly. No written notification of individual staff responsible for maintaining CP and evaluation of CP implementation is carried out once a year, and training is carried out simultaneously together with the evaluation meeting. From the output aspect, compliance filling complements acute appendicitis clinical pathway for, namely 85%.

In the socialization of the use of clinical pathways, routine training should be carried out for each staff associated with how-to fill the CP in turns several times a year, so that all staff involved understand and are familiar with the use of clinical pathways, especially if there are new staff changes or changes in CP forms. To improve compliance with the clinical pathway implementation, a staff member who is responsible for overseeing the implementation of the clinical pathway can be appointed officially on written documents so that it is valid as hospital operational standard procedure. As well as considerations in adding nurses' labor related to limited time to improve compliance with the implementation of clinical pathways.

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KNOWLEDGE OF RATIONAL USE OF MEDICINE AMONG NURSING STUDENTS

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ABSTRACT

Introduction: Rational use of medicine (RUM) is critical for achieving therapeutic goals and avoiding unwanted effects. However, irrational medicine use is becoming a severe issue worldwide since it leads to increased medical costs and unwanted effects. Students as prospective professional nurses need to have knowledge that supports the rational use of medicine to ensure rational administration of the medicine for patients. **Methods:** This descriptive research was conducted to identify knowledge of rational use of medicine among nursing students of Faculty of Nursing Universitas Padjadjaran. Quantitative data was collected by asking respondents to fill out questionnaires. A total of 285 respondents had filled out an online research questionnaire (response rate=76.61%). The collected data were analyzed with descriptive analysis (frequency, percentage, and average). **Result:** The results of this study showed that there is some knowledge related to (RUM) which is not appropriate, such as assuming that over the counter medicines are safe to consume with prescribed medicines (53.3%); tablet medicines can be divided to be administered in child patients (57.9%). In addition, almost all respondents considered it unnecessary to be cautious in giving medication to pregnant and lactating mothers (41.1%) and the elderly (40.4%). **Conclusion:** Thus, nursing students are expected to gain RUM knowledge to obtain better RUM attitudes and behaviors in providing nursing interventions.

Keywords: Drug misuse, Knowledge, Rational use of medicine, Safety-based drug, Nursing student.

INTRODUCTION

Medicine has a positive effect in addressing the patient's health problems. Administering the medicine is rationally necessary to achieve therapeutic goals and prevent unwanted effects. Every stakeholder, including government, medicine producers, healthcare staff, and patients, is responsible for implementing rational use of medicines (World Health Organization, 2002). As health care team members, nurses play a crucial role in drug safety (Vaismoradi, Jordan, Vizcaya-Moreno, Friedl, & Glarcher, 2020).

Rational use of medicines (RUM) is crucial in attaining health care quality for patients and the community (Mahmood et al., 2016). RUM uses medicine based on the patient's clinical needs, in the appropriate dose, for the suitable period, and at the lowest possible cost (World Health Organization, 2002). Based on the definition, RUM focuses on four essential aspects, including correct medication, correct dose, correct duration of treatment, and correct cost (Chaudhari, Mali, Dawari, & Nishandar, 2017)

Based on primary health research results (Riskesdas) 2013 showed that 35.2% of families in Indonesia provide medicines for self-treatment. The average of medicines that they keep was almost three kinds of medicines. Among families who provide medicines, 35.7% of them keep dangerous medicines, and 27.8% keep antibiotics. There is 81.9% of family keeps dangerous medicine, and 86.1% of family keeps antibiotics without a prescription. The absence of dangerous medicines and antibiotics for self-treatment indicates irrational medicine use (Ministry of Health of Republic of Indonesia, 2013).

Furthermore, irrational use of medicine is found among consumers and happens in health care facilities and performed by health care workers. The study conducted in one of a public health center in

Bali showed that polypharmacy and excessive antibiotic use were significant issues in the public health center (Dewi, Arimbawa, & Jaelani, 2018).

Irrational use of medicines is becoming a severe problem worldwide as it leads to increased medical costs, waste of resources, unwanted effects such as side effects, and anti-microbial resistance (Sontakke, Budania, Paranjape, & Pharmacology, 2013). According to the World Health Organization (WHO), more than half of drugs worldwide are prescribed, distributed, or sold improperly, and half of the patients fail to take them properly (World Health Organization, 2002). Irrational use of medicines can be a heavy burden for the economies of countries, especially in developing countries (Nayir et al., 2016)

As professional health workers, nurses become an integral part of the National health service. One of the nurse's most fundamental responsibilities is the administration of medicine. Nurses can successfully perform this responsibility by following rational use of medicine (RUM) principles. Rational use of medicines is considered one of the nurses' primary responsibilities in preparing and administering medicines to the patients. Nurses as health workers who do not have sufficient pharmacological knowledge are more likely to deal with mistakes during medicine administration (Ulupinar & Akici, 2015).

Nurses must obtain the necessary competencies in knowledge and skills within the regulatory, professional, legal, and ethical framework regarding the safe prescription, storage, administration, and disposal of medicines (Vaismoradi et al., 2020). Nurses are expected to understand and register the prescribed medicines and monitor patients' reactions. Therefore, nurses must know about the medicine (Aşiret et al., 2013).

To become professional nurses, nursing students as a future generation need to have appropriate and adequate RUM knowledge in administering medication for patients to ensure the rational administration of medicine. So far, nursing students of Universitas Padjadjaran have generally studied pharmacology in tutorial cases. In the meantime, to use the medicine rationally, students need to know the correct dosage, the appropriate period, and at the lowest possible cost.

In addition, various studies have evaluated RUM in health workers and patients. Nevertheless, RUM-related research on nursing students has never been conducted in Indonesia. Therefore, this research was conducted to evaluate the RUM knowledge of nursing students.

METHODS

This research used the descriptive quantitative method. The variable in this study was knowledge of rational use of medicine (RUM) among nursing students. Data collection was conducted by asking the respondents to fill out the research questionnaires that contained standard questions related to the rational use of medicine. The questionnaire was developed and used in a previous study conducted by Sontakke et al. (2013).

The questionnaire was developed to attain data related to several issues concerned with RUM. This questionnaire was initially developed in the English version. Therefore, it was translated into Indonesian. The back-translation process was used to ensure an equivalent content between the original and translated versions of this instrument. Then, Cronbach's alpha coefficient showed the reliability results were 0.74 for the questionnaire. The responses were converted into true and false responses to each statement. The interpretation of "no" was considered an incorrect response. The level of awareness for each statement was mentioned in percentages.

The population in this study was all nursing students of Universitas Padjadjaran. The samples in this study were recruited using purposive sampling techniques by

setting inclusion criteria including students of the Faculty of Nursing Universitas Padjadjaran. They have obtained Medical-surgical Nursing and pharmacological subject. Non-active students were excluded from this study. All participants were approached to ascertain their willingness to participate in the study. Then, the researcher explained to the potential participants the purpose of the study, gained their informed consent and outlined the procedure, risks, benefits, and confidentiality. The participants had the right to refuse to participate in the study or to withdraw at any time without any negative consequences.

A total of 285 respondents had filled out an online research questionnaire with a response rate of 76.61%. Data collection was conducted after obtaining ethics approval from the Research Ethics Commission of Universitas Padjadjaran with the number 1094/UN6. KEP/EC/2019 and research license number 4005/UN6. L/LT/2019 from Faculty of Nursing Universitas Padjadjaran.

The data were analyzed using descriptive statistics. Descriptive statistics were used to describe knowledge of rational use of medicine among nursing students of Faculty of Nursing Universitas Padjadjaran using frequency, percentage, mean, and standard deviation.

RESULTS

Table 1. The target of student participation based on the study program at Faculty of Nursing Universitas Padjadjaran

Program	Total	Minimal Target	Response rate
Undergraduate	236	78	188
Ners program	136	45	97
Total	**372**	**123**	**285**

Based on table 1, we obtained results that 285 respondents from the undergraduate

and Ners program had filled out an online research questionnaire with a response rate of 76.61%. The characteristics of participating students are illustrated in Table 2 below.

Table 2. Characteristics of Active Students of The Faculty of Nursing Program of Universitas Padjadjaran (n=285)

Characteristics of Respondents	Frequency (*f*)	Percentage (%)
Age (range 20-36)	**Mean=21.43**	**SD=1.22**
Gender		
Male	53	18.6
Female	232	81.4
Study Program		
Undergraduate	188	66
Ners program	97	34

Based on Table 2 obtained results, the average age of respondents is 21.43 years (SD=1.22). The majority of respondents (81.4%) were female. 66% of undergraduate students and 34% of professional study students were involved.

Table 3. Overview of knowledge of rational use of medicine (RUM) in students of the Faculty of Nursing Universitas Padjadjaran (n=285)

Knowledge	Yes		No	
	f	%	f	%
Notice about OTC medicines	224	78.6	61	21.4
OTC with prescription medicines	152	53.3	133	46.7
Notice about different names of the same generic content of medicines	202	70.9	83	29.1
Notice the disparity in prices of different brands of the same medicine	249	87.4	36	12.6
Notice about precautions to be followed during online purchase of	178	62.5	107	37.5

Knowledge	Yes		No	
	f	%	f	%
medicines				
Notice about precautions to be taken while using medicines in children	207	72.6	78	27.4
Notice about precautions to be taken while using medicines in pregnant and breastfeeding women	168	58.9	117	41.1
Notice about precautions to be taken while using medicines in elderly	170	59.6	115	40.4
Any tablet can be divided for use in pediatric patients	165	57.9	120	42.1
Notice about expiry period (expiry date) of medicines	258	90.5	27	9.5

Based on Table 3, most respondents have known almost all components of rational use of medicine (RUM). However, some respondents (53.3%) considered that over-the-counter (OTC) medicines were safe to be consumed with prescribed medicines, and 57.9% of respondents realized that medicine for adults could not be broken down into several small parts for pediatric patients (Sontakke et al., 2013).

In addition, almost half of respondents considered it unnecessary to be cautious in giving medication to pregnant and lactating mothers (41.1%) and in prescribing medicine to the elderly (40.4%).

DISCUSSION

This study revealed that most respondents were female with an average age of 21.43 years (SD=1.22). The study conducted by Nayir et al. (2016) also supported that the age range of 18 to 65 has the most significant association with consumption of unprescribed drugs, which is part of rational use of medicine (RUM). Rational medicine is defined as administrating medicine based on patients'

medical requirements, in proper doses, in an adequate period, and at the lowest possible charge for patients and their societies. This definition considers four essential aspects of the RUM: correct medication, correct dose, correct duration of treatment, and correct cost (World Health Organization, 2002).

Rational use of medicines is considered one of the nurses' primary responsibilities in preparing and administering medicines to patients. Nurses as health workers who do not have sufficient pharmacological knowledge are more likely to make mistakes during the practice. Thus, the nurses can effectively accomplish their accountability by administering medicines in agreement with the rational use of medicine. During the medication administration practice, RUM principles consist of taking prescriptions or orders, keeping medicines, administering medicine, recording, monitoring, and managing medicine-waste issues perfectly (Ulupinar & Akici, 2015).

In this study, 66% of respondents were undergraduate students, and 34% of respondents were in the Ners program. Based on the cross-tabulation analysis, undergraduate students in this study have a higher unawareness percentage than Ners program students in most RUM components. Undergraduate students in this study were unaware of most of the RUM components such as knowing over the counter (OTC) medicines (25%); different names of the same generic content of medicines (32,9%); precautions to be followed during online purchase of medicines (40,9%); precautions to be taken while using medicines in children (30,8%), pregnant and breastfeeding women (44,1%), and elderly (45,2%). These results are in line with the study of Burki et al. (2020), which reported that insufficient knowledge of RUM was primarily found among respondents with higher levels of education.

In addition, the result of cross-tabulation in this study revealed that female students in this study have a higher unawareness percentage than male students

in most of the RUM components, such as unaware on using of OTC with prescription medicines (54,3%); precautions to be followed during online purchase of medicines (39,2%); precautions to be taken while using medicines in children (28,4%), pregnant and breastfeeding women (41,4%), and elderly (41,4%) and unaware about expiry period of medicines (9,55). In contrast, other studies reported insufficient knowledge, mainly among men (Burki et al., 2020), and knowledge of drug use was significantly associated with women (Dawood et al., 2017).

With its various methods, education has an important impact in promoting RUM. A previous study also reported that educational intervention resulted in notable development in knowledge about RUM. However, specific training related to RUM has never been conducted to promote knowledge of RUM for the respondents in this study. Nurses are expected to understand and register the prescribed medicines and monitor patients' reactions. Therefore, in addition to medicine administering skills, nurses must know about the medicine, including expected pharmacological effects, potential side effects, essential points in medicine administration, and interactions between medicine-disease, medicine-medicine, and medicine-food (Aşiret et al., 2013).

In the Indonesia Nursing curriculum, pharmacology is generally taught at the beginning of the undergraduate course (Musharyanti, Claramita, Haryanti, & Dwiprahasto, 2019). After finishing the undergraduate program, the Ners program should be pursued by graduate nursing students to earn ners degree and achieve competency as a professional nurse after they pass the General Registrar exam (Herliani, Harun, Setyawati, & Ibrahim, 2018). Ners program is defined as a professional clinical program in a bachelor's degree program, which aims to comprehensively improve students' abilities and attitudes to become professional nurses through the field and clinical learning experiences.

The Professional Nursing Education Program (Ners Program) is part of the nursing education program. The students experience the learning process by undergoing clinical rotation in various health care facilities (Suba & Scruth, 2015). The Ners program is conducted for one year. Students get education and experience as professional nurses in various healthcare facilities such as hospitals, clinics, and public health centers or communities (Herliani et al., 2018).

Previous study found out that high school and university graduates are more likely to perform irrational use of medicine behaviors such as keep one or two boxes of expired medicines, and stopping to take drugs after complaints subside. At the same time, high school and university graduates are also more likely to take medication according to the doctor's advice compared to other groups (Tengilimoğlu, Tekin, Zekioğlu, & Kılıç, 2020).

The increasing case of irrational use of medicine is due to specific reasons that include; ambiguous/false beliefs, insufficient knowledge of the user, prescribing a burden on the doctor, attitudes driven by the advantages of receptors, advertising events by the pharmaceutical industry, and the absence of protocol application by regulatory authorities. Providing education to all concerned in the correct use of medicine is an effective strategy to gain knowledge and solve the problem of the irrational use of medicine (Burki et al., 2020).

The nursing students' knowledge regarding rational use of medicine (RUM) in this study showed that most respondents had known almost all components of rational use of medicine. Nevertheless, as prospective professional nurses, nursing students need to have the correct knowledge regarding all components of RUM. The present study reflected that majority of the respondent (78.6 %) were aware of over-the-counter (OTC) medicine, which is similar to the

study of Mahato and Bajracharya (2020), which showed that 91.2% of the respondents knew the definition of OTC medicines.

Furthermore, a similar study conducted among adults in the community reported that 52.9% of the participants had sufficient awareness of OTC medicines. The evaluation of antibiotic consumption knowledge describes several irrational uses of antibiotics, including correct dose and frequency, low compliance to antibiotic therapy, and drug choice for common symptoms. Most participants stated that common cold and fever as symptoms of viral diseases were mainly cured with antibiotics (Mahato & Bajracharya, 2020).

OTC medicines can be purchased without a physician's prescription (Mahato & Bajracharya, 2020). The previous study's findings reported that the percentage of medicines prescribed by generic was 93.8%, which is less than the requirement that all medicines should be prescribed in generic. More than half of respondents (53.3%) considered over-the-counter (OTC) medicines safe to be consumed with prescribed medicines in this study. Although OTC medicines are relatively harmless, their inappropriate use can impact serious problems. Therefore, using various media and rational medicine awareness programs is essential for community health (Mahato & Bajracharya, 2020).

Moreover, although some OTC medicines cannot be consumed with prescribed medications, this is not generally acceptable, especially in a country where almost all medicines can be obtained without a prescription. Indonesia is relatively easy to purchase any medicine with or without prescription as a developing country. Limited access to medical information, low drug monitoring system, high cost of health care, unwealthy, availability, unclear laws, and regulations are the essential factors of people to get OTC medicine quickly (Mahato & Bajracharya, 2020)

Nurses need to know that taking the medication without a prescription is not safe, especially if the patient is already treated with some prescription medicines. Therefore, medicines can only be used after consultation with a doctor (Sontakke et al., 2013). In accordance, nursing students must have sufficient competence related to drug safety before working in the actual care situation, especially during clinical rotation. Nurses are the health professionals who spend most of their time with patients. Nurses have an essential role in providing safe medication. The nurses' role begins with patient assessment, medication preparation, and administration (Musharyanti et al., 2019).

Other related knowledge of RUM resulted in this study where 70.9% of respondents realized that similar content in generic medicines is available under different names. These results showed that nursing students' awareness regarding generic and branded medicine was quite satisfying. Even though there were still 29.1 % of nursing students who ignored it. However, a previous study reported that a third of Fresh Bachelor of Medicine and Bachelor of Surgery graduates (FMGs) did not know the same general quality as branded drugs, and they considered them inferior to branded drugs (Chaudhari et al., 2017)

Various brands for the same pharmaceutical product are available, leading to further confusion among users. Generic drugs are medicine manufactured by a factor other than an original innovator company that holds patents for certain pharmaceutical products. Generic drugs are equally efficacious as branded drugs. Thus, the drug regulatory body suppresses receptors to prescribe generic drugs (Chaudhari et al., 2017).

A generic drug has similar active ingredients as the original products produced under patent, with similar dose, route of administration, and concentration. As an innovator product, generic drugs must have similar bioequivalence, quality, performance, and use intended for the same disease conditions. The name of the drug, appearance, and packaging may differ from

the original research products under brand names. Generally, generic drugs must be traded under the material's name (Bhattacharyya, 2019).

The study results conducted in Public Health Center, Kuta district, showed that 85.91% of generic drug prescribing still has 14.09 % of branded generic prescriptions. Branded generic medicine is a drug with the name trade containing active substances with composition, strength, form, route administration, and indication similar to the generic drug approved originators in Indonesia. Moreover, the study also reported that the percentage of antibiotic prescribing for non-Pneumonia ISPA was 29,94%, and 23,84% for non-specific diarrhea (Dewi et al., 2018)

Furthermore, 87.4% of respondents are concerned about variations in prices of different brands of the same medicine. The unbranded generics that are supposed to be cheaper should be traded and prescribed by the name of the active ingredients. The use of generic products is necessary to promote effectiveness in the cost of treatment and to optimize access to healthcare services. The high price of branded medicine is because of the high costs for research and development, clinical and marketing for the drug during the patents. After this exclusive rights period expires, companies will lower the prices with generic names (Bhattacharyya, 2019). The consideration related to price is part of essential aspects of the RUM where administering the medication should consider the correct cost (World Health Organization, 2002).

Another result of this study also presents that 62.5% of respondents realized awareness during online purchase of Medicines. Nowadays, purchasing drugs over the Internet is also a common practice. More and more people are buying drugs online because of the ease and convenience of this platform. However, regulations among countries related to online purchase medicine are varied. Drugs that can only be accessed on prescription in one country can be purchased online from other circumstances where different drug regulations (Sumaila & Tabong, 2018).

There are two different sources for buying all kinds of drugs on the Internet. One is the dark web, and the other is a freely accessible surface web, which can be accessed through search engines such as Google or Yahoo. That buyers do not always realize the need to buy drugs online. For example, buyers don't always know if a prescription is needed or not and what type of website is allowed. Therefore, it is crucial to promote online customers' awareness of the potential risks by offering alternatives reliable websites and to protect them from these grey market problems (Koenraadt, van de Ven, & Policy, 2018).

Moreover, 72.6% of respondents realized awareness in administering medicines for children. More accessible drugs for children in the community could contribute to drug misuse, cause wasting of resources, and develop resistance to antibiotics. Antipyretics were the most commonly used drugs for self-treatment. It was reported that 5% of the children consumed unidentified crushed medicines mixed and crushed by the health worker and administered by the caregiver in powder form. This way of administering medicine is not clear on estimating the dose (Kalyango et al., 2012).

The previous study conducted among children with upper respiratory tract infections (URTIs) revealed that the patients received the average number of drugs was 3.1, higher than the WHO standard, requiring only one or two medicines prescribed per patient encounter. Out of the 142 URTIs diagnosed with the common cold, 77.4% were given antibiotics, and 68.9% of children under five received antibiotics. Although this condition is mainly because of viral infection and the use of antibiotics is inappropriate. Therefore, it is suggested that children with common cold should be managed with nasal decongestant, antihistamine, and zinc as this helps relieve symptoms leading to spontaneous recovery.

Other knowledge related to RUM that is still unclear is that some respondents divided adult tablets for child patients. Tablets cannot be broken down into parts for pediatric patients because a tablet medicine that breaks before use can lose effectiveness. The role of nursing students as prospective professional nurses is to provide health education for patients and the community related to RUM, especially not breakdown adult medicine into several small parts for children (Sontakke et al., 2013).

In addition, some respondents considered that unnecessary to be cautious in giving medication to pregnant and lactating mothers (41.1%) and the elderly (40.4%). Pregnant and lactating mothers and the elderly are among the groups most likely to get side effects from certain medications. Physiological changes during pregnancy result in pharmacokinetic and pharmacodynamic changes in pregnant women.

Meanwhile, in the elderly, there is a physiological aging process that requires attention in the administration of medicines to prevent the risk of adverse reactions. Due to lengthening lifespan, there is a rise in the number of older persons suffering from chronic diseases like cancer, diabetes, cardiovascular disorders, and chronic lung diseases. The higher frequency of chronic diseases requires pharmacological treatment and causes older persons to consume more medicine. Therefore, the elderly population is subscribed to many drugs. Polypharmacy is a common health problem at older ages. Polypharmacy is a combination of five or more drugs or administering more medicine than necessary or at least one unnecessary medicine in treatment. Polypharmacy increases the risk of side effects, complications, and maladaptation.

In a previous study on the irrational use of medicines among the elderly in Sweden, Morin et al. reported that 38% of the elderly are exposed to irrational medicine use (Morin, Fastbom, Laroche, & Johnell, 2015). In a study on potentially inappropriate medicines in India, Kanagasanthosh et al. found inappropriate medicines among approximately 18.34 % of the elderly population (Kanagasanthosh, Topno, & Aravindkumar, 2015). Polypharmacy was common as prescriptions with five to six medicines per patient encounter was found. Some prescribers are not following the WHO or International Network for Rational Use of Drugs (INRUD) requirement of prescribing medicines in their generic and from the essential medicine list of the country

The main reason for the irrational use of medicine is lack of information, confusion, inadequate education and training of medical professionals, and communication between patients and fewer health professionals (Asfaan, 2014). Therefore, nursing students' knowledge of RUM in all components needs to be improved. Lack of knowledge of side effects and interactions of medicine can lead to iatrogenic diseases resulting in increased hospitalization rates and loss of resources (Dakhale, Pimpalkhute, Bajait, & Raghute, 2016).

This study also presents that 90.5% of respondents realized the expiry date of medicines. The expiration date was defined as the end day set by the manufacturer to guarantee the full effect and safety of a medication. Drug expiration dates are shown on most medication labels, including prescription, over-the-counter (OTC), and dietary (herbal) supplements. Loss of efficacy can be a vital health concern, especially when treating an infection with an antibiotic (Gikonyo, Gikonyo, Luvayo, & Ponoth, 2019). Based on a study conducted in Turkey in assessing the attitudes and behaviors of nurses using medicines rationally was revealed that 82.9% of nurses always follow the date of expiration of medicines (Uzuntarla & Cihangiroğlu, 2016).

Based on the results of previous researches, there are some methods to gain knowledge on the rational use of medication among nursing students. Shah et al. (2019) reported that using media approaches such

as TV programs, printed/internet news, radio, etc., was an effective way to disseminate the rational use of medicine to all medical and non-medical university students. In addition, the use of a simulated patient in a course on the rational use of medication proved effective to gain knowledge and skills and received positive feedback from the students to be used as a teaching method of the rational use of medication-related frequent pharmaceutical applications, dosage calculations, observation of adverse side effects and patient training (Unver et al., 2013).

The vast number of the sample becomes the strength of this study. However, the limitation of this study is the results that may have restricted the generalization. Although the sample reached 33% respondents from a population with the minimum acceptable response rates for online or web surveys, there was a bias in selecting the subjects since their participation was voluntary. Other students who have irrational use of medication may not have participated. Moreover, this study was only conducted in one set area that may have a different condition with nursing students in other institutions.

CONCLUSION

This study showed some knowledge related to RUM that is not appropriate such as assuming that over-the-counter medicines are safe to consume with prescribed medicine, tablet medicines can be divided to be administered in child patients. In addition, almost some respondents considered it unnecessary to be cautious in giving medication to pregnant and lactating mothers and the elderly. The results of this study can provide a positive reflection for nursing education. Moreover, it is recommended that media approaches, such as TV programs, printed/internet news, radio, and others, could effectively publicize knowledge on the rational use of medicine to all university students, both medical and non-medical students.

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THE RELATIONSHIP OF HYPERTENSION, GENETIC AND DEGREE OF SMOKING WITH THE INCIDENCE OF COPD AT HAJI PUBLIC HOSPITAL SURABAYA

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ABSTRACT

Introduction: Chronic Obstructive Pulmonary Disease (COPD) is a limitation of the inflow and outflow of air caused by inflammation of the inhaled toxin. The incidence of COPD continues to increase every year, and is predicted to be the highest cause of death in the next 10 years. This study aimed to analyze risk factors for the history of hypertension, genetic, and smoking degree with COPD in patients at Haji Public Hospital Surabaya 2019. **Methods:** This type of research used analytic observational research with a case-control research design. The research sample used simple random sampling. Variables used include hypertension history, smoking degree, and genetic. **Result:** The results of the Chi-Square statistical analysis were male sex at risk with COPD (OR: 14.7; 95% CI: 6.28-34.5); Age> 40 years at risk with COPD (Odds Ratio (OR): 116.8; 95% CI: 15.2-898.4; history of hypertension at risk with COPD (Odds Ratio (OR): 2,512; 95% CI: 1.99-3.16; smoking degree at risk with COPD (high degree OR: 60.95; 95% CI: 7.65-470.3; moderate degree OR: 31.3; 95% CI: 3.85-254.6; low degree OR: 6.1; 95% CI: 1.45-25.6) and smoking behavior (OR: 21.9; 95% CI: 7.71-62.271). **Conclusion:** It can be concluded that the variables which are risk factors for COPD are male sex, age> 40 years, history of hypertension, smoking behavior and degree of smoking. Recommendations based on the results of this study are expected that the community can be familiarized with a clean and healthy lifestyle so that the incidence of COPD can be reduced.

Keywords : COPD, genetic, hypertension, male, smoking degree

INTRODUCTION

Chronic obstructive pulmonary disease is a chronic disease that attacks the lungs. Obstructive pulmonary disease is a limitation of the flow of air that enters through the respiratory system caused by air pollution or inflammation of the toxin that attacks the respiratory system. The prevalence of COPD according to The Burden of Lung Disease is 10.1% in the world with sufferers over 40 years of age and among them 7.6% COPD, 6.6% Chronic bronchitis, and 1.8% emphysema (Halbert, et al., 2006). According to Robert Wise, COPD is predicted to be the third leading cause of death by 2030. This is based on the number of deaths and morbidity caused by COPD. COPD can cause as many as 3.2 million deaths in the world in 2015. This chronic disease is more in countries with lower middle income. The increase in COPD incidence is also followed by an increasing number of smokers throughout the world, especially in developing countries (Wise, 2018).

Indonesia is a developing country, based on basic health research in 2013, the prevalence of COPD in Indonesia as much as 9.2 million people or equivalent to 3.7% (Ministry of Health of the Republic of Indonesia, 2013). Based on GATS Indonesia or The Global Adult Tobacco Survey Indonesia in 2018, COPD in Indonesia is among the fifth largest causes of death caused by exposure to cigarette smoke (WHO, 2019). In addition, smokers are not only active smokers, but also passive smokers. Based on the report of The Global Adult Tobacco Survey in 2011 as many as 51.3% (14.6 million) were exposed to tobacco smoke in the workplace in adults. As many as 78.4%

(1333.33 million) were exposed to tobacco smoke at home. As many as 85.4% of adults are exposed to tobacco smoke in restaurants. Based on the report of the Data and Information Center of the Ministry of Health of the Republic of Indonesia, the number of smokers in Indonesia continues to increase, in 2015 smokers with more than 15 years of age amounted to 22.57% in urban areas and 25.05% smokers in rural areas (Ministry of Health data and information center, 2014). Several previous studies explained some of the risk factors for COPD, including the 2017 Ying Yang study, those risk factors are male sex (OR = 1,467; 95% CI: 1,097-1.96), history of respiratory disease (OR = 2,068; 95% CI: 1.466-2.918), allergy history (OR = 1.791; 1.15-2.78), respiratory infection during childhood (OR = 2,695; 95% CI: 1,504-4.8) and living around polluted areas (OR = 1,631; 95% CI: 1.2-2.2) (Yang, et al., 2017). Some previous studies also regarding the risk of COPD, namely the study of Magitta, Walker, etc. in 2018 with COPD research in Tanzania, showed that risk factors for COPD include male sex, smoking, history of TB and air pollution (Magitta, et al., 2018).

Based on WHO, the risk factors of COPD are divided into 3 namely common modifiable risk factors (unhealthy diet, physical inactivity, tobacco use, outdoor air pollution, allergens) and Intermediate risk factors (raised blood pressure, raised blood glucose and overweight). This is reinforced by the 2019 GOLD (Global Initiative for Chronic Obstructive Lung Disease) report, with an intermediate risk factor, Hypertension. Risk factors for COPD according to the Ministry of Health of the Republic of Indonesia include smoking, alpha antitrypsin deficiency, bronchial hyperactivity and a history of recurrent respiratory infections (Ministry of Health data and information center,2014)

Researchers consider it important to examine the relationship of hypertension history, because of the lack of research on the history of hypertension with COPD.

Although genetic research and cigarette exposure have been carried out, the results of several previous studies are different. This study aimed to analyze the risk factors for history of hypertension, genetic, and smoking degree with COPD in patients at Hajj Public Hospital Surabaya 2019.

METHODS

This research was analytic observational research which means research with no treatment, but only observing the subject. The research design used in this study was case control, which is a research design that seeks a relationship between exposure to disease by comparing between case and control groups. The location of the study was conducted in one of the type B hospitals belonging to the province of East Java, Indonesia, namely Haji General Hospital Surabaya, Indonesia.
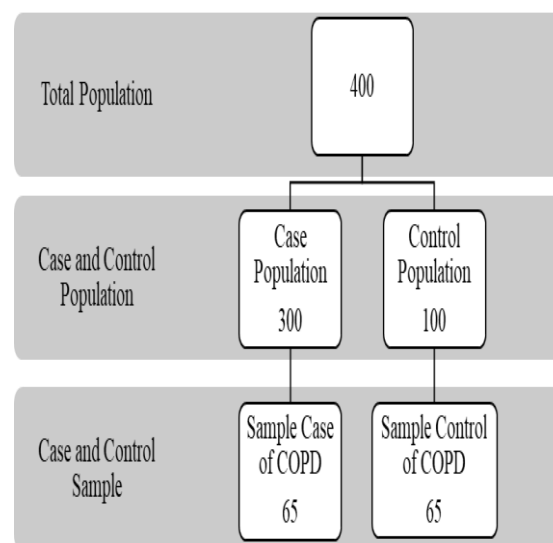

Figure 1. Case-control sampling

The research sample used simple random sampling. The case sample in this study was COPD patients who seek treatment at inpatient and outpatient installations at Surabaya Haji Hospital in 2019.The control sample in this study were visitors who had no history and were not sufferers of COPD at Haji Hospital

Surabaya in 2019. Based on the calculations using a case control hypothesis test sample, 65 respondents were obtained. This showed that the total sample of this study was 130 respondentsThe variables in this study were divided into 2 namely dependent and independent. The dependent variable in this study was the incidence of COPD, the collection of data through interviews and secondary data using medical records, while the independent variables in this study were the characteristics of the respondent (age, and gender), history of hypertension, genetics, and degree of smoking, The collection of data through interviews and collection of hypertension history data through medical records. The sampling technique used in this study was simple random sampling. Data collection techniques in this study used a questionnaire instrument. The questionnaire used was a research questionnaire "Burden of Cigarette Diseases in East Java in 2019" which had passed the validation process. Primary data collection, data collection is also carried out with secondary data taken from medical records. When the research was conducted in August - September 2019. The data analysis technique used was univariable and bivariable analysis. The research protocol was submitted to the Ethical Review Committee and got approval the number of 0727 / KEPK / X / 2018.

RESULTS
Description based on Respondent Characteristics

Table 1 illustrates the variable frequency distribution of research respondents. Gender frequency distribution is more in the female category with a total of 52.3% (68 respondents), while in the male category it is 47.7% (62 respondents). The age group of research respondents was more in the> 40 years category with a total of 66.9% (87 respondents), while in the <40 years category it was 33.1% (43 respondents).

Table 1. Frequency Distribution of Respondents' Characteristics at RSU Haji Surabaya 2019

Variable	Frequency (n)	Percentage (%)
Gender		
Male	62	47.7
Female	68	52.3
Age Group		
>40	87	66.9
<40	43	33.1
Hypertension History	22	16.9
Hypertension	108	83.1
Normal		
Genetic	27	20.8
Genetic	103	79.2
No Genetic		
Smoking	47	36.2
Smoking	83	63.8
No Smoking		
Smoking Degree	16	12.3
High	11	8.5
Moderate	20	15.4
Low	83	63.8
No Smoking		
Total	130	100

Distribution of hypertension history among respondents, 16.9% (22 respondents) had a history of hypertension, and 83.1% (108 respondents) had normal blood pressure. Respondents who had a family history of COPD were 20.8% (27 respondents), while respondents who did not have a COPD family history were 79.2% (103 respondents). Respondents who smoked were 36.2% (47 respondents) while non-smokers were 63.8% (83 respondents) and had different degrees of smoking such as respondents who have a high smoking degree of 12.3% (16 respondents), respondents who have a moderate smoking degree of 8.5% (11 respondents), and respondents who have a low smoking degree of 15.4% (20 respondents).

The Relationship of Respondents Characteristic with COPD Incidence at RSU Haji Surabaya

Characteristics of respondents in this study were divided into 2 namely age group and gender. The age group is divided into 2 namely the age group> 40 years and the age group <40 years. The sexes are divided into 2 namely women and men

Table 2. Relationship of Respondent Characteristics with COPD in Surabaya Haji Hospital 2019

Variable	COPD				p	OR	95%CI	
	Yes		No				Lower	Upper
	N	%	N	%				
Age group								
>40 years old	64	49.2	23	17.3	0.00	116.8	15.2	898.4
<40 years old	1	0.76	42	32.3				
Gender								
Male	50	38.4	12	9.2	0.00	14.7	6.281	34.5
Female	15	11.5	53	40.7				

Table 2 shows that there were 64 people (49.2%) who were in the> 40 years age group and had COPD. A total of 1 person (0.76%) included in the age group <40 years and had COPD. A total of 23 respondents (17.3%) were in the> 40 years age group and did not experience COPD, while 42 respondents (32.3%) were <40 years old and did not have COPD.

Table 2 also shows that there were 50 people (38.4%) male and had COPD, whereas as many as 15 people (11.5%) were women and had COPD. A total of 12 people (9.2%) were men and did not have COPD, while 53 were women and did not have COPD.

Based on statistical analysis using Chi-square obtained results that gender has a relationship with COPD incidence, this is evidenced by p-value = 0.00 and Odds Ratio (OR) = 14.7 and these results also indicated that age groups have a relationship with COPD incidence, this evidenced by the p-value = 0.00 and Odds Ratio (OR) = 116.8. The OR value means that the age group> 40 years has a risk of 116.8 times greater COPD than the age group <40 years. In addition, men have a 14.7 greater risk of developing COPD than women.

Relationship of Hypertension History with COPD Incident in Surabaya Haji Hospital 2019

Historical hypertension data were obtained by interview and medical record. Hypertension is often associated with several other non-communicable diseases like CVD, stroke, and COPD. The following are the results of a statistical analysis of the history of hypertension with COPD:

Table 3. Relationship History of Hypertension with the incidence of COPD in Surabaya Haji Hospital 2019

Variable	COPD				p	O R
	Yes		No			
	n	%	n	%		
Hypertension History						
Hypertension	2 2	16. 9	0	0	0.0 0	2. 5
Normal	4 3	33	6 5	5 0		
95% CI = 1.99 -3.16						

Table 3 shows 22 people (16.9%) had a history of hypertension and had COPD. As many as 43 people (33%) did not

have a history of hypertension and had COPD. A total of 65 people (50%) did not have a history of hypertension and did not have COPD and 0% had a history of hypertension and had COPD.

Based on statistical analysis using Chi-square, the results show that the history of hypertension has a significant relationship with the incidence of COPD, this is evidenced by the p-value = 0.00 and Odds Ratio (OR) = 2.5. The OR value means that someone who has a history of hypertension has a 2.5 times greater risk of developing COPD than those who have normal blood pressure.

Relationship between Genetic and COPD in Haji Hospital Surabaya in 2019

Genetic history is often associated with COPD incidence. This is related to the lack of antitrypsin-alpha-1. In this study, family history data were obtained from questionnaire instruments. The following are the results of genetic statistical analysis with COPD:

Table 4. Relationship between Genetic and COPD in Haji Hospital Surabaya in 2019

Variable	COPD				*p*	OR
	Yes		No			
	N	%	N	%		
Genetic						
Genetic	1	13.	9	6.	0.05	2.3
No	8	8	5	9	2	
Genetic	4	36.	6	43		
	7	1				
			95%CI= 0.979 - 5.798			

Table 4 shows that there were 18 people (13.8%) who had a family history of COPD and had COPD, whereas those who did not have a family history, but experienced COPD as many as 47 people (36.1%). A total of 9 people (6.92%) had a family history, but did not have COPD, while those who had no family history of COPD and did not have COPD as many as 56 people (43.07%).

Based on statistical analysis, it can be seen in Table 4 that p-value = 0.052 and Odds Ratio (OR) = 2.3. This shows that there is no relationship between family history and the incidence of COPD in Surabaya Hajj General Hospital in 2019. Family history is also not at risk for COPD.

The Relationship between Smoking Behavior and the Degree of Smoking with the Incidence of COPD in Surabaya Hajj General Hospital in 2019

Smoking behavior is often cited as a major risk factor for COPD in the world. In this study, not only looked at smoking behavior or not, but also looked at smoking rates by someone with COPD at the Hajj general hospital in Surabaya.

The Brinkman Index is a way to measure a person's smoking level. The Brinkman Index is calculated by multiplying the average number of cigarettes consumed a day and smoking length in a number of years. The measurement results from the Brinkman Index (IB) are high, if the calculation result is more than 600. It is classified as moderate if the calculation result is 200 to 600 and classified as light smoking if less than 200.

Table 5 shows that there were 42 people (32.3%) who had smoking behavior and experienced COPD, while those who did not have smoking behavior, but had COPD as many as 23 people 17.6%). Five people (3.84%) had smoking but did not have COPD, while 60 people did not have smoking and did not have COPD (46.15%).

Table 5. The Relationship between Smoking Behavior and the Degree of Smoking with COPD
in Surabaya Haji Hospital in 2019

Variable	COPD				p	OR	95%CI	
	Yes		No					
	N	%	N	%			Lower	Upper
Smoking								
Smoking	42	32.3	5	3.84	0.00	21.9	7.71	62.271
No Smoking	23	17.6	60	46.15				
Smoking Degree								
High	15	11.5	1	0.76	0.00	60	7.65	470.3
Moderate	10	7.7	1	0.76		31.3	3.85	254.6
Low	17	15.3	3	2.3		6.1	1.45	25.6
No Smoking	23	13	60	46.15				

The degree of smoking was high and 15 people experienced COPD (11.5%), while those who had a high degree of smoking but did not have COPD were only 1 person (0.76%). There were 10 people (7.7%) who had moderate degrees of smoking and those who had COPD, while those who had moderate smoking but did not have COPD only 1 person (0.76%). The degree of smoking was low and experiencing COPD were as many as 17 people (15.3%), while those with low smoking degrees, but not experiencing COPD were only 3 people (2.3%). Based on statistical analysis, it can be seen in Table 5 that p-value = 0.00 in both variables and Odds Ratio (OR) = 21.9 in smoking behavior. 21.9 times the risk of having COPD compared to nonsmokers.

DISCUSSION
Relationship of Respondent Characteristics with COPD at Surabaya Haji Hospital

Risk factors that often fall into the non-modifiable risk category are gender and age. Based on the Global Initiative for Chronic Obstructive Lung Disease, illustrating that age reflects the amount of cumulative toxin inhalation exposure, and this is followed by a decrease in lung function due to aging. Airways and aging parenchyma will occur structural changes associated with COPD vulnerability in old age (GOLD, 2019).

Most studies reportED that COPD prevalence and death is greater in men than women, although recent studies in developed countries have reported that COPD prevalence is almost the same in men and women. This is caused by changes in tobacco smoking patterns in women that are increasing in developed countries. In Indonesia, active smokers still constitute the majority of the male group, according to the Global Adult Tobacco Survey (GATS) report in Indonesia that around 36.1% of Indonesians smoke, as many as 67.4% of them are men and 4, 5% of them are women (WHO; Indonesian Ministry of Health; CDC Foundation, 2012). This reinforces the results of this study, that male sex is one of the risks of COPD in Indonesia.

This study shows that age and sex have a relationship with COPD. This variable is a variable that cannot be modified, so more preventive measures to maintain life to stay healthy by implementing a clean and healthy lifestyle. This study shows that male sex and <40 years are at risk of developing COPD. This is in accordance with several previous studies, such as the 2018 Safitri study in a hospital in Blitar, Indonesia (Safitri, 2018). In addition, besides Winda, this is also consistent with Ying Yang's research in China in 2017, that male sex and> 40 years old have a risk of COPD (Yang et al., 2017). This happens because men use more tobacco in men and age> 40 years are also

at risk due to decreased lung function so that it is less than optimal (WHO, 2013).

Relationship of Hypertension History with COPD at Haji Hospital Surabaya

Hypertension is one of the main risks of CVD and is an important contributor to poor prognosis and mortality in COPD. History of hypertension has a relationship with COPD in this study with (p-value = 0.00) and has a risk of 2.5 times and in this study hypertension history is not a modifiable risk or a risk that cannot be modified, but a history of hypertension is a medium risk which will worsen the COPD prognosis and some cases can accelerate the onset of COPD. Previous studies examining the risk of a history of hypertension with COPD are the Soon-Hye study with colleagues in 2017 with an Odds Ratio (OR): 1.7; 95% CI: 1.37-2.13; p = 0.001. The presence of hypertension is also associated with the main risk factor for COPD, namely smoking behavior. Aside from being just a disease, COPD produces restrictions on air flow, COPD can be a systemic disease that can affect the cardiovascular system and autonomic nerves (Kim et al., 2017).

Someone who has a history of hypertension will be at risk for several other diseases. Based on the Global Initiative for Chronic Obstructive Lung Disease in 2019, hypertension is perhaps the most common comorbidity in COPD patients. Hypertension can also have implications for COPD prognosis. Diastolic dysfunction due to hypertension can be associated with sports intolerance that has been treated optimally. Hypertension is also a symptom associated with acute exacerbation, which triggers hospitalization in COPD (GOLD, 2019).

A person who has hypertension and COPD does not have a different treatment from COPD patients who do not have hypertension, because hypertension is treated according to the usual hypertension guidelines. The role of treatment with beta-blockers is less prominent in current hypertension guidelines, and there is no evidence that patients with COPD increase the risk of cardiovascular beta-blockers to either reduce the benefits of treatment with LABA or increase cardiovascular risk. (GOLD, 2019).

COPD with hypertension also cannot be separated from one of the main factors of COPD which is smoking. Smoking can cause hypertension, and hypertension can worsen COPD. COPD patients who have hypertension will be associated with a poor prognosis and can develop into right-sided heart failure (Imaizumi, 2015). Based on this study, hypertension in COPD patients is caused by loss of alveolar remodeling of the pulmonary vessels by chronic hypoxia and inflammation, decreased levels of endothelial vasodilators such as nitric oxide, vasospasm and so on. This change is also seen in COPD patients who do not have hypertension or normal blood pressure with normal pulmonary function and endothelial dysfunction from smoking behavior as an alleged main cause or a great risk in developing pulmonary hypertension in COPD patients (Imaizumi, 2015).

The Relationship between Genetic with the Incidence of COPD in Surabaya Hajj General Hospital in 2019

A significant family history risk of limited air flow has been observed in people who smoke, all smokers and siblings of patients with severe COPD, suggesting that 49 shows that genetics along with environmental factors can influence this vulnerability. Single genes, such as matrix encoding matrix metalloproteinase 12 (MMP-12) and glutathione S-transferase have been linked to risk and decreased lung function (GOLD, 2019). This has been confirmed by several previous studies. One of them is the Brashiel study, which stated that there are substantial steps that have been neglected to have an impact on the understanding of COPD genetics in the last 50 years especially on epidemiology, that a small number of smokers develop COPD,

while others have a similar number of undeveloped smoking history (Brashier & Kodgule, 2012).

Based on Brashier's research, it was shown that a severe genetic risk factor identified was the SERPINA1 gene that had encoded the serine protease inhibitor, alpha-1 antitrypsin (AAT). Disorders of the SERPINA1 gene cause AAT-1 deficiency. This causes the absence of protection of respiratory organs resulting in emphysema. M allele emphysema is associated with normal AAT while Z allele is often associated with AAT-1 deficiency emphysema. This occurs in only about 1-2% of the population that shows anomalies in SERPINA1. This shows that there are many other genetic variations that can cause the development of COPD. This results in an understanding that COPD is a polygenic disease that involves complex interactions between various polymorphic genes. Studies have examined many genes that have been linked to COPD, but these tend to be lacking (Brashier & Kodgule, 2012).

Some other studies are Yang's research from China, which links genetics with COPD. This shows that genetics is one of the risk factors for COPD incidence in China with (OR = 2,068; 95% CI: 1,466 - 2,918) (Yang et al., 2017). Although research on genetics with COPD is very rare and this study shows that genetics has no relationship and is not a risk factor for COPD at Hajj General Hospital in 2019 with an Odds ratio (OR): 2.38; 95% Confidence Interval (CI): 0.979 - 5.798. This is reinforced by the statement from the Global Initiative for Chronic Obstructive Pulmonary Disease (EMAS) that the best genetic risk factor is severe hereditary alpha-1 alitrypsin deficiency, and this is only relevant to a small part of the world population. It also illustrates that interactions between genes and environmental exposure that affect a person occur COPD (GOLD, 2019).

The Relationship between Smoking Behavior and the Degree of Smoking with the Incidence of COPD in Surabaya Hajj General Hospital in 2019

In general, smoking behavior is a major risk factor for COPD incidence worldwide. Although it is not only smoking behavior that can cause COPD and there is significant evidence regarding epidemiological studies that non-smokers can also cause limited air flow and chronic entry. However, compared to smokers with COPD, never smoking with chronic inflow and outflow has fewer symptoms, is mild disease and has a lower burden of systemic inflammation. People who have never smoked with chronic limited air flow do not seem to have an increased risk of lung or cardiovascular cancer. However, there is evidence that nonsmokers with COPD have an increased risk of pneumonia and death due to respiratory failure (GOLD, 2019).

Some longitudinal studies of COPD have followed groups and populations for up to 20 years, to date there have been no studies that monitor the progress of the disease through its entire course, or include pre and perinatal periods that will shape the future of the individual. Thus, an understanding of current COPD risk factors is in many cases incomplete resulting from complex interactions between genes and the environment. Smoking is a major environmental risk factor for COPD, but even less than 50% of the development of COPD over a patient's lifetime. That's because there are other risk factors involved (GOLD, 2019).

Based on Yang's research, et al., Showed that smokers have a higher prevalence of respiratory symptoms and lung function, abnormalities, a greater annual FEV1 reduction rate and a greater COPD mortality rate than nonsmokers. This is supported by statistical analysis in the study of Yang et al. The risk of COPD is higher for smokers than nonsmokers (OR: 2,092, 95% CI: 1,707-2,565). based on this, smoking cessation should be advocated as a key step and important

intervention to prevent COPD (Yang et al., 2017). Smoking can also cause emphysema or as a risk factor for emphysema. Continual exposure to secondhand smoke causes an increase in pulmonary macrophages in the matrix metalloproteinase (MMP). Types of MMP 9 and 12 can inhibit endogenous ant proteinases (alpha-1 antitrypsin) and degradation of pulmonary matrix molecules that play an important role in the defense of lung integrity (Oktaria et al., 2017). Smoking is a major factor in COPD, smoking can interfere with ciliary movements and inhibit the function of alveolar macrophages, besides smoking can also cause hypertrophy and hypersecretion of the mucous glands and continuous exposure can cause lung damage (Oktaria et al., 2017).

The exposure to inhalation which is a risk of COPD, smoking is the risk that has the greatest relationship in several countries. However, only about 15% of smokers who have COPD appear clinically and have a history of exposure of 40 years or more. Smokers with pre-existing airway reactivity (defined by increased sensitivity to inhaled metacholine) even without clinical asthma, have a higher risk of developing COPD than nonsmokers. Other risk factors include low body weight, respiratory distress in childhood, and exposure to passive cigarette smoke, air pollution, and work dust or inhaled chemicals that have contributed to the risk of COPD, but the risk of inhalation exposure which contributes most is smoking (Wise, 2018).

Inhalation exposure can trigger an inflammatory response in the respiratory tract, especially in alveoli which can cause disease in genetically susceptible people. This process is usually mediated by an increase in protease activity and a decrease in antiprotease activity. Lung proteins such as neutrophil elastase, matrix metalloproteinases and cathepsin, break down elastin and connective tissue in the normal process of tissue repair. Under normal circumstances, protease activity will be balanced with antiprotease. In COPD patients, activated neutrophils and other inflammatory cells release proteases as part of the inflammatory process. The activation of neutrophils and macrophages also leads to the accumulation of free radicals, such as superoxide anions and hydrogen peroxide, which inhibit antiproteases. This can cause bronchoconstriction, mucosal edema, and mucosal hypersecretion. COPD inflammation increases with increasing disease severity and followed by a history of severe illness, inflammation does not completely heal despite stopping smoking (Wise, 2018).

Previous studies throughout the world have shown a higher smoking prevalence among COPD patients compared to nonsmokers, and in people who smoke younger they are exposed to COPD than nonsmokers. One interesting indicator is when lung function and mobility / endurance are relatively unaffected in COPD patients who continue to smoke, have risks because of their younger age or shorter smoking times. At the time of diagnosis, more intensive education must be given to COPD patients, not only regarding inhalation, but also about the results and systemic effects and the importance of stopping smoking and avoiding exposure to cigarette smoke is an effective way to prevent COPD (Karadogan, et al., 2018).

Smoking behavior from person to person is different, this is distinguished by the level of smoking. Smoking rates can be calculated with an index called the Brinkman Index (IB). The Brinkman Index is a doubling between the number of cigarettes smoked per day and the length of smoking a year. The Brinkman Index (IB) classification results are mild with a score of 0-200, moderate with a score of 200-600, and high with a score of more than 600 (Naser, et al., 2016). Based on the results of this study, the degree of smoking has a relationship with COPD which has a value

of p = 0.00 and those who have high smoking rates are 16 respondents, of which 15 respondents are exposed to COPD. The smoking rate is moderate as many as 11 respondents, 10 of them affected by COPD. Low smoking rates of at least 20 respondents, 17 of whom have COPD. This can be the basis for creating non-communicable diseases prevention programs, especially COPD. Not smoking or stop smoking is an effective prevention for COPD or other non-communicable diseases. A person who tries not to smoke and quit smoking must be supported in his efforts with motivational counseling and also supported by government policies on tobacco control (Karadogan et al., 2018).

Smoking behavior is a major risk factor for COPD, however, there are a number of studies that do not show smoking behavior with COPD and more research shows that there is a relationship between smoking behavior and COPD as in the Safitri 2018 study, smoking behavior (OR: 4.09; 95% CI : 1.34-12.4) (Safitri, 2018). Based on the results presented, this study shows that there is a significant relationship between smoking behavior and COPD (OR: 21.9; 95% CI: 7.71 - 62.271). Smoking is the main cause because in cigarettes there are chemical compounds such as nicotine, tar, and CO that can damage the respiratory organs, especially the lungs (GOLD, 2019). In addition to smoking behavior, smoking rates using the Brinkman index also have a relationship with COPD (p = 0.00). This is reinforced by supportive research, namely Naser, Irvan, Erly's research in 2016 showed that there is a relationship between smoking rates and COPD (Naser et al., 2016). This is supported by the literature which stated that the higher the level of smoking a person will be at increased risk of COPD because the higher the smoking rate the more accumulation of inflammatory toxins that enter the body (GOLD, 2019).

This study has several limitations, obtaining a history of hypertension through medical records and not obtaining information about the severity of COPD due to biased information and simplicity of questions on the instrument. The strength of this research is that it can provide information about the risk of hypertension and cigarette exposure with COPD.

CONCLUSION

Based on the above results, it can be concluded that there is a relationship between male sex,> 40 years with COPD, history of hypertension with COPD, and smoking behavior and degree of smoking with COPD. This is not only an association relationship, but also these variables are risk factors for COPD. This is evidenced by the OR value and the estimated interval. While unrelated and not included as a risk factor in this study at Surabaya Hajj General Hospital is a genetic variable. This is evidenced by the p-value which is not significant, so the OR value and the estimated interval cannot be used on genetic variables.

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DIFFERENCES IN TEENAGE GIRLS' KNOWLEDGE AND ATTITUDE BEFORE AND AFTER BEING EXPOSED IN PUBLIC SERVICE ANNOUNCEMENT MEDIA OF "IRON SUPPLEMENTATION" (Study at SMP Negeri 10 Surabaya)

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ABSTRACT

Introduction: Teenage girls are included in groups who are prone to anemia. Various attempts have been made to prevent anemia in teenage girls. Public service announcement of "Iron Supplementation" is one of the health promotion media related to the prevention of anemia. This research aims to determine the difference in the knowledge and attitudes of teenage girls before and after exposure to public service announcement media of "Iron Supplementation". **Methods:** This research is a quantitative study with pseudo-experimental methods. The knowledge and attitude variables are measured by the Paired T-test test and the Mann-Whitney test. The study subject amounted to 30 subjects for each group. **Result:** The results of the analysis show that there were differences in the students' knowledge (p = 0.00) before and after watching videos in both the "selfie" group and the "animation" group. There were differences in students' attitudes before and after watching the video on the "selfie" group (p = 0.00). However, there was no difference in the student's attitudes toward the "animation" group (p= 0.469). **Conclusion:** There was no difference in students' knowledge between selfie groups and animation groups after watching videos. There was a difference in attitudes between the "selfie" group and the "animation" group after watching videos. Public service announcement is needed in delivering health messages for changes in knowledge and attitudes. However, there is still a need for mentoring and direct support from teachers.

Keywords: Knowledge, Attitude, Public Service Announcement, Anemia, Teenage Girl

INTRODUCTION

Anemia becomes a very serious health problem if it continues to be ignored without any early prevention and treatment efforts, especially in vulnerable groups such as pregnant women and teenage girls. Nutritional anemia is still one of the main nutritional problems in Indonesia caused by a deficiency of iron, folic acid, and/or vitamin B12 (Arisman, 2010). Anemia in teenage girls can have a negative impact: decreasing productivity which leads to learning achievement because it reduces the ability to think dexterity and lack of concentration. If anemia in teenage girls is allowed to occur without any prevention and treatment efforts, it can have a negative impact that will carry over to a pregnant woman. Anemia in pregnant women can cause maternal death during childbirth and have an impact on the baby. Anemia can be prevented by consuming food sources of iron and iron supplementation.

According to the World Health Organization (McLean et al., 2009), the incidence of anemia in teenage girls, especially in developing countries reached 53.7%. Based on data from Riskesdas (2013), the prevalence of anemia in teenagers in Indonesia is 35.1%. Teenage girls aged 13-18 years reached 22.7%. In the city of Surabaya, 26.5% of middle and high school teenagers experienced anemia (Afifah, 2011). This percentage shows the prevalence of anemia in middle and high school teenagers in Surabaya. Based on research Setyono (2010) states that anemia in teenage girls reaches 33.3% in Surabaya. WHO (2011) states that the prevalence of anemia in an area that reaches 20% -39.9%

is included as a moderate public health problem.

Various attempts have been carried out by the Indonesian government through the Iron Nutrition Anemia Prevention and Control Program (PPAGB) targeting Junior High School (SMP) and Senior High School (SMA) children through iron supplementation. The PPAGB program also has coaching activities aimed at increasing the knowledge of teenage girls regarding anemia prevention. Based on data from Nutrition Status Monitoring, the coverage of Fe tablets that have been received by teenage girls (12-18 years) in East Java in 2017 is higher than in 2016. In 2016, teenage girls who received blood-added tablets had a percentage of 13, 7% (Ministry of Health, 2018) whereas in 2017 it has a percentage of 14.74%. However, the results of coverage of Fe tablets or iron supplements for teenage girls in Surabaya reached 38.84% in 2017 (East Java Provincial Health Office, 2017).

Based on the results of Riskesdas (Ministry of Health, 2018), the reasons for teenage girls (10-19 years) in East Java do not drink or spend iron supplements obtained from school that is owing to only drinking during menstruation (3.7%), forgetfulness (19.7%), taste and bad smell (29.1%), side effects (7.7%), and feeling unnecessary (26.8%). According to teenage girls, iron supplements have a bitter taste so they don't want to drink them. Teenage girls also do not feel the need to take iron supplements every week or during menstruation because they feel fine even though they do not consume iron supplements and do not feel sick or have anemia (Sari, 2019).

According to the results of research from (Yuniarti, Rusmilawaty, and Tunggal, 2015), several factors that can cause adherence of teenage girls to consume Fe tablets are the teenage girls' knowledge about the benefits of Fe tablets consumed and anemia. Therefore, knowledge about efforts to prevent anemia and the risk of anemia is very important for teenage girls to

have. There is also a factor from oneself, namely awareness of consuming Fe tablets. Based on the results of research by Risva and Rahfiludin (2016) respondents with good attitudes have a high awareness of 2.2 times to consume iron supplements compared to respondents who have bad attitudes knowledge and it can influence adherence to consume iron supplements.

Based on research from Sukmawati in 2011 (Martini, 2015) related a significant relationship between knowledge about anemia and the incidence of anemia in teenage girls who lack knowledge about anemia has a 2.3 times risk of developing anemia. Therefore, messages or information about preventing anemia need to be conveyed to teenage girls. Dissemination of this information is expected to affect the behavior of teenage girls.

Health promotion is always related to efforts or activities to deliver health messages to individuals, groups, or the public. Health promotion media that can facilitate the delivery of health messages is more clearly and received as well. Health promotion media will be better if five senses are used more (Notoatmodjo, 2012b). One of them is audiovisual media (video) that links to the sense of sight and hearing. Public Service Advertising as an audio-visual media can be used to reach all levels of society by conveying messages to raise awareness, attention, and public awareness of several conditions that can threaten the harmony and public life including health problems (Pujiyanto, 2013).

Based on S-O-R theory, advertising as a stimulant can stimulate an individual (organism) to cause the desired response. The response in the form of knowledge, attitudes, and actions related to the prevention of anemia in teenage girls. Based on the Theory of Reasoned Action, individuals have beliefs and attitudes related to the behavior carried out. The behavior of the individual is often determined by the tendency or intention to

carry out the behavior. Therefore, advertising media as health promotion tools are needed to increase knowledge and attitudes. Teenage girls need information about preventing anemia which is inviting them to make an effort to prevent anemia independently by displaying the Public Service Announcement of "Iron Supplementation". This study was conducted to determine differences in knowledge and attitudes of teenage girls related to anemia prevention before and after exposure to advertising media.

METHODS

This research was quantitative. This study used a quasi-experimental research method (quasi-experimental) with a non-equivalent control group design (Notoatmodjo, 2012a). The use of the Non-Equivalent Control Group design in this study aimed to determine the differences that occur after receiving interventions related to health behaviors and preventing anemia. The research location was at SMP Negeri 10 Surabaya, Tegal Sari District, Surabaya City.

The population of this research was teenage girls who were students of SMPN 10 Surabaya in 2019. According to the Republic of Indonesia's Minister of Health Regulation No. 25 of 2014, teenagers have an age range of 10-18 years. The average junior high school student has age of 12-15 years, including the teenage age group. Therefore, the population in this study were teenage girls aged 12-15 years of SMPN 10 Surabaya students in 2019.

The sample of this research was teenage girls aged 12-15 years who have the status of female students at SMP Negeri 10 Surabaya. The sample size was calculated using the formula of a sample size to test the hypothesis of two different means. The minimum sample size is 60 students. The sample was divided into 2 groups: 30 students in the selfie group and 30 students in the animation group.

The variables studied were the knowledge and attitudes of students before and after watching public service announcements (PSA). The selfie group was the students who watched a 30-second version of the PSA "Tablet Tambah Darah Versi Selfie". This PSA video was obtained from the Indonesian Ministry of Health and aired on Indonesian television (Ministry of Health, 2016). The animation group was the students who watched a "Healthy, Smart, and Beautiful Without Anemia" video for 31 seconds. Healthy, Smart, and Beautiful videos without anemia used animated displays or moving images. This video was obtained from the Youtube Nutrition International website (Nutrition International, 2018). Both of these advertising media have different views. The PSA "Tablet Tambah Darah Versi Selfie" uses real-life views in preventing anemia. Each group watched ads three times displayed through the LCD so that they could reach the entire classroom. The screening of advertisements was carried out alternately between groups in the class that has been determined.

Data collection techniques in this study utilized primary data, secondary data, and literature studies. Primary data were obtained through pre-test and post-test questionnaires containing several questions. Questions on knowledge variables related to how to prevent anemia, the recommended consumption of blood-added tablets, types of foods containing iron, and symptoms of anemia in general. Questions on attitude variables related to individual beliefs and evaluation of his beliefs about anemia prevention behavior. Categorizing knowledge and attitudes based on the scores obtained are good (76-100%), sufficient (56-75%), and less (<56%). While secondary data were obtained through health profile books, WHO data, and risk-related cases of anemia prevalence. Literature studies included books, journals, and articles related to issues discussed in the research.

Data analysis techniques used were univariate analysis and bivariate analysis. Univariate analysis was performed to determine the characteristics of respondents. While the bivariate analysis was used to determine the effect of public service announcement of "Iron Supplementation" with a different appearance on knowledge and attitudes. This analysis uses 2 types of tests: Paired T-test and Mann-Whitney test.

Bivariate analysis in paired groups (pre-test and post-test) was performed using the Paired T-test. Paired T-test is used to determine whether there are differences in knowledge and attitudes before and after watching PSA. Bivariate analysis was also carried out in the unpaired group (selfie group and animation group) using the Mann-Whitney test. The Mann-Whitney test was used to see whether there are differences in knowledge and attitudes between the selfie group and the animation group after watching PSA. The data used in this article had passed the ethics test at the Faculty of Dentistry, Airlangga University with the number: 459 / HRECC.FODM / VII / 2019.

RESULTS

SMP Negeri 10 Surabaya is located in Tegal Sari District, Dr. Soetomo, Surabaya City. It is one of the state schools with local government ownership status. SMP Negeri 10 Surabaya is included in the working area of the Public Health of Dr. Soetomo.

Table 1. Age of Respondents

Age (Year)	Selfie Group		Animation Group	
	N	(%)	N	(%)
12	0	0	16	53,3
13	16	53,3	14	46,7
14	14	46,7	0	0
Total	30	100	30	100

This research produces data based on predetermined research variables. Based on the data obtained, the results of this study began with the characteristics of respondents and then continued with the results of the pre-test and post-test according to the research objectives.

Based on Table 1 shows that the age of the respondents ranged from 12-14 years. In the selfie group, the age of respondents was 13 years (53.3%) and 14 years (46.7%) whereas in the animation group, the age of respondents was 12 years (53.3%) and 13 years (46.7%). Most respondents were 13 years old.

Table 2. Information Sources of Preventing Anemia

Information Sources	Selfie Group		Animation Group	
	n	(%)	n	(%)
Family members	2	6,7	7	23,3
Teachers	11	36,7	18	60
Friends	0	0	1	3,3
Television	6	20	3	10
Online Media	11	36,7	1	3,3
Total	30	100	30	100

Based on Table 2 above shows that the greatest source of information was from the teacher both the selfie group (36.7%) and the animation group (60%). While in the selfie group, the greatest sources of information were not only from teachers but also from online media (36.7%).

Table 3. Consumption of Iron Supplements on Respondents

Consumption	Selfie Group		Animation Group	
	n	(%)	n	(%)
Yes	24	80	21	70
No	6	20	9	30
Consumption Frequency				
Routinely once a week	11	36,7	14	46,7
Uncertainty	13	43,3	7	23,3
Others	6	20	9	30
Total	30	100	30	100

Based on Table 3 above shows that respondents who had taken blood builder tablets were 24 students (80%) in the selfie group. On the other hand, 21 respondents (70%) in the animation group had taken iron supplements. However, some respondents had not consumed iron supplements for 6 students in the selfie group and 9 students in the animation group. In the selfie group, 11 students took iron supplements regularly or as recommended. Whereas in the animation group, respondents who consumed iron supplements were 14 students.

Table 4. Knowledge of Respondents before Watching Advertising Media

Category	Selfie Group		Animation Group	
	N	(%)	N	(%)
Good	6	20	8	26,7
Enough	13	43,3	13	43,3
Less	11	36,7	9	30
Total	30	100	30	100

Based on Table 4 above shows that respondents in the selfie group who were well knowledged were 6 students (20%). In the animation group, 8 knowledgeable respondents (26.7%) had good knowledge. However, both in the selfie group and the animation group, some respondents lacked knowledge about anemia prevention.

Table 5. Knowledge of Respondents after Watching PSA

Category	Selfie Group		Animation Group	
	n	(%)	N	(%)
Good	20	66,7	23	76,7
Enough	10	33,3	6	20
Less	0	0	1	3,3
Total	30	100	30	100

Based on Table 5 above shows that respondents who are well-knowledged were 20 students (66.7%) and 10 students (33.3%) had sufficient knowledge in the

selfie group after watching PSA. Whereas in the animation group, respondents with good knowledge were 23 students (76.7%) and 6 students (20%) had sufficient knowledge.

Table 6. Respondents' Attitudes before Watching PSA "Iron Supplementation"

Category	Selfie Group		Animation Group	
	n	(%)	n	(%)
Good	11	36,7	20	66,7
Enough	19	63,3	10	33,3
Less	0	0	0	0
Total	30	100	30	100

Based on Table 6 above shows that respondents who had a good attitude as many as 11 students (36.7%) and 19 students (63.3%) had sufficient attitude regarding the prevention of anemia in the selfie group. Whereas in the animation group, respondents who had good attitudes were 20 students (26.7%) and 10 students (33.3) had sufficient attitudes regarding anemia prevention. There were no respondents who had fewer attitudes (0%) regarding anemia prevention in either the selfie group or the animation group before watching PSA.

Table 7. Respondents' Attitudes after Watching PSA "Blood Builder Tablets"

Category	Selfie Group		Animation Group	
	n	(%)	n	(%)
Good	12	40	23	76,7
Enough	18	60	7	23,3
Less	0	0	0	0
Total	30	100	30	100

Based on Table 7 above shows that respondents who had a good attitude as many as 12 students (40%) and 18 students (60%) had enough attitudes in the selfie group. In the animation group, respondents who had good attitudes were 23 students

(76.7%) and 7 students (23.3) had sufficient attitudes. There were no respondents who had a category attitude with less category (0%) regarding anemia prevention both in the selfie group and the animation group after watching advertising media.

Table 8. Data Normality Test

Variable	Method			
	Selfie Group		Animation Group	
	P	Notes	**P**	Notes
Knowledge				
Before	0,164	Normal	0,229	Normal
After	0,009	Not Normal	0,020	Not Normal
Attitude				
Before	0,867	Normal	0,303	Normal
After	0,003	Not Normal	0,339	Normal

Table 9. Differences in Knowledge of Respondents Before and After Watching PSA "Iron Supplementation"

Variable	Selfie Group		Animation Group	
	x̄	p-value	x̄	p-value
Knowledge				
Before	5,67	0,00	6,46	0,00
After	8,8		9,19	

Based on Table 9 above shows that there are statistical test results that if the value of p <α = 0.05 then there are differences in the knowledge of respondents before and after watching PSA. The p-value of the respondent's knowledge variable about preventing anemia was 0.00 in the selfie group. Therefore there was a difference in knowledge between before and after watching advertisements in the selfie group. Likewise in the animation group, respondents knew about the

prevention of anemia with a p-value of 0.00. Thus, there was a difference in knowledge before and after watching advertisements in the animation group.

Table 10. Differences in the Attitudes of Respondents before and Sesudan Watch PSA "Iron Supplementation"

Variable	Selfie Group		Animation Group	
	x̄	p-value	x̄	p-value
Attitude				
Before	30,53	0,042	34,17	0,469
After	31,5		34,63	

Based on Table 10 above shows that there are statistical test results that if the value of p <α = 0.05 then there are differences in attitude before and after watching PSA. The p-value of the respondent's attitude towards anemia prevention was 0.042 in the selfie group. It means that there was a difference in attitude before and after watching the ad. While in the animation group, the respondent's attitude toward anemia prevention had a p-value of 0.469. So, there was no difference between before and after watching the ad.

Table 11. Differences of Changes in Knowledge and Attitudes of Respondents towards Prevention of Anemia

Variable	x̄	p-value
Knowledge Changes		
Selfie Group	8,8	0,130
Animation Group	9,19	
Attitude Changes		
Selfie Group	31,5	0,002
Animation Group	34,63	

Based on Table 11 above shows that there were statistical test results in which if the value of p <α = 0.05 then there were

differences in changes in knowledge and attitude before and after watching PSA media. Changes in knowledge of respondents after watching PSA media have a value of p = 0.130. So there is no difference in knowledge between the selfie group and the animation group after watching the ad. Changes in the attitude of respondents after watching PSA media have a value of p = 0.002. Thus, there are differences in attitude between the selfie group and the animation group after watching the ad.

DISCUSSION
Characteristics of Respondents

Respondents are teenage girls aged 12-14 years who are students of SMP Negeri 10 Surabaya. Most respondents were 13 years old in the selfie group and the animation group. Age 12-14 years included in the category of early teens. In adolescence, individuals need to avoid mistakes that can unwittingly harm themselves. So teenagers need good and correct guidance (Sarwono, 2010). Teenage girls are more prone to anemia due to blood loss during menstruation. Based on research by Briawan, Arumsari, and Pusporini (2011), the majority of students (50.3%) suffer from anemia between the ages of 13-15 years. This study indicates the tendency for students aged 13-15 to experience a higher risk of anemia than other age groups.

Information about preventing anemia can be obtained through family, teachers, friends, television, and online media. The teacher has an important role in giving knowledge to students that can influence the behavior of teenage girls. Based on research from Nuradhiani, Briawan, and Dwiriani (2017), teenage girls who get good teacher support significantly increase adherence 4.7 times more likely to consume iron supplements than those who lack support from teachers. Based on the results of the questionnaire showed that the majority of respondents obtained information from teachers. However, most respondents have sufficient knowledge of

the category. Some respondents also lack knowledge about anemia prevention. Sources of information can also be obtained through online media. Nowadays technology is developing rapidly which shows that it should be very easy for teenage girls to get information about preventing anemia.

Most respondents have consumed blood builder tablets both in the selfie group and in the animation group. Although many have taken blood builder tablets, there are still teenagers who consume iron supplements irregularly. Based on research from Nurbaiti (2019), there is a significant relationship between information media and anemia prevention in SMAN 4 Jambi. Some respondents still consume iron supplements irregularly showing that a health promotion media is needed that can change this behavior.

The Difference in Knowledge of Teenage girls in SMP Negeri 10 Surabaya Before and After Being Exposed to Public Service Announcement Media of "Iron Supplementation"

Differences in teenage girls' knowledge of anemia prevention before and after watching advertising media show an influence. The influence that occurs due to the presence of stimulants in the form of advertising media (audio-visual) causes increased knowledge in teenage girls. The existence of advertising media is expected to influence the attitudes of teenage girls to have better attitudes. Based on the results of research from Mularsih (2017) shows that teenage girls who are well-informed about anemia tend to have supportive behavior in preventing anemia during menstruation. Conversely, teenage girls who have less knowledge about anemia, tend to have behavior that does not support the prevention of anemia during menstruation.

The results showed that there were changes in student knowledge before and after watching PSA media. This change in knowledge occurs in both the selfie group and the animation group. This study shows

that the majority of respondents have good knowledge of categories after watching advertising media both in the selfie group and the animation group. The average value of knowledge in the selfie group is smaller than the animation group both before and after watching advertising media. However, both of them still experience an increase in knowledge after watching advertising media.

The addition of knowledge is the response obtained after receiving information. Information can be obtained from advertising media that are shared both on television and online media. The results of this study are in line with Meidiana, Simbolon, and Wahyudi (2018) that an increase in teenage knowledge about obesity after being given a video. Knowledge is needed in preventing anemia. Based on research from Nurbaiti (2019), there is a significant relationship between knowledge and prevention of anemia in SMAN 4 Kota Jambi. Therefore, increasing the knowledge of teenage girls about preventing anemia is very important in changing teenage behavior.

Statistical test results on the average value of knowledge about anemia prevention showed a significant difference between before and after watching advertising media both in the selfie group and the animation group. The existence of these differences can be seen from the p-value in the knowledge variable. The existence of this difference indicates that there is an influence of "Iron Supplementation" advertisements on increasing student knowledge regarding anemia prevention.

The results of this study also showed that there was no difference in the knowledge of teenage girls about preventing anemia between the selfie group and the animation group after watching PSA media. The difference in appearance between the two advertising media used in this study did not cause a different response. Both advertising media influence knowledge because of an increase in knowledge both in the selfie group and the animation group.

Based on S-O-R theory, the results of research that have been done state that advertising messages delivered via video can cause responses from teenage girls in the form of increased knowledge. The results obtained are in line with research conducted by Meidiana, Simbolon, and Wahyudi (2018) that there are significant differences between teenage knowledge before and after being given a video. That is, there is an influence of education through audiovisual media on increasing knowledge of overweight and obese teenagers. In addition, the results of this study are also in line with research conducted by Aeni and Yuhandini (2018) which states that there is an effect of increasing the knowledge of teenage girls about BSE after watching a video. A similar study was carried out by Tindaon (2018) who showed that there is an influence of video media on teenage knowledge about pornography exposure.

Receiving information by the public can be facilitated by channeling it through the human senses. Knowledge can be received by someone through the senses. About 75% to 87% of human knowledge is channeled through the eyes. While the other 13% to 25% channeled through other senses. Therefore, the delivery and reception of health information to someone is easier to do through visual tools (Notoatmodjo, 2012b).

Based on the results of this study indicate an increase in respondents' knowledge about anemia prevention after watching advertising media. Advertising media can have an effect shown through student responses, namely increased knowledge after watching advertisements. There is a recall of the average value of student knowledge about anemia prevention after watching advertising media. The results of this study indicate that video advertisements can be used to increase student knowledge related to anemia prevention.

Differences in the Attitudes of Teenage girls in SMP Negeri 10 Surabaya Before and After Being Exposed to Public Service Announcement Media of "Iron Supplementation"

The difference in attitudes of teenage girls towards the prevention of anemia before and after watching advertising shows an influence. The influence that occurs due to the presence of stimulants in the form of advertising media (audio-visual) causes a change in attitude in teenage girls. In general, respondents have had an adequate attitude towards preventing anemia.

The results showed that there were changes in students' attitudes regarding anemia prevention after watching the video advertisement. This attitude change only occurs in the selfie group because of differences in the average value before and after watching the video. While the results of the study in the animation group did not experience a change in attitude related to anemia prevention after watching the advertisement video. The absence of this difference in attitude occurs because the difference in average value between before and after watching the ad is too small in the animation group.

Based on the Theory of Reasoned Action, attitude is a holistic evaluation of a person towards an action to be taken (Notoatmodjo, 2010). Attitude also acts as a closed response that arises in a person after receiving a stimulant in him. Based on research from Tindaon (2018), an increase in the average value of attitude after the video is given. This study is also in line with research from Santi, Sabrian, and Karim (2014) which shows that there is a change in the mean attitude after being given health education with audiovisual media. Video as a stimulant can cause a response in the form of an increase in attitude.

The results of this study indicate that there are differences in the average value of attitudes before and after watching videos in the selfie group. This difference shows that there is an influence of advertisement of iron supplementation on attitudes towards teenage girls regarding anemia prevention. Whereas in the animation group, there was no difference in the average value of attitude before and after watching advertising media in the animation group. The absence of this difference indicates that the advertisement media with animated displays has not been able to influence teenage attitudes towards anemia prevention.

The results of this study reveal that there are differences in attitudes towards teenage girls about anemia prevention between the selfie group and the animation group. This difference can occur because of differences in the average value of the attitude variable between the selfie group and the large animation group before watching advertising media. From the beginning, respondents in the animation group had a good attitude before watching advertising media with an average value greater than the selfie group. However, the difference in average attitudes between before and after watching advertising media only occurs in the selfie group. While in the animation group, differences in the average value of attitude between before and after watching advertising media did not occur.

Based on the differences between the two groups, the respondents showed that the selfie group and the animation group had different attitudes. Differences in appearance between the two advertising media used in this study turned out to cause different responses. In the selfie group, there are differences in the average value of the attitudes of teenage girls before and after watching advertising media. While in the animation group, there was no difference in the average value of the attitudes of teenage girls before and after watching advertising media. Therefore, according to researchers the theme of advertising should be used to change the attitudes of teenage girls by giving a picture of real life.

Based on the S-O-R theory, it can be explained that the existence of a stimulus

can cause a response from an individual. One of them is a closed response, attitude. The results of this study are in line with research conducted by Meidiana, Simbolon, and Wahyudi (2018) which shows that there is an influence of education through audiovisual media on improving attitudes of overweight and obese teenagers in IQRA ITS Junior High School in Bengkulu City in 2018. Other studies by Tindaon (2018) concluded that there was a significant change in teenage attitude after being given a video. The results of this study indicate differences in the attitudes of respondents towards the prevention of anemia before and after watching advertising media in the selfie group. This difference shows that advertising media influences teenage girls related to anemia prevention, especially in the selfie group.

CONCLUSION

The conclusion obtained from the results of this study is the respondent's knowledge related to anemia prevention has changed after watching the public service announcement of "Iron Supplementation" in teenage girls at SMP Negeri 10 Surabaya both the selfie group and the animation group. While the attitudes of teenage girls namely attitudes toward anemia prevention change after watching the public service announcement of "Iron Supplementation" to teenage girls in SMP Negeri 10 Surabaya, especially the selfie group. Media advertising in the form of audio visuals is one of the tools of health promotion media that has a great opportunity for the occurrence of behavioral changes in preventing anemia in the target or community. Video advertisements are recommended to show real-life backgrounds such as PSA "Tablet Tambah Darah Versi Selfie". However, increasing knowledge and attitudes of teenage girls towards anemia prevention still requires direct support from teachers.

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RELATIONSHIP OF KNOWLEDGE AND ATTITUDE TO THE PREVENTION OF TYPE II DIABETES MELLITUS AMONG STUDENTS OF PUBLIC HEALTH UNDERGRADUATE DEGREE PROGRAM

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ABSTRACT

Introduction: Diabetes mellitus (DM) is a degenerative disease that causes the body's tissues or organs to deteriorate over time. One of the provinces in Indonesia with the highest prevalence of diabetes is the province of East Java. Knowledge related to DM type II should have been instilled since school. When someone has enough knowledge, it will form good attitudes and actions. This study aims to study the relationship between attitudes and knowledge of public health students with actions related to the prevention of DM type II. **Methods:** This type of research is analytic descriptive research with cross-sectional research design. The study population was all S1 Public Health Sciences students, amounting to 870 students. The sampling technique is total sampling / saturated sample. So the size of the study sample is 870 students. This study uses prevalence ratio (PR) analysis to determine the strong relationship between variables and the magnitude of risk. **Result:** The homework between knowledge and action variables shows a value of 1,114 (95% CI = 0.888 – 1.399) and the prevalence ratio value between attitude and action variables shows a value of 0.597 (95% CI = 0.490 - 0.726). **Conclusion:** Suggestions from this researcher are making public service advertisements about student compliance and awareness about healthy lifestyle habits, especially restrictions on foods high in sugar, limiting eating fast food, doing proper and regular exercise, and getting enough sleep.

Keywords: Actions, Attitudes, Diabetes Mellitus, Knowledge

INTRODUCTION

Diabetes Mellitus (DM) may refer to a degenerative disease that causes tissue or organs of the body to worsen over time. DM occurs due to a metabolic disorder, a condition where the pancreas produces a lacking amount of insulin so that the insulin can not work optimally. This condition might increase blood sugar levels (Hyperglycemia) caused by abnormalities in insulin secretion, insulin action, or even both. Hyperglycemia might cause blood sugar to accumulate in the blood resulting in failure to enter the cell. The failure may be triggered by a decrease in the hormone insulin or even a defect in insulin function. Type II diabetes is a DM caused by a decrease in the amount of insulin produced by the body (Susanti, 2019).

Diabetes Mellitus can be categorized into several types, including type I diabetes, type II diabetes, gestational type, and other types of diabetes. However, type II diabetes is considered a widespread type of diabetes. Overall, the type of diabetes that 90% of people suffer from is classified as type II diabetes (Ministry of Health Republic of Indonesia, 2014).

According to the World Health Organization (WHO), the number of people who have diabetes per year in the world reaches 415 million, and more than 80% of them occur in developing countries. Indonesia ranked sixth in the world in 2017 due to the prevalence of diabetes (Department of Health, 2018). East Java is believed to be a province that has had the highest prevalence of DM in Indonesia. Riskesdas reported that the number of people suffering from diabetes

continuously increased from 2007 to 2013, amounting to 330,512. East Java is also observed to be a province in the top 10 in the highest DM prevalence category. Following the order, East Java is in the sixth rank throughout Indonesia (Ministry of Health Republic of Indonesia, 2014)

In 2012, it was estimated that 25.1% of diabetes cases are from Surabaya, East Java. DM cases also increased in 2013 to 30.12%. Whereas in Sentinel Hospital in East Java, DM disease was ranked 5th out of 49 other infectious diseases (Meidikayanti and Wahyuni, 2017). The increasing of the number of people with DM each year and the decreasing of the age of patients suffering from diabetes mellitus might impact the high costs incurred by the state. Based on the analysis of the World Economic Forum, in the period 2012-2030, Indonesia will be afflicted by 2800 trillion rupiahs or equivalent to twenty times of the Indonesian health budget in 2012 as a whole (Larasati, 2017).

The results of pre-research interviews conducted by the researcher at the Faculty of Public Health, Universitas Airlangga, reveal that most students have a particular lifestyle that might be the trigger of early DM. Students often consume fast food because of its practicality, mainly since the online application comfortably supports it. Besides, they often gather or do assignments in fast-food restaurants, thereby increasing the frequency of consumption of fast food. The frequency of students consuming fast food is reported to reach more than two times a week. Furthermore, they also often consume sugary drinks and soft drinks. Most students also rarely exercise because they are busy with activities outside the campus or lazy. Some students also stated that they have close relatives affected by DM.

Knowledge of Type II DM prevention is critical for adolescents to understand, seeing that they are considered as a high affected age group. The number of adolescents suffering from DM is estimated to be around 12,191,564 people (out of 176,689,366 people) (Ministry of Health Republic of Indonesia, 2014).

Risk factors for type II DM may include permanent factors and modifiable factors. The unalterable factors might refer to factors innate within the individual so that it cannot be modified, for example, sex, race, age, genetic predisposition, history of giving birth to LBW babies, and other invariant factors. On the other hand, the modifiable factors might be related to lifestyles such as hypertension, lack of physical activity, smoking, obesity, and other particular lifestyles. The modifiable risk factors will be managed as prevention efforts (Ministry of Health Republic of Indonesia, 2014). Type II diabetes is often referred to as diabetes lifestyle because it is mostly influenced by genetics, environmental factors (including obesity, age, insulin resistance, physical activity, and food.) and an unhealthy lifestyle. An unhealthy lifestyle may be denoted as the primary determining factor for the occurrence of diabetes mellitus. By monitoring the lifestyle of people with diabetes, it will enhance the chance to regulate blood sugar levels in the body efficiently (Betteng, Pengemanan and Mayulu, 2014).

After understanding the existence of risk factors, prevention must be formed. Prevention is believed to contribute as an effort to maintain a healthy status, improve physical and mental health, and prolong life. There are three stages of prevention to overcome a health problem, namely primary prevention which prioritizes health promotion efforts and various special protections, secondary prevention where efforts are made to of an early diagnosis, immediate treatment, and disability limitation, and tertiary prevention where the last effort that can be done is rehabilitation (Rivai, 2005)

Efforts to prevent DM should be prepared beforehand. Knowledge related to

diabetes mellitus should have been taught in school. When someone has sufficient knowledge, this person would be likely to develop good attitudes and actions. Knowledge might be formed by the experience and the results of sensing or perceiving a particular object to increase insight and produce knowledge output. Attitude is assumed to be the response or reaction that has not yet occurred from the individual to a stimulus or object. Health actions refer to all things related to the activities or actions of individuals in improving and maintaining their health, which is also related to actions to prevent disease (Notoatmodjo, 2003).

Healthy behavior could be applied to reserve diabetes. Behavior is noted as a response arising from oneself due to circumstances around a particular person (Notoatmodjo, 2003). Based on the theory of behavior shift stated by Lawrence Green, a person's behavior is influenced by several factors, which are internal factors and external factors. Three main factors that can influence individual behavior, among others, are predisposing factors, enabling factors, and reinforcing factors (Notoatmodjo, 2010).

Predisposing factors attribute as the first reference as an effort to change behavior. One predisposing factor in this study is the respondent's knowledge and the respondent's attitude toward any diabetes preventive measures. Both of these predisposing factors might be likely to influence an individual's behavior toward DM prevention. Thus, this study aims to analyze the relationship between attitudes and knowledge of public health students with actions toward diabetes prevention. The regular students of the Public Health Program of Universitas Airlangga were selected to be respondents because they had received initial courses related to diabetes mellitus since the early semester. In addition to that, they are also considered as the succeeding health promoters in improving public health.

METHODS

This research applied quantitative research. A cross-sectional approach was chosen and conducted at the Faculty of Public Health, Universitas Airlangga in April to June 2019. Eight hundred and seventy students of the undergraduate Public Health Science Study Program of Universitas Airlangga, consisting of 211 students of Batch 2015, 217 students of Batch 2016, 216 students of Batch 2017, and 226 students of Batch 2018 were selected as the participants of the study. Sampling techniques were employed with a total sampling / saturated sample of 870 students.

The independent variable chosen was the knowledge and attitude of public health students toward the prevention of diabetes mellitus. The dependent variable in this study was the action of public health students on the prevention of diabetes mellitus. The data were collected using an online questionnaire. After that, the data were classified into univariate data and bivariate data. Notwithstanding, the p-value was not examined because a non-probability sampling was used, so the results of the study could not be concluded universally.

Next, the dependent and independent variable data were analyzed using bivariable analysis with cross-tabulation on statistical test equipment. The analysis displayed the frequency results to determine the PR (Prevalence Ratio) and the significance of the risk.

Characteristics of respondents in this study were described based on several criteria, among others, a (1) age of the individual is calculated from the time the individual was born until the time of the study which is divided into individuals aged more than 20 years and individuals less than 20 years old; (2) gender is a characteristic of respondents' sexuality grouped into female and male; (3) the year of education is the length of time that has been taken by the

respondent from the beginning he entered college which is categorized into individuals who have taken less than the same as the second year and individuals who have taken more than the second year; (4) domicile is the area where the respondent lives divided into two groups namely Surabaya domicile and domicile outside Surabaya; (5) ethnic group is an identity of a certain group that contains culture and customs which is divided into two groups, namely Javanese and other than Javanese; (6) Body Mass Index (BMI) is a number that indicates the criteria of the respondent's body is divided into several groups, namely underweight, normal, overweight, or obese; (7) family history of DM is the presence or absence of genetics component of diabetes mellitus divided into two groups: respondents who share genetic factors with family members and respondents who do not share genetic factors with family members; (8) the history of family members suffering from DM includes father, mother, grandfather, grandmother, and siblings. The following is a frequency distribution of respondents' characteristics. Ethical approval for this study protocol was obtained from the Research Ethics Committee of Faculty of Dental Medicine Universitas Airlangga with certificate number 200/HRECC.FODM/V/2019.

RESULTS

The followings are the results of the study based on the analysis that has been conducted:

Overview of Characteristic of Respondents

The respondents of the study selected are 870 students of undergraduate students of Faculty of Public Health, Universitas Airlangga, academic year 2018/2019.

Table 1. Frequency Distribution of Respondent Characteristics

Characteristic	Total	
	n	**%**
Age		
≥ 20 years old	555	63.8
<20 years old	315	36.2
Total	**870**	**100**
Sex		
Male	105	12.1
Female	765	87.9
Total	**870**	**100**
Duration of Study		
≤ Second Year	439	50.5
>Second Year	431	49.5
Total	**870**	**100**
Domicile		
Surabaya	511	58.7
Other than Surabaya	359	41.3
Total	**870**	**100**
Ethnic Group		
Javanese	760	87.3
Other than Javanese	110	12.7
Total	**870**	**100**
BMI		
Underweight	43	4.9
Normal	578	66.4
Overweight	192	22.1
Obese	57	6.6
Total	**870**	**100**
Shared Genetics Factor		
Yes	357	41.0
No	513	59.0
Total	**870**	**100**
Family Members Suffering from DM		
Father	107	12.0
Mother	77	9.0
Grandfather	59	5.0
Grandmother	111	13.0
Siblings	3	2.0
None	513	59.0
Total	**870**	**100**

Table 1 displays the results of the distribution of respondent characteristics. It

can be seen that 63.8% of respondents are in the age range of more than equal to 20 years. 87.9% of the respondents are female. Moreover, 50.5% of respondents have studied for more than two years and 58.7% of respondents reside in Surabaya. Based on the ethnic group, 87.3% of respondents are Javanese, while according to BMI, 66.4% of respondents have a normal weight. Related to the shared genetics factor, 59.0% of respondents do not have a family history of diabetes mellitus, and 59.0% do not have family members who suffer from diabetes mellitus.

Overview of the Understanding of Diabetes Mellitus

Knowledge or understanding is the output of the perceiving stimulus of an object. Knowledge can be obtained from formal education or non-formal. The following is the frequency distribution of the understanding of diabetes mellitus prevention.

Table 2. Frequency Distribution of Understanding of Diabetes Mellitus Prevention

Knowledge	Total	
	n	%
High	636	73.1
Low	234	26.9
Total	870	100

Table 2 provides the results of the study, showing that 636 respondents (73.1%) possess a high level of diabetes prevention knowledge, and 234 respondents (26.9%) possess a low level of knowledge. The majority of public health students possess a great understanding related to the prevention of diabetes mellitus.

Knowledge can be gained from various sources through both formal and non-formal education. Formal education can be

received through schools, while non-formal can be obtained from experiences or stories shared by others.

Overview of Attitude toward Diabetes Mellitus Preventive Measures

Attitude refers to an individual's response to the stimulus they perceive that can affect an individual's actions directly or indirectly. The following is a frequency distribution of diabetes mellitus prevention attitudes.

Table 3. Frequency Distribution of Attitude toward Diabetes Mellitus Preventive Measure

Attitude	Total	
	N	%
Positive	484	55.6
Negative	386	44.4
Total	870	100

Based on Table 3, the results show that the attitudes of 484 respondents (55.6%) are positive, while the attitudes of 386 respondents (44.4%) are negative. The majority of public health students already perform a positive attitude regarding the prevention of diabetes mellitus.

The form of attitude shown by respondents is related to eating patterns, sleep patterns, and physical activities. Respondents also seem to prefer low-sugar foods, eating a maximum of two hours before bedtime, and physical activities on foot.

Overview of Diabetes Mellitus Preventive Measure

The action implies an action accomplished by the individual after receiving various stimuli both internal and external. The following is the frequency distribution of diabetes mellitus preventive measures.

Table 4. Frequency Distribution of Diabetes Mellitus Preventive Measure

Action	Total	
	n	%
Good	592	68.0
Poor	279	32.0
Total	870	100

According to Table 4, it can be inferred that 592 respondents (68.0%) perform good actions while other 279 respondents (32.0%) perform poor actions. The majority of public health students already perform good actions related to the prevention of diabetes mellitus.

Forms of action executed include rare consumption of foods and drinks high in sugar, not smoking, not consuming alcohol, sleeping approximately 7-8 hours per day, and checking blood sugar levels regularly.

Relationship between Knowledge and Diabetes Mellitus Preventive Measures

The following is the result of the analysis of the relationship between knowledge of DM and DM preventive measures on public health students of Universitas Airlangga. Based on Table 5, it is shown that a total of 427 respondents (49.1%) possess high knowledge and good diabetes mellitus preventive measures, while other 165 respondents (19.0%) possess low knowledge and good diabetes mellitus preventive measures. On the other hand, as much as 24.0% or 209 of the total respondents have high knowledge and poor diabetes mellitus preventive measures. In addition, as many as 69 respondents (7.9%) have low knowledge and poor diabetes preventive measures.

Table 5. Relationship between Knowledge and Diabetes Mellitus Preventive Measures

Knowledge	Action				Total	
	Good		Poor			
	n	%	N	%	N	%
High	427	49.1	209	24.0	636	73.1
Low	165	19.0	69	7.9	234	26.9
Total	592	68.0	278	32.0	870	100
PR (CI 95%) = 1.114						

According to statistical tests, the prevalence ratio reaches 1.114 (95% CI = 0.888 – 1.399), which implies that respondents with a high level of knowledge have the opportunity to take proper actions by 1,114 times greater than respondents who have profound knowledge. Thus, it can be inferred that respondents who have immense knowledge will perform right actions related to DM prevention.

Relationship between Attitude and Exclusive Diabetes Mellitus Preventive Measures

The following is the result of the analysis of the relationship between attitudes and actions to prevent diabetes mellitus of public health students at Universitas Airlangga.

Table 6. Relationship between Attitude and Exclusive Diabetes Mellitus Preventive Measures

Attitude	Action				Total	
	Good		Poor			
	n	%	n	%	n	%
Positive	365	42.0	119	13.7	484	55.6
Negative	227	26.1	159	18.3	386	44.4
Total	592	68.0	278	32.0	870	100
PR(*CI* 95%) = 0.597						

As shown in Table 6, as many as 365 respondents (42%) have positive attitudes, while the other 227 respondents (26.1%) have negative attitudes. However, these respondents perform good DM preventive measures. On the other hand, 119 respondents (13.7%) possess positive attitudes and poor DM preventive measures, while 159 respondents or as much as 18.3% possess negative attitudes and poor DM preventive measures.

Based on statistical tests, the prevalence ratio value is 0.592 (95% CI = 0.490 - 0.726), which indicates that respondents who possess a positive attitude might have the opportunity to perform good actions 0.597 times greater than those who have a negative attitude. Thus, it can be seen that respondents who have a positive attitude will take the right actions related to DM prevention.

DISCUSSIONS
Relationship between Knowledge and Diabetes Mellitus Preventive Measure

The results of the study indicate that public health students possess high knowledge and positive actions. Based on the analysis, highly educated students tend to have good actions related to the prevention of diabetes mellitus.

This result is supported by research conducted by Amalia and colleagues (2016) that there is a relationship between the level (Amalia, Sutikno and Nugraheni, 2016) of knowledge about DM and the type of DM that become the majority in Wonodadi Health Center, Blitar Regency (P = 0.027). Another research conducted by Khairani (2012) is also in line with the study that there is a relationship between knowledge about understanding DM and diabetes prevention in the elderly (P = 0.001).

However, this study is contrary to that of (Azriful et al., 2018), who found that correlation between the level of knowledge of diabetes risk factors and diabetes status on Civil Servants of UIN Alaudin Makassar (P = 0.121) does not exist.

Knowledge is believed to be an essential role in the formation of actions as a whole because knowledge forms the trust that is used in conveying a reality, creating the basis for individual decisions and developing actions on an object (Notoatmodjo, 2013). This condition then influences the individual in taking action. The newly built action, particularly on adults, is initiated in the cognitive domain, which implies that the subject perceives the stimulus in the form of objects or outside material before new knowledge is developed into actions or attitudes(Priyanto, 2018).

The results also have been able to demonstrate that personal knowledge related to what has been perceived, analyzed interpreted, and influenced by the surroundings might form an attitude that is applied in daily life leading to a particular action. A highly educated person can deeply understand about diabetes preventive measures, which might be able to prevent the

incidence of diabetes early, starting from creating a regular eating schedule, taking into account the intake of calories consumed, paying attention to the types of foods that are appropriate and allowed, and doing appropriate exercises.

Public health students possess a high level of knowledge about diabetes prevention because they have received courses in college. Moreover, public health students are required to be sensitive to the DM issues that are increasingly prevalent among the community. Public health students might be able to be a role model for the community in taking any diabetes preventive measures. Exposure to knowledge about DM prevention will increasingly form positive attitudes in students toward the prevention of diabetes.

Relationship between Attitude and Diabetes Mellitus Preventive Measures

This study confirms that public health students possess positive attitudes and perform good actions. Public health students who have positive attitudes tend to have good actions related to the prevention of DM. A study by Saputra, Rahmatiah and Muhasidah (2017) was of the opinion that 74.4% of students possess a good attitude toward DM prevention efforts, and 25.6% have lower attitude toward diabetes. This result is in line with the research conducted by Shankari et al. (2018). They are of the opinion that the attitude of 48% of students is considered a good attitude, 46% of the students possess fair good attitudes while 6% of students have an unfavorable attitude toward the prevention of diabetes.

The formation of action might be initiated with knowledge or insight related to the stimulus in the form of objects or materials related to diabetes prevention, thus creating a brand new knowledge or insight in a person before generating an innate response in the form of an attitude related to something of which he is aware. Later, a response in the

form of action will arise regarding the implementation or nonfulfillment of DM prevention.

Public health students undoubtedly, however, show that they have good knowledge and attitude related to DM prevention. It can also be suggested that public health students might be able to process knowledge and good attitude into have good behavior related to the prevention of DM.

CONCLUSION

The study has identified that the majority of public health students already possess immense knowledge, positive attitudes, and good actions related to DM prevention. The findings clearly indicate that public health students with high levels of knowledge are 1.114 times more likely to implement significant DM preventive measures, and public health students with positive attitudes are 0.597 times more likely to implement large DM preventive measures. Taken together, this research suggests (1) performing early diabetes detection by taking a health screening at the nearest health facility to identify the glycemic condition; (2) implementing the knowledge obtained by performing positive actions to avoid DM in daily life; (3) FKM or the Faculty of Public Health invites students to start implementing healthy lifestyle, such as doing regular exercise, decreasing fast food consumption highly sweetened drinks.

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THE INFLUENCE OF LEADERSHIP STYLE ON EMPLOYEE DISCIPLINE IN WIYUNG SEJAHTERA HOSPITAL

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ABSTRAK

Introduction: The quality of health services is an important aspect that determines the success of a hospital. Through performance, the role of human resources determines the success of a hospital. Efforts to determine employee performance need to be performed, one of which is by measuring employee discipline. The application of employee discipline is related to the role of the leader in directing his subordinates. The way leaders lead their subordinates is reflected in the leadership style applied. This study aimed to determine leadership style applied in Wiyung Sejahtera Hospital and its effect on the level of employee work discipline. **Methods:** This was a quantitative study with analytic observational research design. This study involved 80 employees working in Wiyung Sejahtera Hospital as a sample. All of the samples met the inclusion criteria as respondents. The independent variable in this research is leadership style and the dependent variable is the level of employee work discipline. Data were obtained through survey with questionnaire aids. **Result:** The results showed 31.25% of the leadership styles applied by the head of the unit was directive leadership styles. The results of the linear regression effect test indicate that the significance value was $<\alpha$ is 0,000 <0.1. The results of the linear regression analysis showed that leadership style had a regression coefficient of 0.311. **Conclusion:** In conclusion, leadership style applied has an effect of 90.9% on the level of employee work discipline.

Keywords: leadership style, work discipline, hospital

INTORDUCTION

As the driving force of an organization, employees determine an organization's achievements. Optimal employee performance can increase organizational opportunities in achieving goals. The role of a leader in an organization is important for employees to carry out all matters related to the survival of an organization (Fajrin and Susilo, 2018). A leader - as an employee mobilizer - will implement several methods appropriate to the situation and conditions to influence the behavior of other employees (Jamaludin, 2017). This is called leadership style. In essence, leaders can apply more than one leadership style. Different task demands, leader characteristics and subordinate characteristics can determine the choice of leadership style to be used.

As a capital-intensive and labor-intensive health service facility, hospitals need employees with optimal performance. Wiyung Sejahtera Hospital is a type C hospital located in West Surabaya. The location of Wiyung Sejahtera Hospital is close to some housing which has the potential to be a place of treatment for the surrounding community and is a reference for several health centers around it. As a health facility, Wiyung Sejahtera Hospital has implemented a performance appraisal as a form of supervision of employee performance. Performance shows the role of employees in doing work that is reflected in the attitudes and work behavior of employees (Setiawan, 2015). Performance appraisal is carried out routinely for once every semester. Indicators used in the performance appraisal include work time discipline, friendliness and responsibility. In each assessment indicator, discipline in

working hours has the highest weighting among the 2 other indicators. The weighting of disciplinary indicators in working time contributes 35% of the effect on employee performance appraisal results. The weighting is conducted based on internal considerations of hospital management. Procedures for appraisal performance appraisal are carried out through 3 methods including assessment by a random colleague, assessment by the head of the unit, assessment of subordinates and an assessment of the punctuality of coming and coming home from work based on a finger print attendance recap. The assessment method used is often referred to as the 360 assessment (Satlita, Yanuardi and Ahdiyana, 2015). This is performed to reduce the subjectivity of the assessment. The Performance Appraisal Results Method shows the following results:

Table 1. Result of Employee Performance Appraisal at Wiyung Sejahtera Hospital in 2018

Indicator	Score		Total
	Achieved	Not achieved	
	%	%	%
Punctuation	49.42	50.58	100
Friendliness	98.07	1.93	100
Job responsibilities	97.3	2.7	100

Based on Table 1, punctuation indicator has the highest percentage of 50.58%. This percentage shows the number of employees who did not reach the standard assessment score. Friendliness is an indicator that has the highest percentage of 98.07%. It shows the number of employees who can achieve the minimum score set. In conclusion, 50.58% of employees did not reach the score on the indicator of work time discipline. Therefore, an evaluation related to this issue needs to be carried out.

Punctuality is assessed based on employee attendance recap through finger print. Based on work units, employee lateness occurs in all work units of Wiyung Sejahtera Hospital. This is experienced by almost all unit heads and staff. Lateness of unit head should be minimized as a leader; the unit head should be able to set an example for his staff. Achievement of employee scores on indicator of punctuality needs attention from every level of management. Unit head as the firstline manager has a closer relationship with subordinates as executors. Therefore, the role and position of the head of the unit needs to be optimized to improve the performance of subordinates.

The success of a leader influences the performance of its members (Khairizah, Noor and Suprapto, 2017). This refers to employee work performance as measured by standards or assessment criteria set by the organization. This is explained in Path Goal Theory that employee behavior and attitudes impact on the rewards to be received. Rewards can be received if an employee shows a good performance, one of which can be measured by the attitude of motivation in employees who will improve performance, one of them through work discipline. Path-goal theory focuses on the way a leader directs the expectations of subordinates and influences the motivation of subordinates on effective performance to get rewards in accordance with the expectations of subordinates (House, 1975). There are two main points in Path-Goal Theory, they are leader's focus in directing the expectations and motivations of subordinates to the performance and the assumption that leader's behavior is motivation for subordinates.

There are four types of leadership styles based on Path-Goal Theory including directive, participatory, supportive and achievement leadership styles. Suitability in the application of leadership style shown by leaders can affect the perception of subordinates to obey or even not obey the leader. Therefore, considerations in the

selection of leadership styles need to be adjusted to the work environment and organizational culture in the workplace. This is because the harmonized leadership style and organizational culture can improve employee performance (Muhajir, 2014).

Based on the description, a leader has an important role in employee performance. In addition, it is necessary to improve employee performance, especially in punctuality. Therefore, the author examined the influence of leadership style on the level of work discipline at Wiyung Sejahtera Hospital. This study aimed to determine the leadership style that has been applied in Wiyung Sejahtera Hospital and an analysis of the influence of leadership style on the level of employee work discipline.

METHODS

This was a quantitative research with an analytic observational research design. Based on the time of data collection, this was a cross sectional study because the data collection was performanced once. The population in this study was all 251 employees in each work unit at Wiyung Sejahtera Hospital in Surabaya. Sampling technique was proportional random sampling – a technique that calculates sample calculation based on the number of members in each work unit divided by the total number of samples needed. The results of the calculation resulted in 72 samples. To facilitate the research, the sample in this study was completed into 80 respondents divided proportionally to the 14 work units studied. The work unit under study was a unit led directly by the head of the unit instead of the section head. The selection of work units was based on HRD recommendations because there were some work units that were not allowed to be examined. The study was conducted in work units which were mostly under the auspices of the service department. These were pharmaceutical unit, laboratory unit, radiology unit, nutrition unit, medical record unit, ICU nursing unit, emergency unit nursing, midwifery unit, NICU nursing unit, specialist poly unit, blue 2 inpatient unit, blue inpatient unit 3 and pink inpatient units. Analysis was done at the individual level.

There were several inclusion criteria for respondents as sample. First, employees who are in work units at the Wiyung Sejahtera Hospital in Surabaya who do not have structural positions as unit heads, section heads or other managerial sections. Second, respondents are employees with minimum work period of 3 months when the research is conducted. Third, the employees studied are part of the unit directly led by the head of the unit who does not hold concurrent positions as head of the division or other unit heads.

The study was conducted at Wiyung Sejahtera Hospital. The research location is near two competing hospitals. The inaccessibility of performance appraisal indicators by half of the study population led to the study. Retrieval of data for research conducted in May-June 2019 at the end of the employee work shift.

Independent variable in this study was leadership style, while the dependent variable was the level of work discipline. Data collection was conducted through surveys with questionnaire tools. The number of question items on the questionnaire used was 44 items consisting of 28 items of leadership style questions and 16 items of work discipline level questions. Data analysis technique used to determine the effect of leadership style on the level of work discipline was the analysis of linear regression test. Regression test results produce simple linear regression equation models. To facilitate and provide an overview of this research, a conceptual framework was created. Belowis the research concept framework:
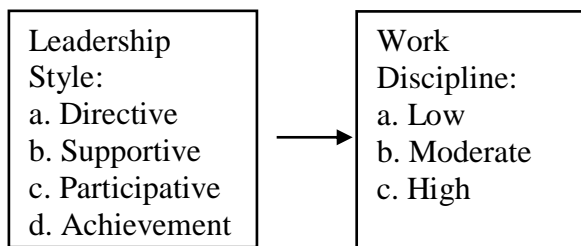
| Leadership Style: a. Directive b. Supportive c. Participative d. Achievement | → | Work Discipline: a. Low b. Moderate c. High |

Figure 1. Research Conceptual Framework

Leadership style was a method used by the unit head to give orders, advice, motivation, and make decisions related to work in achieving organizational goals. The leadership style referred to in this study is the directive, supportive, participative and achievement leadership style. Indicators of measurement of leadership style used were the behavior of the head of the unit, the relationship between the head of the unit and subordinates, the way the head of the unit makes decisions, and how the boss reaches his goals (Hilda, 2016). Measurements were made by assigning a score according to a Likert scale of 1 to 5 with the provisions that the answers are never, rarely, sometimes, often, always. The scores obtained were then summed and averaged for each leadership style. The average value of the highest leadership style was determined to be the leadership style. It is the leadership style trend that is applied by the head of the unit.

Work discipline is a form of subordinate action resulting from the arising of a desire within oneself to comply or not comply with regulations that apply in the workplace (Astutik, 2016). It was measured based on indicators of timeliness, compliance with regulations, work responsibilities, and the implementation of duties and obligations. Measurements were taken by respondents by rating 1 to 5 with the provisions that the answers were never, rarely, sometimes, often, always. The results of the assessment were then categorized as low, medium, high. The category for work discipline level variable is divided into low if the respondent's value $X < 37.33$, moderate if the respondent's value is $37.33 \leq X \leq 58.67$, and high if the respondent's value $X > 58.67$. This research was ethical and obtained an ethical certificate issued by the Faculty of Dentistry, Airlangga University. The ethics certificate number for this study is 287 / HRECC.FODM / V / 2019.

RESULT
General description of RS Wiyung Sejahtera

Wiyung Sejahtera Hospital is a type C public hospital located in West Surabaya. This hospital has been established since July 1, 1995. This was previously a clinic under the name of Wiyung Sejahtera Public Clinic under the auspices of the Wiyung Sejahtera Foundation. In 1997 the Wiyung Sejahtera General Clinic made additional service facilities such as dental treatment facilities, maternity home services and BKIA services (maternal and child welfare centers). In 1998, the Wiyung Sejahtera Clinic completed its service facilities by opening a drug room (pharmacy) service and specialist services, namely by organizing practical doctor services together with specialist doctors.

In 2004 the Wiyung Sejahtera Foundation had the intent and purpose of legalizing clinical business entities with legal strength and legal aspects. After experiencing rapid development and growth, on August 9, 2005 the Wiyung Sejahtera Clinic changed its status to a General Hospital. This then required Wiyung Sejahtera Hospital to experience changes, especially in the needs of human resources. The formation of a new organizational structure was carried out to support the running of health services provided.

The development of Wiyung Sejahtera Hospital has progressed from year to year. It is undeniable that the policy regarding tiered referral for BPJS patients is driving the increase in patients at Wiyung Sejahtera Hospital. In order to stay afloat as a referral health facility, attention to the quality of service needs attention. The management of Wiyung Sejahtera Hospital

is aware of this so that it conducts performance appraisals for employees, supervises quality indicators, conducts training employees and managing patient complaints.

As a health care facility, Wiyung Sejahter Hospital is aware of the risks that may occur to employees and patients. Therefore, SOP is created for every work to be performed. Regulations and policies have been implemented to regulate employees and improve hospital quality. Employee participation in complying with existing regulations is needed as a form of work discipline behavior. Employee work discipline affects hospital quality and employee performance.

Characteristics of Respondents

Respondents in this study were spread across 14 work units in Wiyung Sejahtera Hospital with a sample of 80 respondents. Data on the characteristics of respondents obtained from filling out the questionnaire. Characteristics of respondents were all things that were attached to respondents. In this study, the characteristics of respondents described the distribution of respondents including gender, age, education and years of service. Research respondents were employees who meet the research inclusion criteria.

Characteristics of Respondents by Gender

Gender is the physical form of the respondent that was seen during the study. The following table shows the characteristics of respondents by gender:

Table 2. Respondent Characteristics by Gender

Sex	N	%
Male	15	18.75
Female	65	81.25
Total	**80**	**100.0**

Based on Table 2, the majority (81.25%) of respondents were female.

Characteristics of Respondents by Age

Age refers to the age of respondent's age from birth to the day he filled out the research questionnaire. It is shown in the following table. Based on Table 3, the majority (80%) of respondents were in the age range of 21-30 years.

Table 3. Characteristics of Respondents by Age

Age	n	%
21-30 yr	64	80
31-40 yr	12	15
41-50 yr	4	5
>50 yr	0	0
Total	**80**	**100**

Characteristics of Respondents by Education

Education refers to the last formal education taken by respondents to the time this research was conducted. It is listed as follows.

Table 4. Characteristics of Respondents by Education

Education	n	%
Junior High	0	0.0
Senior High	13	16.25
D3	54	67.50
Undergraduate	13	16.26
Total	**80**	**100.0**

Based on Table 4, the majority (67.50%) of respondents were D3 graduates.

Characteristics of Respondents based on Years of Service

The characteristics of the respondents based on years of service are shown in the following table:

Table 5. Characteristics of Respondents Based on Years of Service

Years of service	N	%
>3 months	17	21.25
>1 year	23	28.75
3 years	13	16.25
>3 years	27	33.75
Total	**80**	**100.0**

Work period refers to the first day the respondent worked at Wiyung Sejahtera Hospital until the research was conducted. Based on Table 5, the respondent's years of service were varies but was dominated by respondents with a service life of more than 3 years (33.75%) of total respondents. Respondents with 3 years of service had a smaller number (16.25%) of the total respondents.

Leadership Style

Measurement of leadership style is measured in each work unit of Wiyung Sejahtera Hospital. Respondents assess the tendency of leadership style applied by the head of the unit. The leadership style applied by each work unit in Wiyung Sejahtera Hospital can be different in each unit. That is because the differences in the duties and functions of each unit so that there is an adjustment in the leadership of the unit head in directing his staff. The subordinate's perspective in interpreting orders, advice, and policy making can cause differences in the assessment of leadership styles (Triyono, 2016). The following are the leadership styles that are applied to each work unit according to staff perception:

Table 6. Identification of Leadership Styles

Leadership Style	n	%
Directive	25	31.25
Supportive	18	22.50
Partisipative	21	26.25
Achievement	16	20.00
Total	**80**	**100**

Based on Table 6, directive leadership style had the highest percentage (31.25%) compared to other leadership styles. Supportive, participative and achievement leadership styles had almost the same percentage. Thus, shows that the head of the unit at Wiyung Sejahtera Hospital tended to apply directive leadership style. The supportive, participative and achievement leadership style had the almost the same percentage.

Employee Discipline Level

Work discipline is one of the things that must be realized by employees as a form of compliance with the rules that apply in the workplace. Employee work discipline shows the ability and willingness of employees to comply with applicable work regulations. The success of the leader in directing subordinates will increase work discipline. The direction given by the leader will cause motivation for the employee and affect his behavior. Wiyung Sejahtera Hospital makes discipline as an indicator of performance appraisal. The operational definition of discipline used in Wiyung Sejahtera Hospital in performance appraisal is discipline at work time, namely the punctually of employees coming and going home from works. In this study, the operational definition of work discipline was a form of subordinates' action resulting from a desire within one self to comply or not comply with the regulations that apply to the work place. The results of measurements of employee work discipline were carried out to determine the employee work discipline level. Measurements were made by self-assessment. Categorization measurement of the level of employee work discipline compared to normative conditions that should occur.

Based on Table 7 employees work discipline level at Wiyung Sejahtera Hospital was low. This shows that employees have known the work rules that apply and tried to obey these rules. As many as 78.75% of employees had a high level of work discipline. This shows that the

employee has realized and is willing to obey the applicable rules. On the other hand, 21.25% of employees had a moderate level of work discipline. This needs to be a concern so that employees can increase the level of work discipline. The following are the results of measurements of employee work discipline:

Table 7. Work Discipline Level

Work Discipline Level	n	%
Low	0	0.0
Moderate	17	21.25
High	63	78.75

Work Discipline Level	n	%
Total	80	100

The Effect of Leadership Style on Work Discipline Level

The description of leadership style and level of discipline is shown in Tables 6 and 7. To find out the relationship of leadership style with the level of work discipline, making cross tabulation between the two variables is done. Here are the results of the cross tabulation of leadership style variables with work discipline level variables.

Table 8. Cross Tabulation of Leadership Styles and Employee Discipline Level

Leadership Style	Work Discipline Level						Total		Sig.
	High		Moderate		Low				
	n	%	n	%	n	%	N	%	
Direktive	24	88.9	3	11.1	0	0	27	100	
Supportive	14	87.5	2	14.2	0	0	16	100	0,000
Partisipative	10	50	10	50	0	0	20	100	
Achievement	15	88.2	2	11.7	0	0	17	100	

Table 8 shows the relationship between leadership style and employee's work discipline. Respondents with unit heads who had directive leadership style (88.9%), achievement (88.2%) and supportive (87.5%) had a high level of work discipline. Employees with leadership who apply the participative leadership style (50%) had the lowest percentage of employees with high levels of work discipline. Employees with the highest level of work discipline were owned by employees with unit heads who tend to apply the participative leadership style (50%), while the level of work discipline was moderate for employees with unit heads who apply supportive leadership styles (14.2%), directives (11.1%), achievement (11.7%) had a nearly equal percentage. In participative leadership style, the level of work discipline was high (50%) and the level of work discipline was moderate (50%) which was balanced.

Statistical tests were conducted to determine the effect of leadership style on the level of work discipline. The results of statistical tests using data processing software show that the t-statistic value was more than the t-count of 17.224, more than 1.664. The significance value of 0.00 was less than 0.1. This shows that the leadership style influences the level of employee work discipline. Linear regression analysis was done to find out how much influence the leadership style has on the level of work discipline. The results of linear regression analysis yielded the equation $Y = 4.294 + 0.496X$. The coefficient of determination R showed a value of 0.890 while R^2 indicated a value of 0.792. Based on these results it can be seen that there is a strong relationship between leadership style and work discipline because the value of R was close to 1.

Based on the value of R^2 leadership style affected the level of discipline by 79.2%

while 20.8% was influenced by other variables outside the model. The dependent variable of the level of work discipline is symbolized by Y, while the independent variable is symbolized by X. In the equation the leadership style provides a positive influence on the level of work discipline. When the leadership style increased, the level of work discipline also increased by 0.496 assuming other variables were considered constant or had a value equal to 0.

DISCUSSION
Leadership style

Leadership Style is defined as a way and effort made by leaders in influencing subordinates to achieve organizational goals through performance (Kurniawan, 2018). Another opinion stated that leadership style is a tool on managerial aspects that can be used by leaders to manage the organization's human resources (Muttaqin, Mukzam and Mayowan, 2016). There are several figures that describe the type of leadership style. House (1975) explained that there are four types of leadership styles based on path-goal theory including directive, supportive, participative and achievement leadership.

Directive leadership style is a way for leaders to direct their subordinates by giving orders or specific tasks to their subordinates, making important decisions and being involved in their implementation (Yulistian, Astuti and Utami, 2013). This leadership style is also called the authoritarian leadership style. This is because the leader becomes the center of information and decision making. Communication in this leadership style tends to go in one direction and does not provide subordinates the opportunity to express opinions. Based on the results of the study, directive leadership style is the most leadership style applied by the head of the unit (31.25%) according to the evaluation of his subordinates. The application of directive leadership style is adjusted by the tasks carried out by the unit. high-risk tasks

that require a high level of accuracy. Unit heads tend to stick to the existing regulations and often provide direction to minimize errors. In addition, this leadership style will be effectively applied if the leader has subordinates who are less independent in carrying out the task.

Supportive leadership style is the attitude of leaders with kinship and considers subordinates to be equal to him (Ridho, 2014). Leaders with supportive leadership styles tend to be easy to find and easier to discuss. Communication between leaders and subordinates tends to go both ways if the relationship between leader and unit head is harmonious. The results showed that 22.50% of respondents rated the head of the unit implementing a supportive leadership style. Head of work units that tend to apply supportive leadership style are specialist poly and IPS units. Specialist poly unit consists of several specialist poly staffs consisting of doctors and nurses. Here, there is no visible difference in treatment between staff, yet there is still mutual respect for the profession of each staff. IPS Unit (Facility Maintenance Installation) consists of hospital technicians and cleaning service personnel. Differences in educational and professional backgrounds in the two units make the head of the unit implement intense communication to unite his staffs.

Participatory leadership style is a way for leaders to involve subordinates' participation in decision making related to shared interests and organizational goals (Cote, 2017). The results showed that based on respondents' assessment, 26.25% of unit heads adopted this leadership style. Work units with a tendency for participatory leadership style are medical record units, radiology units, and nutrition units. Tasks carried out in these units require accuracy and are related to other units. Based on the hospital structure, the three units are supporting service units, so that in carrying out their duties requires integration with other work units. In carrying out their duties, if there are obstacles, the head of the

unit in the work unit will requests advice from his staff. In addition, the head of the unit creates a family atmosphere with his staff. This shows that the head of the unit believes in the abilities of subordinates, especially during problem solving, even though the final decision is made by the unit head.

Achievement leadership style is the way leaders lead subordinates with a focus on achieving work goals and efforts to improve employee performance (Cote, 2017). The application of the achievement leadership style encourages competition among employees because the head of the unit will conduct his own assessment of the performance of his staff. Unit heads tend to be more careful in supervising the work of their staff. Achievement leadership style is appropriate for employees who have high motivation and high expectations in the workplace organization. Inpatient leadership style is suitable to be applied in the inpatient unit if the employees in the unit already have independence in carrying out their work. That is because the inpatient unit as one of the determinants of BOR, ALOS, TOI, GDR and NDR as indicators of the quality of hospital services.

Work Discipline Level

The level of employee discipline shows the willingness and ability of employees to comply with the rules and values that apply to the organization of work (Tyas and Sunuharyo, 2018). The attitude of employees who obey the rules at work shows that they are aware of something that is forbidden and allowed to be done. Hospitals as health service providers have many risks for employees and patients. As an effort to prevent the risks that occur as well as an effort to meet the needs of employees, it needs to be emphasized to apply high standards of work discipline.

The results of the study at Wiyung Sejahtera Hospital showed that there were 17 respondents with a moderate level of discipline and 63 respondents with a high level of discipline. This shows that employees are aware of the rules and have tried to obey and implement these regulations. Work discipline can arise from self-will and the commands of others (Jatilaksono and Indartono, 2016). The work environment will have an influence on employee discipline. Leaders and coworkers can act as motivators to create work discipline by giving good examples, giving advice and reprimands if subordinates and coworkers with deviant behavior.

The Effect of Leadership Style on Employee Discipline Level

Based on the results of the study, leadership style had an influence on the level of employee work discipline with a significance $<\alpha$ of 0,000 <0.1 and a regression coefficient of 0.311. Leadership style affected the level of work discipline by 31.1%. This is consistent with research conducted by (Gurning, 2013) that leadership style influences the level of employee work discipline. Research conducted by Ariyani (2016) and (Liyas, 2017) showed that leadership style has a positive and significant effect on employee performance. The results of this study are also in line with the statement of (Gibson et al., 2006) that leadership style is part of organizational factors that affect employee performance based on one indicator of work discipline.

Leadership style can be used as a tool to direct employees towards organizational goals. Because it is a tool, every leader has a difference in the application of leadership style based on the situation and conditions. The statement is in accordance with the assumption in the Path Goal Theory that leaders are flexible in choosing leadership styles that are applied according to the situation and conditions (Ridho, 2014). The results of this study indicate that based on staff assessment, the type of leadership style most widely used by unit heads was the directive leadership style. The choice of leadership style shows

the effectiveness of the unit head in leading his staff. Leadership effectiveness depends on how well the leader can provide guidance, motivation, support to achieve the goals and work satisfaction of subordinates (Ma'ruf, 2014). Other research on the influence of each leadership style on discipline showed that there is a positive influence on participative leadership style and delegative leadership style, while authoritarian leadership style shows negative influence (Pratama and Fakhri, 2017).

A leader has an important role as a mobilizer of human resources in an organization. A leader's duty is not only to direct the behavior of subordinates but also as a counselor, instructor, meeting leader, decision maker, as well as delegating authority (Yesi, 2017). Hospitals as industries that are capital, labor intensive and problem intensive require leaders who are able to direct employees to provide quality services in accordance with the hospital's targets ((Putranti and Suparmi, 2016).

The reliability of a leader in choosing a leadership style supports the leader in carrying out his role as a mobilizer. Leadership style towards subordinates is an extrinsic factor. When the attitudes and behaviors of leaders are considered in accordance with the character of subordinates, it is easier for leaders to influence subordinates (Ramadhany, 2017).

CONCLUSION

Most respondents in this study were female with an age range of 21-30 years. Most respondents had a D3 educational background with a work period of more than 3 years. The results showed that the leadership style that tends to be applied by the head of the unit at Wiyung Sejahtera Hospital is directive leadership style. Employees who have a high level of work discipline are employees led by the head of the unit by applying directive, supportive, and achievement leadership styles. The

leadership style variable is proven to have an influence and is significant on the level of employee work discipline. The influence of leadership style is 79.2% on the level of employee work discipline while the rest is influenced by variables beyond the model.

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RELATIONSHIP OF WORKERS' CHARACTERISTICS AND THE USE OF PERSONAL PROTECTIVE EQUIPMENT AGAINST THE ENHANCEMENT OF C-REACTIVE PROTEIN SERUM ON KAPOK-PROCESSING INDUSTRY WORKERS AT BANDREK, PASURUAN

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ABSTRACT

Introduction: The cotton processing industry is an industry that produces cotton dust during the production process. Workers are at risk of exposure to cotton dust, if inhaled and accumulated in the body will cause inflammation that causes an increase in C-Reactive Protein (CRP) serum. The purpose of this research was to determine the relationship between the use of personal protective equipment and worker characteristics that can cause an increase in serum CRP of workers before and after work in the cotton processing industry. **Methods:** This was observational research with a prospective longitudinal design. Respondents in this study were 11 workers in Bandrek village, Mojotengah, Pasuruan. Data collection of worker characteristics was done by interview and observation. Personal dust content data was collected using a personal dust sampler (PDS) with gravimetric calculation methods. increase in CRP data collection using blood specimen collection before and after and conducted laboratory testing using i-chroma reader. Measurement of average dust levels of 5.49 mg / m^3. **Result:** There was no significant correlation between personal dust level   (p = 0.324) and the use of PPE (p= 0,925) with the increase in CRP serum levels. There was a significant correlation between the ages of workers (p = 0.005), years of service (p = 0.006), and length of work (p = 0.004) with the increase in CRP serum level. **Conclusion:** The older the workers, the longer the working period and the longer the working hour, the higher the increase of CRP serum level would be.

Keywords: Worker characteristics, Personal protective equipment, and C-Reactive protein

INTRODUCTION

The development of industrial sectors in Indonesia is growing rapidly, especially in today's globalization era. The development of industry in Indonesia has a positive impact, one of which is the job opportunities for the community around the industry. The impact will affect the increase of economy in the community indirectly (Purwasih & Soesatyo, 2017). However, the growing industry will harm the environment and workers. Environmental problems will arise (environmental pollution) such as air, water, and soil pollution. Health problems that will arise will give a poor impact on the health of workers and communities that are located around the industry (Sampul *et al.*, 2015).

Air pollution is the inclusion of substances, energies, and/or other components into the air by human activities, so that air quality decreases to a certain degree that affects human health (Ministry of Health 2002). *The World Health Organization* (WHO) estimates that in 2016, about 58% of early deaths due to outside air pollution were caused by heart disease and ischemic stroke. While 18% of deaths are caused by chronic obstructive pulmonary disease and acute lower respiratory tract infections, and 6% from death due to lung cancer. Exposure to chemicals and physical or biological substances will cause air pollution (WHO, 2018).

In Indonesia, nearly half of Indonesia's population, or about 100 million people work in the agricultural

sector. Ministry of Agriculture made efforts to nurture business actors to become a foundation to support Indonesia's economy (Kementerian Pertanian, 2018). Kapok industry is one of the industries that are in the agricultural sector. According to *International Labor Organization* (ILO), about 2.3 million people in the world died (due to work) because of the occurrence of occupational accidents and occupational diseases. Work-induced illness dominates the death case of 2.02 million cases so the need to improve health and safety for workers (Departement of Health, 2015). Agriculture work when associated with working conditions, it poses certain risks such as exposure to harmful substances (eg. chemical substances or radiation). A common form of illness found is pneumoconiosis. This work is a dangerous job and kills thousands of people in the world. ILO states that pneumoconiosis disease is one of the work-induced illnesses suffered by many workers.

Kapok industry is one of the industries that produce kapuk dust, resulting in a negative impact on worker health. The impact caused by dust during kapok-production process is one of the risk factors. Dust is a hazardous chemical as the impact of air pollution with a concentration exceeding the Threshold Limit Value (TLV) that has been set. These chemical hazards can be absorbed by the worker through the respiratory (inhalation), through the skin, and can be swallowed or eaten (ingested). Chemicals that are absorbed by the worker will negatively affect the health of workers. So, worker health needs to be monitored from the exposure to air pollution in the workplace (Lestari, 2010).

The research conducted by Fujianti et al (2015), showed that there is a link between the dust level and the symptoms of respiratory problems in workers. According to the research conducted by (Akunsari, 2010), it shows that cotton dust in the cotton industry environment exceeds the TLV limit which results in the decrease

in pulmonary function. The decrease in pulmonary function is due to inflammation in the body. Inflammation is a reduction of body response. In the lungs, inflammation is usually caused by pathogens or by exposure to toxins, pollutants, irritants, and allergens. During inflammation, many types of inflammatory cells are activated. Each of them releases cytokines and mediators to modify the activity of other inflammatory cells. This cell and molecule orchestration lead to the development of inflammation (Moldoveanu *et al.*, 2009).

Low lung capacity may cause an increase in C-Reactive Protein (CRP) Hancoxa et al (2016). The presence of cytokine removal in the body (TNF-α, IL-1, IL-6) results in inflammatory cell activation and stimulates the liver to produce CRP. CRP is produced rapidly and causes an increase in the number of CRP (Handayani, 2014). CRP is a plasmatic protein from the pentraxin and acute-phase reactant family, which is very useful as a common inflammatory marker (Salazar *et al.*, 2014).

Kapok dust enters through inhaled pathways in healthy subjects with different doses which results in the inflammatory cells, respiratory epithelium, and the release of certain cytokines. This causes decreased airflow, increased CRP, clinical symptoms of fever, and changes in lung function. During inflammation, there is endotoxin which stimulates macrophages to release proinflammatory cytokines and CRP. CRP serum levels can diagnose the process of inflammatory events in the body (Handayani, 2014). Increased CRP may result in increased plasma viscosity so that the blood erythrocyte sedimentation rate will increase. The presence of a high CRP indicates a persistent infection. CRP is produced by the liver as an inflammatory cytokine reaction (Baratawidjaja & Rengganis, 2012).

Kapok industry is one industry that has a risk of dust exposure that can harm the health of employees if it is not managed properly. The low awareness of workers to use good respiratory protection equipment

leads to a higher risk of workers being exposed to respiratory disorders. According to the research (Naini, 2009), workers who do not use Personal Protective Equipment (PPE) have a risk 5.38 times higher for respiratory disorders compared to workers who use PPE such as masks. Mask is one of the PPE that should be used in a dust-production working environment. This is because 90% of poisoning cases are caused by the presence of toxic or corrosion chemicals that enter the body through the respiratory pathways (Sa'diyah, 2013).

Industrial workers are working to make a living by fulfilling their household needs so that the health and safety of workers must be assured. Therefore, it was necessary to conduct further research on the relationship of workers' characteristics and the use of Personal Protective Equipment (PPE) to the increased levels of CRP serum on workers in the Kapuk industry, Mojotengah, Pasuruan regency.

METHOD

The type of research used was observational research by using 'an analytical research design. In terms of time, this research was a *longitudinal study prospective.* This research was conducted in one of the kapok-processing industry at Bandrek, Mojotengah, Sukorejo District, Pasuruan Regency. In this research, the population consists of 12 workers in the household industry of kapok processing in Mojotengah village, Sukorejo District, Pasuruan. The population of the study was a population that meets the criteria of inclusion; (1) employees with an age range of 17-55 years old, (2) working at least 1 year, and (3) willing to become a respondent by following a series of sampling activities in this study. The size of samples was determined by calculation using the Lameshow formula. After being calculated using the Lameshow formula, there were 11 workers as the respondents. The samples in this study were workers who meet the criteria of inclusion. The

method used for sampling was the *simple random sampling* method that all workers have the same opportunity to become samples of this research. The independent variables used in this study were personal kapok dust levels, PPE usage, and worker characteristics such as age, working period, and length of work. While the dependent variable in this study is the increased CRP serum levels of workers.

The Data collection used were interviews, observation, and measurement techniques. The interview technique is done for the data collection on the respondent's characteristic variables including age, working period, and length of work as well as the use of PPE on workers while working. Observation techniques are used to support data collection which is done by interview techniques.

The measuring technique conducted in this study included measuring personal dust levels as well as measuring increased CRP levels of workers. The measurement of personal dust levels is carried out using a Personal Dust Sampler (PDS) tool for 8 hours and uses a Gravimetric method to analyze personal dust levels. Measurement of personal dust content carried out by officers from the Technical Implementation Unit of Occupational Safety Surabaya. Measurement of increased CRP levels was done by sampling the blood of the worker before and after work and analyzed using the method of *fluorescence immunoassay i-CHROMA T^{M} Reader*. Blood sampling on workers was done by officers from Cendana Laboratory, Pasuruan.

The data that had been collected were analyzed gradually from the descriptive analysis of each variable to the analysis using a statistical test that includes Sapiro wilk test, and Spearman correlation test with 95% degree of confidence (α = 0.05). This research had been expressed by certificate No. 414/HRECC. FODM/VI/2019 issued by the Health Research Ethical Clearance Commission of Airlangga University**.**

RESULT

Table 1. Result of personal dust level measurement on kapok-processing industry workers at Bandrek, Mojotengah, Pasuruan, the year 2019

Respondents	Result of measurement (mg/m^3)	>TLV
A	6.42	≤ TLV
B	1.01	≤ TLV
C	1.58	> TLV
D	5.74	≤ TLV
E	0.21	> TLV
F	4.05	≤ TLV
G	1.81	> TLV
H	3.04	>TLV
I	17.93	>TLV
J	11.51	>TLV
K	7.1	>TLV
Mean	5,49	
Minimum	0,21	
Maximum	17,93	

Table 2. Distribution of PPE usage on kapok-processing industry workers at Bandrek, Mojotengah, Pasuruan, year 2019

PPE Usage	N	%
Yes	8	27,3
No	3	72,7

Table 3. Characteristic distribution of kapok-processing industry workers at Bandrek, Mojotengah, Pasuruan, year 2019

Variables	N	%
Age		
31-35	2	18,2
36-40	4	36,3
41-45	2	18,2
46-50	2	18,2
51-55	1	9,1
Mean	41	
Minimum/Maximum	35/53	
Working period		
1-3	1	9,1
4-6	6	54,5
7-9	2	18,2
10-12	2	18,2
Mean	6	
Minimum/ Maximum	3/10	
Length of work		
≤ 8 hours	3	27,3
> 8 hours	8	72,7

Variables	N	%
Mean		8,4
Minimum/ Maximum		6/9

Table 1. indicates that the average of personal dust level measurement result was 5.49 mg/m^3, with the lowest dust content of 0.21 mg/m^3 and the highest one of 17.93 mg/m^3. There were 4 points of dust measurement that result in smaller than the TLV determined by the regulations of Minister of Manpower and Transmigration No. 5 Year 2018 about occupational health and safety of the working environment at 3 mg/m^3. And 7 measuring points exceed the Threshold Limit Value (TLV). Table 2 explains the distribution of PPE among industrial workers in kapok-processing industry. There are 8 workers who use PPE at work and 3 workers who do not use the PPE while working.

Table 3 shows that there are 2 workers (18.2%) aged in the range of 31-35 years, 4 workers (36.3%) aged in the range of 36-40 years, 2 workers (18.2%) aged in the range of 41-45 years, 2 workers (18.2%) aged at range 46-50 years, and 1 worker (9.1%) aged at a range of 51-55 years. The average age of workers is 41 years old with the youngest age of 35 years, while the oldest one is 53 years. Table 3 shows that the minimum working period of workers in the kapok-processing industry at Bandrek in this study is 3 years and the longest working period is 10 years, while the average working period of workers is 6 years. In table 3, it shows that the fastest length of work for industry workers is 6 hours and the longest one is 9 hours. The average length of work is 8.4 hours.

Table 4 shows the results of the CRP content measurement before and after work. The result of the measurement shows that there are 4 workers (36.4%) having increased CRP levels, 6 workers (54.5%) having decreased CRP levels, and 1 worker (9.1%) having fixed CRP levels. The average of increase is 0.02 EU/m^3.

Table 4. Distribution of C-Reactive Protein (CRP) Serum examination on kapok-processing industry workers at Bandrek, Mojotengah, Pasuruan, year 2019

Respondents	CRP levels before (mg/L)	CRP levels after (mg/L)	Description
A	4.25	4.14	Decrease
B	2.85	2.98	Increase
C	3.12	3.01	Decrease
D	3.49	3.32	Decrease
E	5.31	5.36	Increase
F	1.22	1.05	Decrease
G	3.14	3.64	Increase
H	3.7	3.54	Decrease
I	1.44	1.44	Unchanged
J	1.78	1.53	Decrease
K	4.15	4.61	Increase
Mean	3,13	3,15	
Minimum/Maksimum	1,22/5,31	1,05/5,36	

Table 5. Analysis of relationship between dust level and the movement of CRP Serum levels on kapok-processing industry workers at Bandrek, Mojotengah, Pasuruan, year 2019

Variable	CRP Movement (mg/L)	
	Significant Value (p)	
Personal kapok dust level	0,324	Personal kapok dust level

Table 6. Analysis of relationship between ppe usage and the movement of CRP Serum on kapok-processing industry workers at Bandrek, Mojotengah, Pasuruan, year 2019

Variable	CRP Movement (mg/L)	
	Significant Value (p)	
PPE Usage	0,925	PPE Usage

Table 7. Analysis of relationship between workers' characteristics and the movement of CRP Serum levels on kapok-processing industry workers at Bandrek, Mojotengah, Pasuruan, year 2019

Workers' characteristics	CRP Movement (mg/L)	
	Significant Value (p)	
Age (year)	0,005	Age (year)
Working period (year)	0,006	Working period (year)
Length of work (day)	0,004	Length of work (year)

A correlation test is used to see the relationship between the personal dust levels and the movement of CRP levels on workers before and after work. The results of the analysis can be seen in Table 5 which shows a significant value of 0.324. This means that there is no link between the personal dust levels and the movement of CRP Serum on kapok-processing industry workers at Bandrek, Pasuruan, 2019. Table 6 shows the significant value between the uses of PPE against the movement of CRP by 0.925. This means there is no link between the use of PPE and the movement of CRP serum levels of workers before and after work.

Table 7 shows that the significant value between the age to increased CRP was 0.005, meaning that there was a relationship between the worker's age to the increase in serum CRP levels of workers before and after work. The value of the correlation coefficient was 0.780; meaning that the positive relationship between ages to increased CRP was very strong. Table 7 shows the significant value between the length of work against the increased CRP by

0.006. This means that there was a relationship between workers' working period and the movement of CRP Serum levels of workers before and after working. The value of the correlation coefficient was 0.761, meaning that there was a positive relationship between the working period to the increased CRP which was a very strong relationship. Table 7 shows a significant value between the length of work against the movement of CRP by 0.004. This means that there is a relationship between the workers' length of work to the increased CRP serum before and after work. The value of the correlation coefficient between the length of work and the increase in the CRP was 0.787, meaning that there was a positive relationship between the length of work and the increasing CRP, which had been a very strong relationship.

DISCUSSION
Personal Dust Level

Kapok-processing industry is one of the industries that produce dust in its processing. Dust is a solid particle that

originates from human activities and natural processes (Mukono, 2010). Kapok dust is respiratory dust that easily causes the condition of the pulmonary to decline. So that workers are easily affected by diseases, especially diseases that attack breathing organs (Helmy, 2019).

Inspection of dust levels is carried out by officers from the Technical Implementation Unit of Occupational Safety of Surabaya. Dust level check is measured using the PDS tool with a filter from fiberglass material. Dust level inspection is done when the worker performs the kapok-processing process. The TLV of kapok dust has been stipulated in the regulations of the Minister of Manpower and Transmigration No. 5 year 2018 on occupational safety and health environmental work of 3 mg/m^3 for 8 hours a day or 40 hours a week. The result of the average personal dust level measurement was 5.49 mg/m^3. When it is compared to the TLV, the result of the measurement has exceeded the threshold value. This is because the dust particles contained in the kapok-processing industry have a smaller size. The dust that is resulted from the processing process will continuously cause inflammation indicated by the increase in the CRP.

The inhalation of the dust and its accumulation in the body will result in a decrease in lung function and become the cause of immunological symptoms in the respiratory tract. Possible immunological symptoms are asthma and *rhinitis* allergies, toxic pneumonitis (a syndrome in toxic organic dust), *pneumonitis granulomatosa* (Extrinsic allergies to *Alveolitis* and hypersensitivity to *Pneumonitis*), chronic bronchitis and decreased pulmonary function. The mechanism of these symptoms is still not well understood (Vogel et al., 2012; Poole et al., 2010).

CRP Levels

CRP is one of the proteins in the acute phase, belonging to the protein group in the blood, and can be increased in acute phase infections as a form of the non-specific immune response. Recent studies show more evidence that CRP plays an important role in inflammatory processes and host responses to infections including complement pathways, apoptosis, phagocytosis, nitric oxide (NO) release, and cytokine production, especially IL-6 and TNF-α. Unlike recent publications, early findings of the CRP may appear somewhat obscure and sometimes contradictory. Transcription induction of the CRP gene occurs in hepatocytes in the liver as a response to the elevated levels of inflammatory cytokines, especially IL-6. CRP can demonstrate increased expression during inflammatory conditions such as *rheumatoid arthritis*, some *cardiovascular* diseases, and infection. As an acute phase of protein, the plasma concentration of CRP deviates at least 25% during inflammatory disorders. The highest CRP concentrations are found in serum, with multiple bacterial infections increasing up to 1,000 times. However, when the stimulus ends, the CRP value decreases exponentially for 18-20 hours, close to the CRP's half-life. Plasma levels of CRP increased from approximately 1 μg/mL to more than 500 μg/mL within 24-72 hours of severe tissue damage such as trauma and progressive cancer (Sproston & Ashworth, 2018). The rate of CRP according to consensus which is less than 5 mg/L is considered normal. Mild inflammation or mild infections is less than 40 ml/L. Active inflammation or bacterial infections is 40-200 mg/L. Severe inflammatory such as an invasive bacterial infection has some degree of malignancy reaching 500 mg/L (Aguiar *et al.*, 2013; Irving *et al.*, 2010).

This study in table 4, shows an increase in CRP by 36.3%. The causes of increased CRP were an increase in phagocytosis, clearance of Microoba, and cell death (Apoptosis). Those processes are called opsonization. The opsonization occurs not only due to the increase in CRP but also involves other cells of the immune system, especially macrophages and

neutrophils (Baratawidjaja & Rengganis, 2012).

In this study, there was a fixed CRP rate of 9.1% and a decrease of 54.7% as well. This research is in line with research (Handayani, 2014) stating that there are regulatory mechanisms played by Toll-Like Receptors (TLR) to regulate negative-gram bacteria. TLR which recognizes the presence of negative-gram bacteria is TLR4. So that, if negative-gram bacterial levels are high, TLR will be induced. When the negative-gram rate is low, then the regulatory process will not occur.

The relationship between dust levels against increased CRP levels

Based on the Spearman test that had been conducted to see the relationship of personal wood dust levels with the increase in CRP, it was obtained the result of $p= 0,925$ which means that there was no relationship between the personal wood dust levels with the increase in CRP. This is because the size of dust that does not contain endotoxin will not affect the increase in CRP. The inflammatory state of the body will trigger the liver to produce the CRP rapidly and resulting in an increase in it (Sproston & Ashworth, 2018).

The research on dust levels against inflammatory events is characterized by the increase in TNF-α. This is in line with the research that stated that the size of dust that does not contain chemicals or other substances will not affect the inflammatory occurrence (Meifina, 2018). Another study expressed that personal dust levels have nothing to do with inflammatory events. The one that leads to the presence of inflammatory events is the LPS endotoxin. The study said that the presence of an increased level of IL-8 serum will begin with the onset of inflammation. This suggests that even though dust is used as an ingredient extracted to determine the endotoxin levels, the levels of the endotoxin do not originate from dust but the outer components of a negative-gram bacteria wall. So that the cause of the existence of

inflammatory events in the body is not dust (Lusno, 2013).

The Use of Personal Protective Equipment (PPE)

The analysis was using the Spearman test to see the relationship between the use of PPE on workers with the increase in CRP serum before and after work (*cross shift*). It shows the p of 0,925 which means that there was no connection between the use of PPE on workers and the increased CRP serum before and after work (*cross shift*). The PPE used by the kapok-industrial workers has not been considered PPE since it still cannot protect the respiratory tract. This is due to the used PPE having large pores, while the dust can enter through the pore gaps of the PPE used by workers.

According to Perdana & Muliatna (2014) the research that has been conducted, it is stated that there is an influence of the implementation of PPE in workers on occupational health and safety. The PPE used by workers must be worthy and compliant. One of the appropriate PPE to protect workers in kapok industry is a mask. This is because in kapok industry, dust is much produced and there are 90% of poisoning cases due to exposure to toxic or corrosive chemicals that enter the body through the respiratory organs (Sa'diyah, 2013).

The relationship of workers' characteristics to increased CRP levels
Age

Increasing age will be more susceptible to disease, due to changes in the metabolism body and hormonal imbalance. This research is in line with research (Meifina, 2018) which stated the older the age of someone, the more likely the occurrence of inflammatory effects on the worker's body. The inflammatory effect on workers can be known by increased CRP.

From the results of the analysis using a Spearman correlation test, it was

obtained *p*= 0.005 which means that there was a relationship between workers' age with the increase in CRP serum before and after work (*cross shift*). In this research, workers who had increased CRP were those who aged above the average age of workers. The results of this study are reinforced by the result of a previous study which stated that the highest result of CRP levels is found in the older age groups. At a young age, if it is found high CRP examination results, then it is more likely that the inflammation to happen (Wyczalkowska-Tomasik *et al.*, 2016). (Karepowan *et al.*, 2018) stated that a person who grows up will be increasingly susceptible to diseases, due to a decrease in physical condition from the cell to all organs of the body.

Working period

The working period is a vulnerable time for a worker working in the industry where they work. The working period plays a role in determining the length of exposure, resulting in the accumulation of exposure which is a risk factor for the health impact of workers (Aji *et al.*, 2012). This research is in line with research conducted by (Handayani, 2014) stated that the working period causes a decline in lung function because the inhalation of dust will settle into various organs depending on the particle type, and size of particles, exposure length, and pollutants. Dust sized 0.5-25 micron generally harms health. From the analysis of the results using the Spearman correlation test, it was obtained *p*= 0.006 which means that there was a relationship between the working period of workers with the increase in CRP serum before and after work (*cross shift*). In table 2, it was shown that the average working period of a worker in this study was 6 years. Workers who had more than 6 years of working experience suffer increased levels of CRP. The working period can increase CRP levels due to the length of the working period of kapok-industry workers who are exposed to continuous dust and the use of respiratory protection equipment that cannot protect the nose and mouth from dust exposure. It can cause the stimulation of an inflammatory reaction that causes the accumulation of macrophages.

Length of work

The length of work affects the daily dose of exposure that workers will receive (Fujianti et al., 2015). Results of analysis using the Spearman correlation test obtained the result of *p*=0.004, meaning that there was a relationship between the length of the work with the increase in CRP serum before and after work (*cross shift*). This research is in line with the research (Fujianti et al., 2015) which stated that if workers work at a location with high dust content and more than 8 hours of working time, the workers will experience more risk of health problems in the respiratory system. The research is also in line with research conducted by (Deviandhoko, Nur, & Nurjazuli, 2013) stating that there is a meaningful relationship between the length of work with impaired pulmonary function. The longer workers are in the working environment exposed to dust, kapok will accumulate in the body of the worker which will cause disease and inflammatory reactions occurrence. It is supported by the length of working in one day exceeding the limit that is recommended by the regulation of the Ministry of Manpower, which is 8 hours per day in 5 working days within 1 week. More than 70% of workers work more than 8 hours per day.

CONCLUSION

Based on the research that has been conducted, there is a relationship between the characteristics of workers (age, working period, and length of work) and increased CRP serum of workers. Personal moisture measurements result in an average value exceeding the specified TLV. Advice from the conducted research on measured personal dust level which exceeds the threshold value, it is a need to reduce dust levels in the working environment. The

kapok-processing industry is advised to make improvements to the air ventilation system due to the high-dust levels in the working environment and the need to give more attention to the protection of workers. Industry owners are obliged to give orders for workers to use masks that conform to standards like *particulate respirator N series* during work. It aims to reduce exposure to kapok dust. They also need to give more attention to the length of work of each worker to reduce the exposure to those hazardous elements that workers will receive.

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A DESCRIPTION OF THE RELATIONSHIP BETWEEN OCCUPATIONAL STRESS AND BLOOD PRESSURE CHANGES IN WORKSHOP MECHANICS

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ABSTRACT

Introduction: Stress is the occurrence of the individual's emotions, thoughts, and physical conditions. Each individual has the potential to experience stress. Stress that comes from the workplace is called occupational stress. Increased blood pressure is one of the physical impacts of work stress that needs attention due to continuous increase in blood pressure will cause high blood in the worker. The purpose of this study was to describe the overview of the relationship between occupational stress and the change in blood pressure on workers. **Methods:** This was descriptive observational research. Respondents were 30 people (mechanics of the workshop). The variables of this research were occupational stress level and systolic blood pressure changes. The stress level was measured by using a questionnaire, while blood pressure was measured by using the tensimeter. The correlation between stress level and blood pressure was analyzed by using cross-tabulation. **Result:** The results showed that the percentage of respondents with moderate stress levels was higher (53.4%) compared to mild stress levels (46.6%). The percentage of respondents with increased systolic blood pressure was higher (63.3%) compared to respondents with decreased systolic blood pressure (3.4%) and constant blood pressure (33.3%). The percentage of respondents with increasing blood pressure was higher for those with moderate stress levels (93.7%) compared to those with mild stress levels (28.5%). **Conclusion:** It can be concluded that the higher the stress level, the higher percentage of respondents with increasing blood pressure would be.

Keywords: occupational stress, blood pressure, workshops, information.

INTRODUCTION

Stress is the occurrence of the individual's emotions, thoughts, and physical conditions. One of the riskiest places to cause stress is the workplace (Zhang, 2012). Stress that comes from the workplace is referred to as occupational stress, which is distinguished into two types namely *eustress* and *distress*. Mild to moderate stress is called *eustress*. While heavy stress is called *distress*. *Eustress* workers are still able to adapt to the demands of work and can also help improve the productivity of their work. However, workers with *distress* will not be able to adapt and they can reduce the productivity of their work (Li, Cao, and Li, 2016). The main cause of occupational stress is 43% due to the severity of working causation, 43% is due to the salary given less, 43% due to the opportunity to develop a career less, 40% due to unfulfilled employment expectations, 34% due to lack of health insurance provided to workers (Orhani and Shehu, 2017).

Physical impacts that arise include increased blood pressure, headache, migraine, gastritis, backache, asthma, fatigue, lethargy, heart disorders, dermatitis, muscle pain, dietary changes, drinking, sleep, and smoking habits (Zurlo, Vallone, and Smith, 2018). The psychic impacts that can be inflicted include anxiety and depression, avoiding work, direction, tension, anxiety, disappointment, and disagreements between employees. If employees are not able to control the stress they experience, it will negatively affect their behavior of workers (Yaacob and Long, 2015).

Wahjono (2010) explained the source of stress derived from 3 factors namely environmental factors, organizational factors, and individual factors (Wahjono, 2010). The first environmental

factor, the environment affects stress due to the consequences of economic uncertainty, politics, technology, and security. The second factor of the Organization, in this case, is the design of the work given to each individual, the working conditions, and the physical layout of each. Role demands are given to workers as a function of the roles performed within an organization. Interpersonal demands are the pressures that employees give to other employees with poor interpersonal relationships and a lack of social support. Organizational structures such as rules and regulations that determine the level of differentiation in the organization as well as individual participation are potential sources of stress. The leadership of the organization with leadership style. Certain leadership styles can lead to potentially stressful cultures. The third factor is the individual. the individual factor is the factors that exist in each individual such as family issues, economic problems, and the characteristics it possesses.

Continuous increase in blood will result in hypertension. Hypertension is when a person experiences systolic blood pressure above 140 mmHg and diastolic blood pressure above 90 mmHg. Hypertension means that there is a disruption in blood vessels resulting in a lack of oxygen and nutrients required by the body (World Health Organization (WHO), 2013).

The relationship between occupational stress to increased blood pressure is still controversial. Its influence is likely through sympathetic nerve activity that can increase blood pressure as a physical reaction when a person experiences an *intermittent* threat (Sartik, Tjekyan, and Zulkarnain, 2017). Long-lasting stress will increase the height of fixed blood pressure. The condition of stress experienced by the individual, the blood vessels will narrow to raise blood pressure (Poerwati, 2008).

The workshop "Rizki Motor" located in Dupak Surabaya stood since the year 2006, is a private company that provides motorcycle repair and maintenance services. The workshop is located on the roadside of a highway that is widely traversed by motor vehicles, motorcycles, and cars.

Workers work 8 hours a day at the workshop. Weekdays are done from Monday to Friday. The workshop has 2 parts, namely the office part consisting of the head of the workshop, branch head, service administration, and Billing Administration unit. The second part, the field is mechanical.

The workshop "Motor Rizki" is a workshop that is engaged in motor services that have good facilities. Facilities owned by the workshop of Rizki Motor such as waiting room service. There are several facilities provided in waiting room service such as a bench with an adequate amount for consumer needs and some drinks that are provided for consumers to drink. However, there are other facilities provided by the workshop such as the sale of complete spare parts tools, workers with good competence, and tools of good quality. The Motor Rizki Workshop starts at 08.00 a.m. until 04.00 p.m.

Blood pressure measurement for all workers was carried out at the initial observation before and after working. For the workers who work in the office, part of blood pressure tends to be normal and does not undergo changes in blood pressure. However, for the mechanical worker, 16 of the 30 workers acquired the result of undergoing a change in blood pressure. Blood pressure can be caused by several factors such as age, heredity, smoking, overweight, lack of exercise, high salt content, liquor, and stress. Of the above factors, the most likely factor is the stress experienced by mechanical workers, therefore the research was done to describe the working stress relationship with the change in blood pressure.

METHODS

This type of research was a descriptive study with an observational research design. Data retrieval with *the cross-sectional* method was only done once or at a certain time without any repetition

and intervention. The population of this study was 30 people, this research used *total sampling* research so that there were samples of 30 people from the total population. Measurement of occupational stress variables was using questionnaire instruments with a *Likert* scale as a measurement guideline.

Assessment of the measurement results of questionnaires further categorized into 3 ordinal levels, namely low stress, moderate and high. While the change in blood pressure variables was measured through two stages, namely when the respondent had not done the work and after doing the work, it was known blood pressure decreased, fixed, and increased. Based on the measurement result, each variable was done by using cross-tabulation (crosstab analysis) so that the picture of the relationship can be recognized. This research had been feasible and through a test of ethics with an ethical certificate of Ethics by the health Research Faculty of Public Health Universitas Airlangga No. 527-KEPK.

RESULTS

Table 1. Characteristics of respondents by the age category of the workers of "Rizki Motor" workshop in 2017

Age (year)	Amount	Percentage (%)
21 - 30	19	63,4
31 - 40	10	33,3
41 - 50	1	3,3
Total	**30**	**100**

Table 1 shows the majority of research respondents aged between 21-30 years, which was 19 people or equivalent to 63.4% of the entire respondent. Respondents aged between 31 to 40 years as much as 10 people (33.3%) And respondents between 41 and 50 years of age amounted to 1 person (3.3%). The oldest age of the respondents was 47 years and the youngest had 24 years old.

Table 2. Characteristics based on the work stress on the workers of "Rizki Motor" workshop in 2017

Occupational Stress	Amount	Percentage (%)
Low	14	46,6
Moderate	16	53,4
Total	**30**	**100**

Table 2 shows that respondents with moderate working stress conditions were being greater than those with low working stress levels. The number of respondents with low working stress amounted to 14 people (46.6%) And respondents with moderate work stress also amounted to 16 people (53.4%).

Table 3. Characteristics of respondents based on the blood pressure condition of the worker before starting work for a day at the "Rizki Motor" workshop in 2017

Blood Pressure Before Working	Frequency	Percentage (%)
110-120 (normal)	26	86,7
130 (high)	4	13,3
Total	**30**	**100**

Table 4. Characteristics of respondents based on the blood pressure condition of the workers after working for a day in "Rizki Motor" workshop in 2017

Blood Pressure After Working	Frequency	Percentage (%)
110-120 (normal)	11	36,7
130-140 (high)	19	63,3
Total	**30**	**100**

Table 3 shows that the number of respondents who had normal blood pressure before work amounted to 26 people (86.7%) And respondents who had high blood pressure before working was 4 people (13.3%).

Table 4 shows that the number of respondents experiencing normal blood pressure after working amounted to 11 people (36.7%) And respondents who had high blood pressure before working were a total of 19 people (63.3%).

Table 5. Characteristics of respondents based on the increase/decrease in blood pressure of the worker in "Rizki Motor" workshop in 2017

Blood Pressure	Frequency	Percentage (%)
Decrease	1	3,4
Constant	10	33,3
Increase	19	63,3
Total	**30**	**100**

Table 6. Cross tabulation between the stress level with the blood pressure in the "Rizki Motor" workshop in 2017

Blood Pressure	Low Working Stress	
	n	**%**
Decrease	1	7,2
Constant	9	64,3
Increase	4	28,5
Total	**14**	**100**

Table 5 shows that only 1 respondent (3.4%) whose systolic blood pressure decreased. 10 respondents (33.3%) had systolic blood pressure in constant conditions and as many as 19 (63.3%) of the respondents experienced an increase in systolic blood pressure.

Table 6 is a cross-tabulation between low working stress and changes in blood pressure. This table shows that the percentage of respondents who experienced low working stress and blood pressure increased by 28.5%.

Table 7. Cross tabulation between the stress level with the blood pressure in the "Rizki Motor" workshop in 2017

Blood Pressure	Moderate Working Stress	
	n	**%**
Decrease	0	0
Constant	1	6,3
Increase	15	93,7
Total	**16**	**100**

Table 7 is a cross-tabulation between moderate working stress and changes in blood pressure. This table shows the percentage of respondents who experienced moderate working stress which increased blood pressure (93.7%) compared to low working stress (28.5%). Based on the above data can be noted that the higher the level of work the more stress is increased and the more respondents have increased their blood pressure. This research can be said that the higher percentage of respondents with increased blood pressure is also the higher respondents who are experiencing moderate working stress levels.

DISCUSSION

The characteristics of a research respondent are seen from age and gender aspects. Judging from the gender, all employees who are selected as research respondents are men. This condition is in accordance with the condition in the field that all personnel of technicians in the "Rizki Motor" workshop are male. Consideration of the selection of workshop technicians all males because the technician work includes the type of heavy work. This condition is in accordance with gender stereotypes that apply especially in Indonesia, such as men are considered strong so that the type of heavy work is more suitable for men (Atusti, 2011).

The elasticity of the muscles will be reduced with age and the incapability of the body to do a lot of things caused by the tightening of muscle tissue and replaced

with connective tissues. An increase in age experienced a process of organ degeneration that makes the organ function decrease so that people more often in experiencing fatigue and pain in skeletal muscles. Workers who are prone to fatigue are workers aged 40 years and more (Amalia and Widajati, 2019).

The results showed that respondents in this study were only experiencing low working stress and moderate working stress. No respondents in the research are experiencing high working stress.

This condition indicates that the condition of employees in the "Rizki Motor" workshop is still in the fair category because no respondents are experiencing high working stress. This is due to the condition of the workplace. All workers are working for the same duration which is 8 hours a day. Weekdays are done from Monday to Friday. The "Motor Rizki" Workshop is a workshop that engaged in motor services with good facilities, the good competency of the workers, and good quality of tools. For business hours at the workshop, the motor Rizki starts from 08.00 a.m. to 04.00 p.m. The work stress that occurs in employees can be positive and negative. On the positive side, stress can make workers passionate about doing their job and improve their productivity, while on the negative side, stress can make workers depressed and ultimately unable to finish their job resulting in decreased productivity (Wahjono, 2010).

The number of respondents with moderate working stress conditions is greater than with low working stress levels. The percentage of respondents with moderate working stress is higher than the low working stress level. Based on the results, workers feel that they receive too many different requests than others and it is difficult to obtain information that can support their duties so this is what causes stress on workers. Working stress conditions that are in the low and medium category of workers in "Rizki Motor" workshop are expected to still have a positive impact. It can encourage the spirit of the worker to

work hard and also able to improve productivity. Occupational stress can occur when there is an influence from the environment, whether in the work or outside the work that makes the worker psychologically depressed (Widyastuti, 2018). Stress can also increase or decrease the appetite of someone as the result of choosing a high diet of sugar and fat (Wulandari, Widari, and Muniroh, 2019).

Changes in blood pressure can be noted by comparing the condition of the workers' blood pressure before work and the condition of the workers' blood pressure after work. At the time before work, the condition of the pressure of 26 workers was under normal conditions (110 mmHg and 120 mmHg) and only 4 workers had high blood pressure (130 mmHg).

Blood pressure measurement is also performed after work. The worker did a self-measurement after finishing their work. The result shows that 11 respondents had normal blood pressure (110 mmHg and 120 mmHg) and 19 respondents had high blood pressure (130 mmHg and 140 mmHg).

Existing data indicates that the respondent's blood pressure before work ranged from 110-130 mmHg. Most respondents have normal blood pressure with a percentage of 86.7%. Subsequent data indicates that the respondent's blood pressure after work ranged from 110 mmHg – 140 mmHg. Most of the respondents suffered high blood pressure with a percentage of 63.4%. Based on the measurement of the before and after work, the percentage of respondents with increased blood pressure is greater than the decrease in blood pressure.

The increase or decrease in blood pressure experienced by respondents can be categorized into low, medium, and high. 18 respondents experienced low condition blood pressure, 10 respondents had increased blood pressure in the medium condition, and 2 respondents experienced an increased blood pressure in high conditions.

The strong blood pump in the heart can drain too much blood every second to

cause a stiff artery and can not expand during the pumping so that the blood is forced to go through narrow vessels and occur Increase or rise in blood pressure (Babba, 2007).

Related to the results of this research, increased blood pressure of respondents in the low category does not need to be a concern. Otherwise, the increase in blood pressure in the medium category or the high category needs to get attention from the company. The continuous improvement of blood in the employee can lead to hypertension, which is the lack of oxygen and nutrient supply required by the body caused by disorders of the blood vessels (World Health Organization (WHO), 2013). When the supply of oxygen and nutrients in the body of employees is lacking, the employee's work productivity will be decreased so which will harm the company.

The result of a cross-tabulation between work stress and an increased blood pressure level indicates that the percentage of respondents whose work stress is moderate and the blood pressure rises higher than low working stress. Based on the data gained is known that increased work stress carries a meaningful impact on the increase in blood pressure. Working stress workers are at risk of increased blood pressure. In this case, it can be due to exposure from the workplace that can lead to nerve tension so that workers experience working stress. Occupational stress can affect the work of the heart thus causing changes in blood pressure in the workers both increased and decreased (Kadir, 2013). In this condition, there is a required response to occupational stress. The main nerve response to stress is an active activity of the sympathetic nervous system as a whole. As a result of stress stimulation and increased arterial pressure the blood flow increases for the muscles needed to become active so that motor activity becomes fast which results in the body doing a *fight-to-flight* preparation assisted by the *hypothalamus* (Kadir, 2013).

The results of the research are in accordance with the results of the research conducted by Kurniasari and Hidayat (2018)

who showed noted in their research showed a significant relationship between occupational stress and increased blood pressure. Respondents with high working stress will experience elevated blood pressure, while those with low working stress also experience increased blood pressure in the low category (Kurniasari and Hidayat, 2018).

If the stress is not managed properly then the increase in blood pressure can be patoligis/sedentary, so it will cause strokes and heart attacks (Kurniasari and Hidayat, 2018). Companies need to identify the factors that are the cause of stress in this company. There are now guidelines to assess work stress in the company, such as the 5 year old of 2018 about occupational safety and a health [work environment.

According to the estimating 5 years 2018, stress can occur when the psychological factors, among others: role insensitivity, role problems, workload, underpromotion, and responsibility to others (Minister of Manpower of the Republic of Indonesia, 2018). Role undoing is that individuals lack understanding of their rights and obligations to do the work. several studies showed that the result of blood pressure and frequency of heart rate is related to low satisfaction with the job that has been done by the worker. Role conflicts are a psychological symptom of a person that can result in discomfort the taste and a decline in work motivation. Inappropriate expectations delivered by individuals in an organization and outside the organization can lead to role conflicts. The most widely studied individual stressor is a conflict of roles. Various conflicts of roles include erratic and conflicting feelings with supervisors about the job and are required to work with people who do not match themselves. The other conflict is when someone has experienced the burden of work. There are two different types; Quantitative and qualitative. When there is a lot of work to be done but there is not enough time to do it, it is called a quantitative burden. On the other hand, qualitative burden occurs

when the individual feels incapable of performing work or considers that the standard is too high to be achieved. Therefore, companies need to do further research to reduce the level of stress and blood pressure experienced by workers.

CONCLUSION

It can be concluded that most respondents experienced moderate working stress. Most respondents experienced increased blood pressure. The percentage of respondents whose blood pressure increased was higher in respondents who experienced moderate working stress levels. The higher the level of working stress the more respondents have increased systolic blood pressure. Future research are suggested to be done related to the topic of analysis of causal factors and levels of occupational stress, exercise, yoga, vacation, and laughs.

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RELATIONSHIP ANALYSIS BETWEEN KNOWLEDGE, FACILITIES AND BEHAVIOR OF HOUSEHOLD WASTE MANAGEMENT AND INCIDENCE OF TODDLERS' DIARRHEA IN SEDAH KIDUL VILLAGE

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ABSTRACT

Introduction: Determinants of health consist of social and physical determinants; one the factors included in physical determinants is environment. Environmental conditions that aren't healthy can attract flies to land. Diarrhea is caused by vectors (flies) that contaminate food and drink consumed by humans. This research aimed to analyze the strength of the relationship between knowledge, facilities, and behavior of household waste management with the incidence of diarrhea in toddlers in Sedah Kidul Village. **Methods:** This research was a descriptive study with a quantitative approach and a cross-sectional study design. Respondents were selected using simple random sampling from families with toddlers in Sedah Kidul Village as many as 40 respondents. The questionnaire was distributed to respondents to obtain research data. The statistical test used was the contingency coefficient to analyze the strength of the relationship between the variables tested. **Result:** The results showed the strength of the relationship for level of knowledge (p-value = 0.373 and C = 0.269) including the weak category, availability of facilities (p-value = 0.380 and C = 0.267) including the weak category, and household waste management behavior (p-value = 0.763 and C = 0.168) including the very weak category with the incidence of toddler diarrhea. **Conclusion:** The conclusion based on the results of statistical tests is there was no significant relationship between knowledge, facilities, and behavior of household waste management with the incidence of toddler diarrhea, supported by the strength category of the relationship on the three variables.

Keywords: Knowledge, facilities, behavior, waste management, diarrhea

INTRODUCTION

Determinants of health were divided into two categories (social and physical determinants), environmental factor was one of the factors included in the category of physical determinants of health, environmental conditions also one of the physical determinants of health and one of the factors in point five (neighborhood and built environment) in five (5) key areas of Social Determinants Of Health (SDOH) which could affect the risk of human health, health or illness, improved function and quality of life (Healthy People, 2020). Environmental factor was in first rank and the highest factors that affects and determines the degree of public health (Bureau of Communication and Community Services Ministry of Health Republic of Indonesia, 2019).

Environment were home/residence, educational institutions, government agencies, health institutions and other public places and a place for activities those shared in everyday life (Healthy People, 2020). Activities and habits carried out by humans in their daily lives would be determined by how good or bad their health status was, from the individual level to the group level (Ridlo et al., 2019). In addition to activities, humans have an immune system that determines the condition of their health status (healthy/sick); human immunity could keep them from getting sick and, therefore, it must be maintained in various ways (the intake into the body, clean and healthy living habits and related conditions environment) (Wahana and Rochmania, 2019). The clean and maintained environment could prevent various kinds of diseases, not only related to waste problems but also related to chemistry,

biology and socio-culture, also determines how environmental conditions will be created (Bureau of Communication and Community Services Ministry of Health Republic of Indonesia, 2019).

Environmental conditions that aren't clean and healthy can cause various types of diseases; diarrhea is one of the diseases that indirectly caused by the environment. Diarrhea Is one of the most contagious diseases experienced by the population of Indonesia and could spread at various ages (Ministry of Health of the Republic Indonesia, 2011). The prevalence of diarrhea in Indonesia (every year) could be estimated to have increased, based on data from Riset Kesehatan Dasar (Riskesdas) in 2018 which showed the prevalence of diarrhea in Indonesia (based on diagnosis by health workers) in 2013 (4.5%) increased by 2.3% to 6.8% in 2018. The prevalence had increased for incidence of diarrhea among children under five (based on the diagnosis of health workers), where the prevalence in 2013 was 2.4% increasing by 8.6% to 11.0% in 2018 (Research and Development Agency for Health Ministry of Health of the Republic Indonesia, 2018).

Diarrhea could cause another serious condition and even death, and would get worse if it occurs in toddlers (Ministry of Health of the Republic Indonesia, 2011). Another impact of the diarrhea in toddlers was if the toddler wasn't only experiencing diarrhea once or twice, it would result in disruption of growth because diarrhea causes abnormalities in the toddler's digestive tract system (absorption disorders so the necessary nutritional intake isn't fulfilled properly) (Suherman and Aini, 2019). Diarrhea is caused by organisms such as bacteria, viruses and parasites that contaminate food and drinks, then infect the digestive tract (Ministry of Health of the Republic Indonesia, 2011). The incidence of diarrhea can be caused by other risk factors.

The research entitled "Determinants of diarrhea among children under two years old in Indonesia" explained determinant factors have a significant relationship and were essential factors in the occurrence of diarrhea in children under two years of age in Indonesia, namely maternal age, maternal education, type toilet facilities, non-exclusive breastfeeding and bottle feeding (Santika et al., 2020).

Another study entitled "Association between women's empowerment and diarrhea in children under two years in Indonesia" suggested that women's empowerment was necessary for reducing child morbidity and mortality (especially the incidence of diarrhea), besides that the level of knowledge possessed by women (mothers) was proven to have a significant relationship with the incidence of diarrhea in children (Astutik et al., 2020). Based on other research, it was explained that the risk factors for the occurrence of diarrhea in children under five years of age were the level of mother's knowledge, history of breastfeeding, mother's habits in washing hands, type of family toilet, and density of flies (Wijaya, 2012). Other studies that were parallel, showed a relationship between fly density and the incidence of diarrhea (Nurfita, 2017).

The presence of flies is often associated with environmental conditions; clean and healthy environmental conditions can reduce the possibility of flies around the house. It is feared that flies that breed and live around the house can cause health problems (such as diarrhea). Therefore, the problem of garbage piles must be addressed. Waste is one of the factors that influence environmental conditions; the increased volume of waste that is not accompanied by additional facilities and processes to manage waste will cause piles of garbage which can cause problems that affect the quality of the environment. The problem is it will become a hotbed of disease and cause an unpleasant smell. Piled-up garbage will attract the attention of disease-carrying vectors (flies and mice) to live and breed, due to the unpleasant smell that comes out of the garbage pile. Garbage must be handled and managed properly, including sorted, collected to Temporary Shelters (TPS), and

transportation from TPS to Final Processing Sites (TPA) (Bellona and Lagiono, 2015).

Unsuitable household waste management could cause the home environment to become dirty, this would attract flies around the house and allow them to contaminate food (Suherman and Aini, 2019). If waste management is considered trivial and not properly cared for, it could indirectly lead to life-threatening diseases (especially if the disease attacks toddlers whose immune systems aren't as good as adults), one of these diseases is diarrhea (Nurfita, 2017).

Maintaining the environment to be kept clean, healthy and without piles of waste must be accompanied by how someone performs waste management, starting with how someone knows waste management (this is very important) because knowledge about this would underlie someone to act/take action and could contribute positively according to the objectives of waste management (Gusti et al., 2015).

Previous research explained that knowledge has a relationship with a person's behavior in managing waste, where someone who has low level of knowledge has a 0.367 times greater risk of behavior (managing waste) that isn't good and, vice versa, if someone has high level of knowledge then he would do good waste management behavior (Saputra, Sangga N.S., and Mulasari, S.A, 2017). Changes in individual and group behavior toward behaviors that support the creation of the highest degree of health could affect environmental conditions, where positive changes would increase the degree of health that could be maintained for a long time, and, if this continues, it could create a healthier society in the future (Healthy People, 2020).

Based on the description of the background, to find out how is the strength of the relationship between the variables of the respondents' level of knowledge, the availability of facilities, and the behavior of respondents regarding household waste management with the variable incidence of diarrhea in toddlers, especially in Sedah Kidul Village, Purwosari District, Bojonegoro Regency, it is necessary to conduct research that can analyze the strength of the relationship between these variables.

METHODS

The design of this research is a cross-sectional study. This research is descriptive with a quantitative approach. The research location is in Sedah Kidul Village, Purwosari District, Bojonegoro Regency. The time of research was from December 2019 to January 2020. The study population is all families with toddlers in Sedah Kidul Village, Purwosari District, Bojonegoro Regency, totaling 60 families. A simple random sampling technique is used to draw samples and calculate the sample size, to obtain the calculation results that are 40 respondents to become the research sample. The independent variables of this research are knowledge, facilities, and behavior of household waste management and the dependent variable is the incidence of diarrhea in toddlers in Sedah Kidul Village.

This study uses primary data collected from the results of filling in a structured questionnaire given to respondents to measure the variables of the respondent's level of knowledge, the availability of facilities, and the respondent's behavior in managing household waste. The questionnaire contains questions that represent in measuring the level of the respondent's knowledge, availability of facilities, and respondent behavior in carrying out household waste management and the incidence of diarrhea in toddlers in the last two weeks (until data collection is carried out).

Correct answers have a score of 1 and wrong answers have a score of 0 on each question, then the scores are added and divided by the total questions so that the final score will be obtained. The final value (on the variable level of knowledge, availability of facilities, and behavior of

household waste management) is then categorized into four levels, very poor (0 - 24.9), poor (25 - 49.9), good (50 - 74, 9), and very good (75-100).

Data are analyzed by statistical contingency coefficient test to determine the strength of the relationship between the dependent variable and the independent variables. Criterion for analyzing the strength of the relationship was looking at the value of C. The classification of relationship strength is divided into very weak (0.00 - 0.25), weak (0.26 - 0.50), moderate (0.51 - 0.75), and strong (0.76 - 1).

This study has received approval from the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University with the ethical review certificate number : 1769 – KEPK.

RESULTS

This section will explain the characteristics of respondents, the respondents' level of knowledge about household waste management, the availability of household waste management facilities, household waste management behavior, and the incidence of diarrhea in toddlers in Sedah Kidul Village, as well as the results of cross-tabulation and statistical analysis to determine the significance and level of relationship strength between the level of knowledge about household waste management, the availability of facilities and behavior of household waste management with the incidence of diarrhea in toddlers, especially in Sedah Kidul Village, Purwosari District, Bojonegoro Regency.

Respondents' Characteristics

Table 1 shows that most of the respondents were female (38 people; 95%), and aged 30 years and over (23 people; 57.5%), 40% of whom had primary school education (16 people), as well as jobs as housewives (IRT) at 75% (30 people).

Table 1. Distribution of Respondents' Characteristics

Variable	Category	Number (persons)	Percentage (%)
Gender	Male	2	5
	Female	38	95
Age	Under 30 years	17	42.5
	30 years and over	23	57.5
Education	SD	16	40
	SMP	12	30
	SMA	11	27.5
	Other	1	2.5
Profession	Housewife (IRT)	30	75
	Private	2	5
	Traders	1	2.5
	Farmers	7	17.5

Table 2 shows the distribution of level of knowledge, availability of facilities, the behavior of household waste management, and incidence of diarrhea in toddlers in Sedah Kidul Village. From that table, could saw the variable category with most respondents. First, for the variable level of knowledge about household waste management, most respondents were at a very good level of knowledge (20 people; 50%). Variable availability of household waste management facilities found most respondents were in the category of availability of very good facilities (26 people; 65%). In the third variable of household waste management behavior,

most respondents were in the good behavior category (17 people; 42.5%). The last variable was the incidence of diarrhea in toddlers; the category with the most respondents was the category that doesn't have the incidence of diarrhea in toddlers (35 people; 87.5%).

Table 2. Distribution Level of Knowledge, Availability of Facilities, Behavior of Household Waste Management, and the Incidence of Diarrhea in Toddlers

Variable	Category	Number (persons)	Percentage (%)
Level of Knowledge	Very Poor	1	2.5
	Poor	6	15
	Good	13	32.5
	Very Good	20	50
Availability of Facilities	Very Poor	1	2.5
	Poor	4	10
	Good	9	22.5
	Very Good	26	65
Behavior	Very Poor	9	22.5
	Poor	5	12.5
	Good	17	42.5
	Very Good	9	22.5
Diarrhea in Toddlers	Yes	5	12.5
	No	35	87.5

Relationship between Level of Knowledge, Availability of Facilities, and Behavior of Household Waste Management with the Incidence of Diarrhea in Toddlers

The results of cross-tabulation and statistical test analysis of the contingency coefficient between the independent variables (the level of knowledge, availability of facilities, and behavior of household waste management) with the dependent variable (the incidence of diarrhea in toddlers) are shown in Table 3. From this table, it can be seen that respondents who have a very good level of knowledge and don't have diarrhea (16 people; 40%) were the highest among the others. The p-value generated from the test for the variable level of knowledge and the incidence of diarrhea in toddlers was 0.373 and the resulting C value (contingency coefficient) = 0.269. From analysis for the second variable between the availability of household waste management facilities and the incidence of diarrhea in toddlers it is known that the highest number of respondents was in the category of very good facilities and doesn't have diarrhea (21 people; 52.5%), the p-value obtained from the results statistical test was 0.380 and the value of C = 0.267. Cross-tabulation and statistical tests for the variable household waste management behavior with the incidence of diarrhea in toddlers showed that most respondents were in the good behavior variable category and didn't have diarrhea (14 people; 35%), and resulted in a p-value = 0.763 and a C value (contingency coefficient) = 0.168.

Table 3. Cross Tabulation and Analysis of the Relationship Between Level of Knowledge, Availability of Facilities, and Behavior of Household Waste Management and the Incidence of Diarrhea in Toddlers

Variable	Category	Incidence of Diarrhea in Toddlers				Total		p-value	C
		Diarrhea (n)	%	No Diarrhea (n)	%	Amount (n)	%		
Level of Knowledge	Very Poor	0	0	1	2,5	1	2.5		
	Poor	1	2.5	5	12.5	6	15	0.373	0.269
	Good	0	0	13	32.5	13	32.5		
	Very Good	4	10	16	40	20	50		
Availability of Facilities	Very Poor	0	0	1	2.5	1	2.5		
	Poor	0	0	4	10	4	10	0.380	0.267
	Good	0	0	9	22.5	9	22.5		
	Very Good	5	12.5	21	52.5	26	65		
Behavior	Very Poor	1	2.5	8	20	9	22.5		
	Poor	0	0	5	12.5	5	12.5	0.763	0.168
	Good	3	7.5	14	35	17	42.5		
	Very Good	1	2.5	8	20	9	22.5		
Total		**5**	**12,5**	**35**	**87,5**	**40**	**100**		

The conclusion could be drawn based on the results of statistical tests between the independent variable (respondents' level of knowledge, availability of facilities, and household waste management behavior) and the dependent variable (the incidence of diarrhea in toddlers), that there was no significant relationship (presented in Table 3). The absence of a significant relationship between the tested variables was supported by the resulting C value or the contingency coefficient, which for all three independent variables showed the strength of the relationship was in the weak and very weak categories. The level of knowledge about household waste management (C = 0.269) was in the weak category, the availability of household waste management facilities (C = 0.267) was in the weak category, and household waste management behavior (C = 0.168) was in the very weak category regarding the strength of the relationship with the incidence of diarrhea in toddlers in Sedah Kidul Village.

DISCUSSION

A source explained that the improvement of water, sanitation and hygiene (WASH) could reduce the possibility of diarrhea disease; therefore, each component in the WASH intervention needs to be coordinated (not separating one component from another) to run more effectively because the intervention component acts based on their respective interrelated transmission lines. The study

also explained the results of evaluating the influence of intervention (hygiene promotion) on knowledge and it was stated that an increase in knowledge wasn't related to how one's hygiene practices/actions would be better (Mills and Cumming, 2016). Knowledge about health and related matters was something important because it could indirectly affect the degree of health because, based on the knowledge a person had, it would determine the implementation (actions/behavior) of a person's healthy lifestyle either at home or outside the home (Sukmawati, Hasyim and Yanzi, 2016). Good knowledge about public health will support a person in having healthy behavior and in carrying out environmental health activities, which are examples of efforts to prevent diarrhea in toddlers. Environmental sanitation efforts with proper waste management need to be done because garbage is a breeding ground for various vectors (flies, mosquitoes, mice, cockroaches, etc.) which are the cause of various types of diseases, besides that garbage could indirectly contaminate water, land and even food for consumption so that it must be managed properly (Ministry of Health of the Republic Indonesia, 2011). Piles of garbage ere around / close to where the community lives make the community more at risk for adverse and detrimental health effects (having diarrhea, congestion, dry cough, eye irritation, and asthma) compared to people who live far from the pile of rubbish, caused by multiplying disease-causing vectors (Munyai and Nunu, 2020). The long-term solution to solve the waste problem is to manage waste properly, for example with the 3R principle (reduce, reuse and recycle) (Government Regulation of the Republic of Indonesia Number 81 of 2012 concerning Management of Household Waste and Waste of Similar Types of Household Waste). People need to have good knowledge about waste management with the 3R principle so that then they can apply proper waste management and prevent health problems, especially diarrhea. Supporting research states that the risk

factors for diarrhea in toddlers are caregiver's education (caregiver for this case could be interpreted as parents who care for their children) and education about environmental health was preferred. Improved caregivers' education and conducting health promotion on hygienic behavior at the household level, especially in poor environments were linked to reducing the incidence of under-five diarrhea in Kenya (Mulatya and Ochieng, 2020).

In addition to the knowledge that was a risk of diarrhea in toddlers, other factors have a significant influence on how someone had the intention and behavior in terms of managing waste by recycling, was the situational factor (Latif et al., 2012). The situational factor relates to the availability of facilities to manage waste; the provision of waste management facilities was directly proportional to community participation in waste management (the fewer facilities were available, the lower the community would participate in managing waste). High participation of the community in managing waste properly would have a positive impact; the problem of waste and the effect could be reduced or even eliminated, including its health impacts. There is a research which explains that less supportive waste management facilities could influenced a person's intention and behavior in carrying out waste management (Latif et al., 2012).

The Centers for Disease Control and Prevention (CDC) stated that one of the things that could done to save human lives from the consequences of diarrhea is to provide adequate sanitation and adequate waste disposal, so it could be concluded that the provision of sanitation facilities is a step/effort in reducing the risk of diarrhea (Centers for Disease Control and Prevention (CDC), 2015). The Centers for Disease Control and Prevention (CDC) also stated that one thing that could done as an effective intervention for diarrhea problems was to support health promotion programs and behavior change so these were clearer and on target; these support the assumption that

one's behavior could directly affect the incidence of diarrheal disease (Centers for Disease Control and Prevention, 2013).

According to the Government Regulation of the Republic of Indonesia Number 81 of 2012 (concerning Management of Household Waste and Waste of Similar Types of Household Waste) waste management means carrying out activities systematically and thoroughly to reduce and deal with waste problems; the principle that could be implemented in waste management is the 3R (reduce, reuse and recycle) with one of the objectives of waste management, namely to preserve the environment and public health (Government Regulation of the Republic of Indonesia Number 81 of 2012 concerning Management of Household Waste and Waste of Similar Types of Household Waste). Environmental damage can minimize and the quality of the environment can improve for the better by increasing the participation of the community in managing waste properly, so it can prevent public health problems and indirectly improve the quality of life for the better for the next generation of the nation. Waste management is carried out by reducing, namely limited piles, recycling, and reuse and by handling waste, whereby the role of the community in managing waste is very important, especially for managed waste at the household level (Government Regulation of the Republic of Indonesia Number 81 of 2012 concerning Management of Household Waste and Waste of Similar Types of Household Waste). Community behavior in managing waste properly will help the government's efforts in dealing with waste problems and public health problems caused by these waste problems. Proper behavior in managing waste needs to be instilled and intensified so that all people in Indonesia can do it. It is necessary to introduce environmental values to the community, so people will understood and can manage waste properly and reduce the amount of waste (Widyaningsih et al., 2015).

Based on the results of statistical tests on the variable level of knowledge about household waste management and the incidence of diarrhea in toddlers shown in Table 3, the p-value was 0.373, and the value C = 0.269. It meant the level of knowledge about household waste management and the incidence of diarrhea in toddlers had no significant relationship and was supported by the value of C that indicated the level of strength of the relationship between the two variables was weak. Respondents' knowledge about household waste management had the highest number of respondents at very good (20 people; 50%), it meant some of them (16 people; 40%) didn't have diarrhea in their toddlers. A high or good level of knowledge about household waste management would underlie that someone behaves well in terms of managing waste and waste problems could be handled properly so that would reduce the risk of diarrhea in toddlers.

The weak level of relationship strength and the p-value results (no significant relationship) between respondents' knowledge and the incidence of diarrhea in toddlers for this study, wasn't followed by other studies which stated that there was a significant relationship between knowledge and the incidence of diarrhea (using Spearman rank statistical test p-value 0.000 and r 0.395); the correlation coefficient value (r = 0.395) indicated that the relationship between respondent's' knowledge and the incidence of diarrhea was in the weak category (Riyanto and Adifa, 2016). Another study also showed the same results (but weren't followed in this study) that concluded that the variables of maternal knowledge and the incidence of diarrhea in toddlers had a significant relationship (Febrianti, 2019). Similar research wasn't in line with this study and also explained that there was a relationship between maternal knowledge and the incidence of diarrhea in toddlers (the chi-square test produced p-value = 0.040) (Putra, Rahardjo and Joko, 2017).

Another study with different results and in line with this study showed there was no a relationship between maternal

knowledge and the incidence of diarrhea after analysis by statistical tests, (with the chi-square test, the p-value was 0.536) (Jannah, Kepel and Maramis, 2016). Someone who has good knowledge doesn't necessarily apply clean and healthy behavior (PHBS) in his daily life. Based on previous research, it was explained that what respondents knew and understood related to environmental health (especially PHBS) wasn't applied in their daily actions, and in the incidence of diarrhea it was stated there were other factors that influenced, namely cultural factors (Jannah, Kepel and Maramis, 2016).

The knowledge regarding household waste management in Sedah Kidul Village wasn't good yet, this was known based on observations when conducting the research. The trash cans in the citizens' houses were open and, in the village, there was no TPS or TPA so this made people tend to burn piles of rubbish in their yards. The results of statistical test analysis on the variable availability of waste management facilities in the household with the incidence of diarrhea in toddlers are shown in Table 3, resulting p-value = 0.380 and value of C = 0.267. It meant there was no significant relationship and was supported by the C value that indicated the availability of waste management facilities in the household environment and the incidence of diarrhea in toddlers in the Sedah Kidul village had a weak relationship. Very good availability of household waste management facilities in Sedah Kidul Village (26 people; 65%) could be seen from the existence of trash cans in front of the houses of most people which was supported from the village, but it wasn't supported by the provision of TPA or TPS in the village for advanced waste management process. So, even though there were trash cans in each house but there was no garbage transportation to the TPA or TPS, people finally chose to burn their waste in their yards. It could reduce the lure of flies to land on the garbage heap.

The weak strength of the relationship between the availability of household waste management facilities and the incidence of diarrhea in toddlers for this study indicated that actually there might be no significant relationship between these variables; this was supported by other research which explained that there was no significant relationship between the condition of landfills and the incidence of diarrhea in toddlers (the chi-square test results p-value = 0.06). It was also known that waste was processed by burning in the yard of the house so it didn't cause a pile of garbage (Oktariza, Suhartono and Dharminto, 2018). A similar study also stated that there was no relationship between the type of landfill with the incidence of diarrhea in toddlers (chi-square statistical test resulted in p-value = 0.303) (Arimbawa, Dewi and Ahmad, 2016). The same conclusion was found in the relationship between the condition of the landfill with the incidence of diarrhea in toddlers, that there was no relationship described in other studies but with a different p-value = 0.255 and using the same statistical test as the previous study (Langit, 2016).

A similar study about the condition of house waste disposal with the incidence of diarrhea in toddlers concluded that there was no significant relationship between the two variables (chi-square statistical test resulted in p-value = 0.063) (Sidhi, Raharjo and Dewanti, 2016). The condition of the landfill in the household that was one of the components of basic sanitation that might not directly affect the incidence of diarrhea; however, the condition of the landfill could trigger the presence or absence of vectors which carried pathogenic microorganisms that cause diarrhea. Poor conditions for landfills could trigger a high density of flies and could contaminate food or drinks and this would cause diarrhea, especially in toddlers (Putri and Susanna, 2020). In contrast to the previous research described, other studies explained that the condition of the family waste disposal facilities and the incidence of diarrhea had a relationship, with the chi-square statistical test resulted in a p-value of 0.017 (Irfan and Delima, 2018).

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Similar results of the research also stated that the quality of household waste disposal facilities had a relationship with the incidence of diarrhea in toddlers (chi-square statistical test yields a p-value of 0.019) (Putra, Rahardjo and Joko, 2017). The type of trash can, whether open or closed, was also known to have a significant relationship with the incidence of diarrhea in toddlers (chi-square test with p-value 0.028) (Fauzi, Setiani and Raharjo, 2015).

The third variable (household waste management behavior), which was tested statistically with the incidence of diarrhea in toddlers, showed the test results presented in Table 3, resulting in p-value = 0.763 and a value of C = 0.168. This meant there was no significant relationship between household waste management behavior and the incidence of diarrhea in toddlers, supported by the value of C which showed the strength of the relationship was in the very weak category. In Sedah Kidul Village, the community's behavior in managing waste is mostly done by burning garbage in their yard; this could reduce the pile of garbage. Burning garbage aimed to reduce the amount, usually in the morning or evening. Waste management by burning would reduce the interest of vectors which carried pathogenic microorganisms that cause diarrhea (such as flies), so it could be minimized and prevent the incidence of diarrhea in the community, especially in toddlers.

With the very weak relationship between waste management behavior at the household level and the incidence of toddlers' diarrhea in Sedah Kidul Village, it also could be said that the two variables didn't have a significant relationship. It was reinforced by other studies that were in line, and the study explained that household waste management had no significant relationship with the incidence of diarrhea in infants (Dhiana, Hestiningsih and Yuliawati, 2017). Preventing piles of rubbish was done by some people in the working area of the Kedungmundu Health Center, especially in the village area by burning it, while in

residential areas the garbage was collected by garbage officers periodically. Similar studies have concluded that there was no significant relationship between waste management and the incidence of diarrhea (Putri and Susanna, 2020). And other studies, which also examined the relationship between waste management and the incidence of diarrhea, analyzed by the chi-square test, yielded a p-value of 0.605, which indicated that there was no relationship between the two variables. It also explained that the absence of a relationship between the two variables was due to diarrheal disease that was not only caused by environmental factors such as unhygienic waste disposal but could be influenced and caused by many other factors (Tarigan and Munthe, 2018). In contrast to previous studies, other studies have obtained results that showed waste management had a significant relationship with the incidence of diarrhea (the chi-square test produced a p-value of 0.043) (Dini, Machmud and Rasyid, 2015).

This study was in line with previous studies which found that there was no significant relationship between the level of knowledge, facilities, and behavior of household waste management and the incidence of toddlers' diarrhea. The fact that was different from previous research was that the community in Sedah Kidul Village already had a very good level of knowledge regarding household waste management, but it wasn't fully applied in behavior or actions in everyday life. This was because the waste management facilities were less supportive. Sedah Kidul Village doesn't yet have a TPA or TPS as a container for advanced waste management. So to solve the problem of piles of garbage, the community prefers to burn rubbish; this was causing diarrhea for toddlers in Sedah Kidul Village to have no significant relationship with the level of knowledge, facilities, and behavior of respondents in managed waste. The weakness of this study is related to the size of the sample used as respondents, where the

number is too small, so it is less sensitive to detect any relationship between variables.

CONCLUSION

Based on the research, it was known that most respondents were female (95%), aged 30 years and over (57.5%), last education was an elementary school (40%), and were housewives (75%). The results of cross-tabulation and statistical tests showed that there was no significant relationship between the level of respondents' knowledge, availability of facilities, and respondents' behavior related to household waste management and the incidence of diarrhea among toddlers in Sedah Kidul Village. It was supported by the C value or the contingency coefficient, which, for the three variables, showed the strength of the relationship was in the weak and very weak categories. The level of knowledge about household waste management (C = 0.269) was in the weak category, the availability of household waste management facilities (C = 0.267) was in the weak category, and household waste management behavior (C = 0.168) was in the very weak category in the relationship with the incidence of diarrhea in toddlers in Sedah Kidul Village. The community in Sedah Kidul Village carried out waste management by burning piles of garbage in their respective yards.

Suggestions for the village government are that it is necessary to provide TPA or TPS facilities to support the management and handling of waste problems properly so the next waste management processes can be carried out. The principle of 3R waste management needs to be further introduced and implemented in the community so that it can help reduce and handle waste and can increase environmental sanitation efforts and thereby prevent diseases caused by waste problems.

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RELATIONSHIP BETWEEN PHYSICAL WORKLOAD, SLEEP QUALITY, WORK CLIMATE, AND NOISE LEVEL WITH WORK FATIGUE IN ROLLING MILL WORKERS IN SIDOARJO STEEL INDUSTRY

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ABSTRACT

Introduction: Every year 250 million work accidents occur and more than 160 million experience occupational diseases (ILO, 2013). One factor that causes work accidents is unsafe behavior caused by work fatigue. The purpose of the study was to analyze the relationship between physical workload, sleep quality, work climate, and noise with work fatigue in Rolling Mill Steel Industry section workers Sidoarjo. **Methods:** This study is an observational and analytical study with a cross-sectional design. The study population was 34 workers and a sample of 31 respondents were workers in the Rolling Mill section. The sampling technique used simple random sampling. Independent variables were physical workload, sleep quality, work climate, and noise. The dependent variable was fatigue. Spearman correlation test was used to determine the relationship between physical workload and work fatigue. A Chi-square test was used to determine the relationship between sleep quality, work climate, and noise with work fatigue. **Result:** The result showed (61,3%) workers experienced moderate physical workload, (61,3%) workers had good sleep quality, (64,5%) workers worked above work climate threshold limit value, (77,4%) workers worked above noise threshold limit value, and (48,5%) workers had normal fatigue. Statistical analysis shows physical workload (p = 0.031), sleep quality (continuity correction = 0.047), work climate (fisher exact = 0.002), and noise (fisher exact = 0.009) have a relationship with work fatigue. **Conclusion:** This study concludes that physical workload, sleep quality, work climate, and noise have a relationship with work fatigue.

Keywords: fatigue, physical workload, sleep quality, work climate, noise

INTRODUCTION

The rapid development of the industry in Indonesia is encouraging companies to improve industry and production quality. The development of industry has increased the standard of human life, but it can also cause work accidents. Work accidents result in significant losses to the industry. Based on data from the International Labour Organization (2013), work accidents occur 250 million times. In addition to the crash, 160 million workers experience illness as a result of hazards while working. Occupational accidents and occupational diseases have an impact on economic losses in some countries, even reaching 4% of the Gross National Product.

In doing work, two of the common causes of accidents are unsafe work behavior and an unsafe work environment.

Based on these two reasons, work accidents are predominantly caused by unsafe behavior, hitting 80% to 85% of such cases (Anizar, 2013). Unsafe work behavior is one of the effects of work fatigue. So based on the concept of work fatigue risk management proposed by Tarwaka (2015), fatigue does impact unsafe work behavior and with the final impact of increasing the risk of work accidents.

The problem of fatigue is one of the significant issues. Based on a survey conducted in the United States, 24% of patients who were adults who went to the clinic experienced fatigue (Setyawati, 2010). Based on data from the International Labour Organization (2013), over the years 2 million workers in various parts of the world died as a result of workplace accidents caused by fatigue. The study showed the results of 58,115 samples studied, and 32.8% of them experienced

work fatigue. Research conducted by O'Neil (2013) showed work losses due to fatigue, which, if valued materially, can result in losses of $ 1000 / week.

According to Safe Work Australia (2013), the factors causing work fatigue are work schedules, work factors such as workload, sleep quality, and work environment conditions.

In the production process of steelmaking, there are potential hazards experienced by workers. The hazard that occurs is due to the steel casting activity which results in environmental conditions having a hot work climate and high noise intensity. These two factors provide additional workload for workers which results in acceleration of the onset of work fatigue. Harmful effects due to work fatigue result in a decreased focus on doing work, thereby increasing the risk of work accidents.

Based on this explanation, to reduce the risk of work accidents, research on the causes of work fatigue is important to do. The results obtained, can explain and provide recommendations related to comprehensive prevention related to work fatigue so that the risk of work accidents can be minimized.

METHOD

The conducted research was observational analytic research or research conducted by observing the object without giving treatment and conducted to determine the relationship between the independent variables with the dependent variable. The approach used was cross-sectional which means the research was carried out at one time. The population in this study were all workers of the Rolling Mill of the Sidoarjo Steel Industry as many as 34 workers. The sample taken was a portion of the workers using the simple random sampling formula to obtain a research sample of 31 workers. This research was conducted in the Rolling Mill section of the Sidoarjo Steel Industry. Data was collected in February 2019.

The dependent variable in this study was work fatigue. The independent variables in this study included physical workload, sleep quality, work climate, and noise. Data collection techniques were carried out by measuring physical workload by measuring pulse with the Cardiovascular Load (CVL) method, measuring work climate and measuring noise, and filling the Pittsburgh Sleep Quality Index (PSQI) questionnaire.

Spearman correlation test data analysis was used to analyze the relationship between physical workload variables and work fatigue. A Chi-square test was also carried out to examine the relationship between sleep quality, work climate, and noise with work fatigue. (No: 106 / EA / KEPK / 2019).

RESULT
Distribution of Workers' Physical Workload in the Rolling Mill Section of the Sidoarjo Steel Industry

Pulse measurements were carried out to calculate the physical workload received by workers. The measurement results of the pulse were then entered into the Cardiovascular Load (CVL) formula, and a cardio load value was obtained that represents the workload held by the worker. The results were then categorized according to the %CVL category. The physical workload was classified as mild if %CVL is less than 30% and medium if %CVL is between 30% and 60%.

Table 1. Distribution of Workers' Physical Workload in the Rolling Mill Section of the Sidoarjo Steel Industry

Physical Workload	Freq (n)	Percentage (%)
Light	12	38,7
Moderate	19	61,3
Total	31	100,0

The results of the measurement of physical workload showed that the majority or 61.3% of the total workers of the Rolling Mill section of the Sidoarjo Steel Industry received a moderate category of workload.

Distribution of Workers' Sleep Quality in the Rolling Mill Section of the Sidoarjo Steel Industry

Sleep quality can be interpreted as a description of someone's satisfaction with the sleep they experienced (Ohayon, 2017). Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. There were 7 variables of sleep quality assessment which include subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleeping pills, and disruption of activity during the day.

Each component of sleep quality contained questions with a Likert scale. Sleep quality is categorized as good if the PSQI score obtained from the assessment carried out has a value less than 5, and is categorized as poor if it has a value of more than 5.

Table 2. Distribution of Workers' Sleep Quality in the Rolling Mill Section of the Sidoarjo Steel Industry

Sleep Quality	Freq (n)	Percentage (%)
Good	19	61,3
Poor	12	38,7
Total	31	100,0

The estimated sleep quality of 61.3% of the total workers of the Rolling Mill section of the Sidoarjo Steel Industry showed that the quality of sleep was in a good category.

Work Climate in the Rolling Mill Section of the Sidoarjo Steel Industry

Work climate measurements were carried out at 5 points at the Rolling Mill work location. The working climate was measured using a digital instrument measuring the working climate with the brand Questemp. Each measurement point was measured for one minute and the measurement results were obtained in the form of dry temperature (SK), wet temperature (SB), ball temperature (SG), and relative humidity (RH).

Then the measurement results using the work climate formula were calculated and the working climate was obtained in the form of the Wet and Ball Temperature Index (ISBB).

Table 3. Measurement Result of Work Climate in the Rolling Mill Section of the Sidoarjo Steel Industry

Measurement Location	DT (^{o}C)	WT (^{o}C)	GT (^{o}C)	RH (%)	WBGT (^{o}C)
Conveyor A	37,1	29,4	49,1	36,7	37,0
Lower BRF A	34,2	28,8	37,0	66,4	31,2
Upper BRF A	45,5	30,8	49,1	63,7	37,0
Descaller	31,5	26,8	34,2	69,7	28,8
BRF A Control Room	27,6	24,5	27,7	78,4	25,4

Work climate measurements show Conveyor A and Billet Reheating Furnace (BRF) A were the highest working climate locations with temperatures of 37°C. Control Room was the location with the lowest working climate with temperatures of 25.4^{o}C.

Determination related to the fulfillment of the work climate with a Threshold Limit Value (TLV), the results of the work climate measurement were adjusted to the workload. These results were then compared with Regulation of the Minister of Manpower and Transmigration (2018) concerning Occupational Safety and Health at Work Environment. The respondent's work climate was categorized

to be less than the same as the TLV and exceeding the TLV.

The distribution of the work climate shows that the majority or 64.5% of the total workers in the Rolling Mill section of the Sidoarjo Steel Industry worked in climatic conditions exceeding the TLV.

Table 4. Distribution of Work Climate in the Rolling Mill Section of the Sidoarjo Steel Industry

Work Climate	Freq (n)	Percentage(%)
≤TLV	11	35,5
>TLV	20	64,5
Total	31	100,0

Distribution of Noise Intensity in the Rolling Mill Section of the Sidoarjo Steel Industry

Noise in the Rolling Mill of Sidoarjo Steel Industry was measured by an instrument or measuring instrument in the form of a Sound Level Meter. The measurement results in the form of noise intensity. The results of noise intensity measurements at 5 measurement points in the Rolling Mill section of the Sidoarjo Steel Industry are as follows.

Table 5. Measurement Result of Noise Intensity in the Rolling Mill Section of the Sidoarjo Steel Industry

Measurement Location	Noise Level (dBa)
Conveyor A	94,2
Lower BRF A	88,6
Upper BRF A	89,3
Descaller	84,5
BRF A Control Room	80,2

Noise measurement results show Conveyor A point was the highest noise intensity point with a noise intensity of 94.2 dBa. Billet Reheating Furnace (BRF) A Control Room is the point with the lowest noise intensity with a noise intensity of 80.2dBa.

Determination related to the fulfillment of noise intensity with TLV was done by adjusting the results of the measurement of noise intensity with the work time of workers. The results were then compared with Regulation of the Minister of Manpower and Transmigration (2018) regarding Occupational Safety and Health at Work Environment, the noise at the work location experienced by respondents were categorized to be less than the same as the TLV and more than the TLV.

Table 6. Distribution of Noise Level in the Rolling Mill Section of the Sidoarjo Steel Industry

Noise	Freq (n)	Percentage (%)
≤TLV	7	22,6
>TLV	24	77,4
Total	31	100,0

Noise distribution shows the majority or 77.4% of the total workers of the Rolling Mill section of the Sidoarjo Steel Industry were doing work in a condition of noise exceeding the TLV.

Distribution of Workers' Fatigue in the Rolling Mill Section of the Sidoarjo Steel Industry

The measurement of work fatigue used an instrument measuring the reaction time with the light excitatory method. Light excitement was chosen because humans respond to light better so as to provide more accurate measurement results.

The measurement results were then categorized into work fatigue in the normal category if the measurement score is 150-240 milliseconds, light if the measurement score is 241-410 milliseconds, and moderate if the measurement score is 410-580 milliseconds. The following is the distribution of work fatigue for workers in the Rolling Mill of the Sidoarjo Steel Industry.

The measurement of work fatigue shows that workers in the Rolling Mill section of the Sidoarjo Steel Industry

experience work fatigue in the normal, light, and moderate categories. Based on these measurements, the majority or 48.5% of the total workers of the Rolling Mill section of the Sidoarjo Steel Industry experienced work fatigue with the category of normal work fatigue.

Table 7. Distribution of Work Fatigue in the Rolling Mill Section of the Sidoarjo Steel Industry

Work Fatigue	Freq (n)	Percentage (%)
Normal	16	48,5
Light	13	41,9
Moderate	2	6,5
Total	31	100,0

Relationship between Physical Workload and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

The results showed that the majority of workers received a light physical workload or 56.3% of workers experienced fatigue in the normal category. In contrast to workers who received workloads in the light category, workers who received workloads in the medium category, the majority or 76.9% of workers experienced work fatigue in the light category.

Table 8. Relationship between Physical Workload and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

Work Fatigue	Physical Workload				Total	
	Light		Moderate			
	n	%	n	%	n	%
Normal	9	56,3	7	43,7	16	100
Light	3	23,1	10	76,9	13	100
Moderate	0	0	2	100	2	100

Statistical analysis conducted using the Spearman correlation test showed $p = 0.031 < \alpha = 0.05$ which means there is a meaningful relationship between physical workload and work fatigue

Relationship between Sleep Quality and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

The results showed that among workers who experienced good quality of sleep, most of them experienced normal work fatigue 81.2% of the total workers who experienced work fatigue under the category of normal work fatigue.

Whereas workers who experienced poor quality of sleep, the majority experienced mild work fatigue 53.8% of the total workers experienced work fatigue with mild work fatigue category.

Table 9. Relationship between Sleep Quality and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

Work Fatigue	Sleep Quality				Total	
	Good		Poor			
	n	%	n	%	n	%
Normal	13	81,2	3	18,8	16	100
Light	6	46,2	7	53,8	13	100
Moderate	0	0	2	100	2	100

Statistical analysis conducted using the Chi-square test showed the value of Continuity Correction = $0.047 < \alpha = 0.05$ which means there is a meaningful relationship between sleep quality and work fatigue.

Relationship between Work Climate and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

The results showed that workers who work in climatic conditions ≤TLV the majority experienced normal work fatigue at 62.5% of the total workers who experienced normal work fatigue.

Whereas for workers who work in climatic conditions >TLV, the majority experienced mild work fatigue 92.3% of the total workers who experienced mild work fatigue.

Table 10. Relationship of Work Climate with Work Fatigue in Workers of the Sidoarjo Steel Industry Rolling Mill Section

Work Fatigue	Work Climate				Total	
	≤TLV		>TLV			
	n	%	n	%	n	%
Normal	10	62,5	6	37,5	16	100
Light	1	7,7	12	92,3	13	100
Moderate	0	0	2	100	2	100

Statistical analysis conducted using the Chi-square test showed the value of Fisher Exact = 0.002 <α = 0.05 which means there is a significant relationship between work climate with work fatigue.

The Relationship between Noise and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

The results show that workers who did work in noise conditions less than TLV, most of them experienced normal work fatigue at 43.8% of the total workers who experienced normal work fatigue.

For workers who work in noise conditions exceeding TLV. All workers who work in noise conditions exceeding TLV experienced mild work fatigue

Table 11. Relationship between Noise and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

Work Fatigue	Noise Level				Total	
	≤TLV		>TLV			
	n	%	n	%	n	%
Normal	7	43,8	9	56,2	16	100
Light	0	0	13	100	13	100
Moderate	0	0	2	100	2	100

Statistical analysis conducted using the Chi-square test showed the value of Fisher Exact = 0.007 <α = 0.05 which means there is a significant relationship between noise and work fatigue.

DISCUSSION
Physical Workload on Rolling Mill Workers in Sidoarjo Steel Industry

Measurement of the physical workload of workers in the Rolling Mill section of the Sidoarjo Steel Industry found that the majority of workers received workloads in the moderate category.

In general, the workload experienced by workers is influenced by complex factors, both internal and external. Tarwaka (2015) explained that internal factors are factors that originate from within the worker such as work capacity or the ability of workers. While external factors come from the work environment, work, or organization work.

The concept of workload was also conveyed by Salvendy (2012) explaining that workload is influenced by the characteristics of workers, work design and work tools, work environment, work organization, and social and economic impacts due to the work system.

Based on this concept, the moderate workload received by most workers is because, in addition to the workers doing the main work, workers also get additional workload from the physical work environment in the form of work climate and noise.

The work was carried out in the form of benthic work, billet cutting, cleaning, and operating. Workers carry out their work with exposure to the work climate and high noise caused by the steel casting process.

According to Tarwaka (2015) workloads that are currently becoming the workers' workloads are still permitted but have the possibility of being repaired in the future. Based on this concept, supervision is needed so that the workload does not increase to become heavier. This supervision can be done in the environment so as not to increase both climate and noise.

Supervision carried out is one of the applications of the concept put forward by Tarwaka (2015), namely ergonomic balance. Ergonomics balance in the form of

a balance between work capabilities possessed by workers with workloads provided by the company. The ergonomic balance has the main objective of increasing the work productivity of workers and companies.

Sleep Quality of Rolling Mill Workers in Sidoarjo Steel Industry

The sleep quality assessment experienced by workers of the Rolling Mill section of the Sidoarjo Steel Industry found that the majority of workers experienced good quality sleep. Research conducted has results that are in line with research conducted by Putri (2018). The results of the study indicate good sleep quality which is experienced by most of the shift workers I. The concept of sleep quality put forward by Safe Work Australia (2013) stated that sleep quality is influenced by circadian rhythms and work shifts done by workers.

Based on the research and concept, good sleep quality experienced by most workers in the Rolling Mill section of the Sidoarjo Steel Industry is caused by workers doing work on the first shift, from morning to evening, and sleeping at night.

However, from the results of research conducted, there were still some workers experiencing poor sleep quality. Poor sleep quality can occur due to sleep workers, but with a short duration at night between 4-6 hours. The short duration of sleep indicates workers still have activities at night which should be used as sleep time. The activity shows that workers fight their circadian rhythm because the night is a time for sleep and rest.

Working Climate in Sidoarjo Steel Industry Rolling Mill Section

The work climate measurement results show that the majority of work locations in the Rolling Mill section of the Sidoarjo Steel Industry were work climates that exceed the TLV of the specified work climate. Observations that were made show that workers work with work time settings

of 25% -50% and 50% -75% with light and moderate workloads. Based on Regulation of the Minister of Manpower and Transmigration (2018), working climate ISBB (at work time settings 25% -50% of workers work with light workloads at ISBB 32°C and with medium workloads at ISBB 30°C. At work time settings 50% -75% of workers work with workloads mild at ISBB 31°C and with the moderate workload at ISBB 29°C).

The working climate that exceeds TLV in most work locations was due to the steel casting process. Based on Suma'mur (2014), the temperature needed in the steel casting process reaches 1,850°C, which is then released into the environment so that the work environment has a high work climate.

A work climate that exceeds TLV, according to NIOSH (2011) can have several impacts such as disruption of work performance in the form of work fatigue and stolen rest by workers, dehydration, prickly heat, and muscle spasms.

Work climate control is important as a preventive effort to prevent the occurrence of adverse effects due to a high work climate. According to Suma'mur (2014), one of the efforts to control the work climate is by increasing airflow. Efforts to increase air movement can be done by installing artificial ventilation at work sites.

Based on observations made at the Upper BRF A location, there had been artificial vents in the form of blowers to circulate air. However, the blowers were located far from where the workers did their jobs. Based on this, it is suggested to the company to move the position of the blower closer to the location of the worker doing the work.

Noise in the Rolling Mill Section of the Sidoarjo Steel Industry

Noise can be interpreted as a disturbing sound and the presence of it is not expected said Tarwaka (2015). Based on measurements made at the Rolling Mill section of the Sidoarjo Steel Industry, the

majority of work locations were work locations that exceed TLV. Observations made, workers worked with noise exposure for 4 and 8 working hours. Based on Regulation of the Minister of Manpower and Transmigration (2018) ISBB noise (on exposure for 8 working hours is 85 dBa and at exposure for 4 working hours is 88 dBa). Noise that exceeds the TLV is caused by the sound of production machines and work tools.

Furthermore, According to Regulation of the Minister of Manpower and Transmigration (2018) Concerning Occupational Safety and Health, the allowable noise threshold value is 85 dBa with exposure of 8 hours a day or 40 hours a week. Noise exposure that exceeds the threshold value of noise, can have an impact on work disruption which results in a decrease in work productivity.

According to Suma'mur (2014), noise can have an impact on psychological disorders that cause interference with resting and lead to fatigue. Research conducted by Dewanti (2015) suggested the impact of noise can cause hearing loss which can lead to progressive deafness.

Noise control needs to be done at the Rolling Mill of the Sidoarjo Steel Industry because most locations have noise that exceeds the TLV. One of the control efforts that can be done by companies according to Suma'mur (2014) is by controlling noise directly at the noise source. Observation of the work environment was carried out, the production machine naturally produced noise and when interviewed with workers, the engine used has been tried to be installed with a silencer to reduce the noise produced. Further observations found that there were work tools in the form of overhead cranes that should not produce noise, but instead produce noise due to lack of maintenance. So, companies need to conduct immediate maintenance to provide lubrication so that noise at the Rolling Mill of the Sidoarjo Steel Industry can be controlled.

Work Fatigue in Rolling Mill Workers of Sidoarjo Steel Industry

Fatigue measurements performed on workers at the Sidoarjo Steel Industry Rolling Mill section found the majority of workers experienced work to fatigue in a mild category. The measurement of work fatigue was carried out at 02.00 p.m. or before the worker finished doing his work, and at the end of working hours, there had been an accumulation of fatigue since the worker did the work in the morning.

Based on the concepts put forward by Safe Work Australia (2013), the work environment which includes climate and noise is a factor that affects the occurrence of work fatigue. A similar concept was put forward by Suma'mur (2014) who stated that work climate and noise are the cause of work fatigue. Based on this concept, the work environment is an important factor in work fatigue. The environmental conditions of the Rolling Mill of the Sidoarjo Steel Industry were predominantly working climate and noise that were beyond the TLV. These conditions should provide workers with more work fatigue, but based on the results of measurements made, most workers experienced normal work fatigue.

Normal work fatigue experienced by most workers can occur because workers first take a break from 11:30 .p.m. to 12.30 p.m. During breaks, workers ate lunch in the canteen and take a prayer at the company's mushalla. The company provides canteens and mushalla that are comfortable and air-conditioned.

Based on the rest that is the recovery of fatigue experienced by workers, that means when measuring work fatigue, the results obtained are mostly experiencing normal work fatigue. The concept of rest is in line with the concept of Suma'mur (2014) who explained that rest is the most appropriate effort to restore the body's condition from being tired to not tired. Another concept that supports the control of work discharge was also put forward by Dawson (2012), he explained in minimizing mistakes in doing work due to work fatigue,

thus the need for control efforts by taking adequate rest. O'Neil (2013) explained the importance of taking a break because it can minimize work fatigue and maintain optimal productivity.

The Relationship between Physical Workload and Work Fatigue in Rolling Mill Workers in Sidoarjo Steel Industry

Physical workload measurements obtained show physical workload with mild and moderate categories. Workers who received physical workloads in the mild category majority experienced normal work fatigue. In contrast to workers who received a light physical workload, workers who received a physical workload in the moderate category, the majority of it experience mild work fatigue. The difference in physical workload and its impact on work fatigue is due to differences in work activities carried out and the differences in the environmental conditions in which the work is carried out.

This study has results that are in line with research conducted by Pajow (2016) and Kusgiyanto (2017) who explained that physical workload has a significant relationship with work fatigue. Other studies on similar industries conducted by Amalia (2019) also showed the results of a meaningful relationship between physical workload and work fatigue. The results of this study are also in accordance with the concepts put forward by Safe Work Australia (2013) and Suma'mur (2014) which explained that the work fatigue factor is a work factor in the form of work monotony and environmental factors in the form of work climate and noise.

Observations made on workers who do work in the Rolling Mill section of the Sidoarjo Steel Industry are mostly repetitive work within a certain time. Work done repeatedly is a job that tends to be monotonous, this is in accordance with the concepts previously described as one of the factors that cause work fatigue.

The works carried out were benthic, billet cutting, cleaning, and operating work.

In benthic work carried out at the work site, the worker conveyor repeatedly went in and out of the shelter and separated the hot wire rod stack that comes out of the forming machine. In billet cutting jobs, workers worked in half bent to cut billets before entering Billet Reheating Furnace (BRF). In the cleaning work carried out on the descaler and Billet Reheating Furnace (BRF) A Under the workers cleaned mill scale or dust from heating billets. In operating work, the operator operated the Billet Reheating Furnace (BRF) in the control room and stared at the operating monitor for a long time, occasionally exiting the control room to supervise Rolling Mill directly. The four jobs are not only monotonous but also exposed to work climate and noise.

Work fatigue, if not controlled, can cause a decrease in work productivity. Therefore, it is needed to control work fatigue. The concept presented by Tarwaka (2015) explained that the control of work fatigue can be done by setting rest periods and providing food for workers. Provision of more varied work and work reorganization to control work fatigue caused by monotonous conditions.

Relationship between Sleep Quality and Work Fatigue in Rolling Mill Workers of Sidoarjo Steel Industry

The results showed that workers who experienced good quality sleep, most of them experienced normal work fatigue. Whereas workers who experience poor quality of sleep, most experience mild work fatigue. Research conducted has results that are in line with research conducted by Trisnawati (2012) which stated that sleep quality and work fatigue have a meaningful relationship. The concept of fatigue proposed by Potter (2016), one of the causes of work fatigue is sleep disturbance. Sleep disturbance is influenced by several factors, one of which is the shift work system performed by workers. Shift work systems performed by workers can cause interference with workers' circadian

rhythms. The concept of fatigue related to circadian rhythm is strengthened by Satterfield (2013) which explained that the body has a rhythm automatically related to the time of activity and rest, when resting time is used for activity or vice versa, it will disrupt the circadian rhythm and will have the potential to cause fatigue.

Based on this concept good sleep quality should be able to cause a level of normal work fatigue in workers, however, there are some workers with good sleep quality experiencing mild work fatigue.

According to the results, Mild work fatigue can occur because of the condition where workers had good sleep quality but sleep for a short duration at night with the duration of 4-6 hours. The duration of sleep does not provide enough rest time for the body, so the body is not optimal in recovering from being tired to not tired. According to Safe Work Australia (2013), adults need 7 to 8 hours to get to sleep optimally. Therefore, in an effort to maintain and improve the quality of sleep and restore the body's condition from fatigue, workers can sleep at night for 7 hours.

The Relationship between Work Climate with Work Fatigue in Rolling Mill Workers of the Sidoarjo Steel Industry

The results of a study conducted showed that the majority of Sidoarjo Steel Industry Rolling Mill work locations are work locations with a work climate exceeding the TLV. For workers who work in climatic conditions beyond the TLV, most workers get mild and moderate work fatigue. However, the results of the study still found workers who get normal work fatigue.

Normal work fatigue obtained by workers at the Rolling Mill of the Sidoarjo Steel Industry can occur because the worker's body has received an acclimatization process to its work environment. Acclimatization causes the worker's body to become accustomed to the work environment so that the body is not much affected by the work climate that exceeds the TLV.

This research carried out results in line with the research conducted by Ramayanti (2017) and Suryaningtyas (2017) which stated that the work climate has a meaningful relationship with work fatigue. Research conducted on similar industries conducted by Dwiyanti (2019) showed the results of the relationship between work climate and work fatigue. Further concepts according to Jacklitsch (2016) the impact of a hot work climate can lead to heat fatigue or work fatigue due to heat. The working climate results in the body requiring additional efforts to maintain heat balance in the body. Additional efforts are made by the body such as the occurrence of vasodilation, an increase in body skin temperature, and core body temperature that starts with a decrease and then an increase (Soedirman, 2014). These additional efforts result in the body getting tired more quickly because the body requires more energy.

To reduce the impact caused by the work climate, it is necessary to have control of the company. Based on observations made, the company had endeavored to provide drinking water for workers. However, the drinking water provided by the company, especially in the Billet Reheating Furnace (BRF) A work area was quite far from the work location of the workers, because the drinking water supply was placed in the control room location. Efforts can be made by the company to able to provide drinking water closer to the location where the workers do their work. According to NIOSH (2011), efforts to prevent and minimize the effects caused by the hot working climate are to consume 1 glass of mineral water (150-200cc) every 15 to 20 minutes.

The Relationship between Noise Level with Work Fatigue in Rolling Mill Workers of the Sidoarjo Steel Industry

Noise intensity measurements are performed, showing that the majority of

workers carried out work in conditions beyond the noise TLV. At locations with noise intensity below the TLV, most workers experience normal work fatigue. Whereas for workers who perform in noise conditions more than TLV, the majority of them feel mild work fatigue.

Research conducted is in line with the results of research conducted by Paulina (2016) and Ningsih (2018) which stated that between noise and fatigue, there is a meaningful relationship.

This research is in line with the concept put forward by Safe Work Australia (2013) which stated that fatigue is caused by physical environmental factors, one of which is noise. The concept of fatigue is similar, explained Suma'mur (2014) which stated that noise is one of several factors that can cause work fatigue.

Noise control is to reduce the impact of noise experienced by noise receivers or workers. Suma'mur (2014) stated that control can be done using personal protective equipment (PPE). The company implemented controls by providing PPE in the form of earplugs to workers. However, based on observations made, there were found many workers who did negligent work in the use of earplugs. Based on this, there is a need for more intensive PPE supervision so that workers' compliance in the use of PPE in the form of earplugs can increase.

CONCLUSION

The research can be concluded that moderate physical workload, good sleep quality, work climate and noise that exceeds TLV and normal work fatigue are experienced by some workers in the Rolling Mill of the Sidoarjo Steel Industry.

Statistical tests conducted showed that physical workload, sleep quality, work climate, and noise are factors related to work fatigue experienced by workers at the Rolling Mill of the Sidoarjo Steel Industry.

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THE EFFECT OF EDUCATIONAL INTERVENTION BASED ON TRANSTHEORETICAL MODEL FOR A LOW-SALT DIET AMONG HYPERTENSION PATIENTS: A LITERATURE REVIEW

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ABSTRACT

Introduction: This literature review aimed to describe the educational intervention for a low salt diet based on a trans-theoretical model in hypertensive patients. **Methods:** This study was a literature review from several databases such as PubMed, Science Direct, Cochrane library, Ebsco, and ProQuest. This study intended to examine studies related to the application of TTM in educating low salt diets in hypertensive patients published in English in the last 5 years. Data were analyzed by summarizing and categorizing studies and interventions. To assess the quality of the articles reviewed, a critical appraisal was assessed using the CASP Randomized Controlled Trial Checklist and the Joanna Briggs Institute Critical Appraisal Checklist for Quasi-Experimental Studies. **Result:** Five articles were identified and included in the review. A literature review reveals that TTM-based education can change the behavior of hypertensive patients on a low salt diet. Changes in the behavior of a low-salt diet have an impact on clinical changes such as decreased salt excretion in the urine, decreased weight and waist circumference, decreased blood pressure, and the risk of cardiovascular disease. **Conclusion:** TTM can be used to change the behavior of a low salt diet in hypertensive patients which has an impact on changing biochemical indicators of hypertensive patients.

Keywords*: hypertension, low-salt diet, transtheoretical model, literature review*

INTRODUCTION

Hypertension is a common chronic disease in communities. Hypertension is a global health problem affecting more than one-fourth of the adult population (Mills et al., 2016). The prevalence of people with hypertension increases from year to year. Currently, the number of people with hypertension in the world reached 22% of the existing population (WHO, 2019). Hypertension is estimated to cause 17% of deaths worldwide or around 9.4 million deaths annually (Forouzanfar et al., 2017).

Age greatly affects the risk of hypertension. Age 24-35 years has 1.56 times more than age 18-24 and will increase to 11.53 times at age ≥75 years (Rahajeng & Tuminah, 2009). Healthy living habits reduce the risk of hypertension by 38% in women and 43% in men (Bai et al., 2017). Low-salt diet behavior is one of the behaviors suggested by Joint National Committee (JNC) 7 in preventing hypertension-related complications (JNC, 2003). Salt restriction can lower blood pressure and reduce the risk of cardiovascular disease in hypertensive patients (Laatikainen et al., 2016; Ratchford et al., 2019; Yang et al., 2018). However, only 22% of people with hypertension adhere to a low-salt diet (Warren-Findlow & Seymour, 2011).

There are various factors influencing the self-management behavior (SMB) of hypertensive patients including belief in the efficacy of therapy, self-efficacy, social support, and the communication of healthcare workers (Mulyati et al., 2013). Of these factors, communication among healthcare workers has the most dominant influence on SMB. The communication between healthcare workers and patients refers to the education provided to hypertensive patients. The accuracy of health education interventions

can increase a person's knowledge, attitudes, skills, and self-efficacy to independently carry out independent nursing practice (Irwan et al., 2016). Therefore, an appropriate educational intervention is needed for the behavior change of hypertensive patients, especially the low-salt diet.

One of the educational models that can be used in changing patient behavior is the transtheoretical model. TTM is also known as the "stages of change" theory. The TTM changes behavior gradually so that the subjects' behavior does not change drastically. This has a better impact that relapsing can be minimized. TTM describes the behavior change stages by including several main components, namely, the stages of change, the processes of change, decisional balance, and self-efficacy (Prochaska et al., 2009). Decisional balance involves consideration of the pros and cons of changes that will be made, self-efficacy concerns the belief in the self-ability to overcome risky situations without returning to old habits, and termination relates to the desire to return to old habits. The three components are interrelated with the stage of change and processes of change (Prochaska et al., 2009). Stages of behavior change in TTM consist of pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska JO, 2013). In the application of TTM, patients are given an intervention based on the stages of the change.

TTM has been widely used in changing patient behavior, especially in chronic diseases such as diabetes (Arafat et al., 2016; Lin & Wang, 2013), physical activity in patients with multiple sclerosis (Plow et al., 2011), and colostomy self-care (Wen et al., 2019). There are several studies applying TTM to the case of hypertension but have not given consistent results. Besides, previous studies discussing the effectiveness of TTM in changing the behavior of a low-salt diet in hypertensive patients used the randomized controlled trial (RCT), quasi-experimental, and cross-

sectional design. RCT is a research design with a low risk of bias so that it has a high level of confidence in the research results obtained.

However, there is no literature review on this topic. Through literature review, a comprehensive picture is obtained from various previous studies that can be the basis for evidence in conducting an intervention. Therefore, this study was designed with a literature review of existing studies. This literature review aims to describe the effect of a low salt diet educational intervention based on a transtheoretical model in hypertensive patients.

METHOD
Design: a literature review
Searching strategy

The searching strategy refers to the use of several keywords related to research questions in searching the database. Since the terms used vary, the author used various keywords by inserting the words "and" and "or" to ensure that all related studies can be taken. The keywords used in all databases were as follows:

P : 'hypertension' OR 'hypertensive' OR 'high blood pressure' OR 'elevated blood pressure' OR 'htn'

I : 'transtheoretical model' OR 'trans-theoretical model' OR 'stage of change' OR 'TTM' OR 'SOC' OR 'behavior change'

C : 'usual care' OR 'standard education' OR control OR 'no intervention'

O : 'Low-Salt Diet' OR 'Low salt diet' OR 'Low-Salt Intake' OR 'low sodium intake' OR 'DASH Diet' OR 'sodium level intake' OR 'sodium dietary' OR 'salt reduction' OR 'salt restriction'

Study criteria

Inclusion criteria

In this literature review, the author determined the study criteria. There were: (1) the population is adult with hypertension, (2) quantitative studies with intervention, (3) intervention given is only

transtheoretical model, (4) research results in the form of low-salt diet behavior, (5) studies conducted in the last five years (2015-2019), and (6) studies from all countries written in English will be accepted.
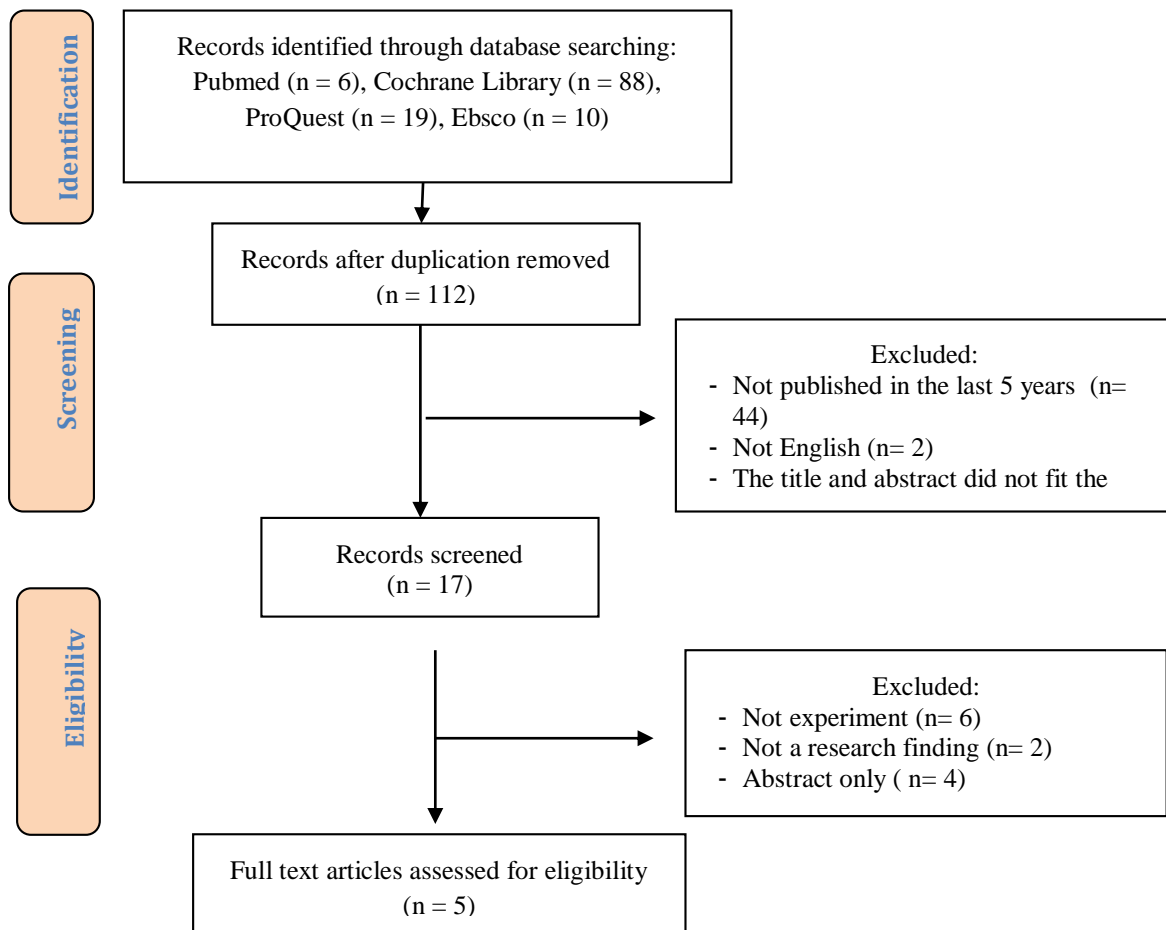
Exclusion Criteria

The exclusion criteria in this literature review were (1) studies that examine patients with hypertension complicated by other diseases, (2) studies that provide additional interventions other than TTM, and (3) studies that are without interventions.

Article selection

The study selection process consists of four steps (Figure 1). The first step was the identification of articles from all search databases that were published in the last 5 years (2015-2019) (n = 44), not in English (n = 2), and the title and abstract were not in accordance with the research question (n = 49) to obtain 17 articles. In the second step, the author screened the non-research articles (n = 2), abstract only (n = 4), and not experimental/qualitative (n = 6), to obtain five articles. The third step was eligibility, in which the author checked the duplicated articles and then conducted a feasibility test of the inclusion criteria and the final result was five articles. Furthermore, in this step, the author evaluated the quality of articles that have been tested for eligibility by using the instrument that will be submitted in the article quality assessment section. The final step (included) was a literature review of the five articles that had gone through the selection.
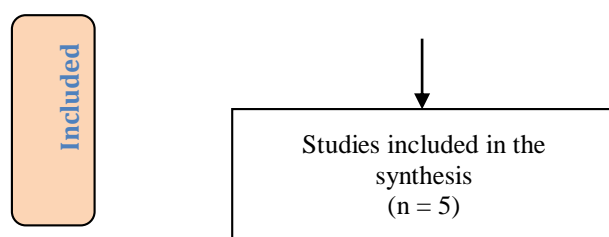

Identification

Records identified through database searching: Pubmed (n = 6), Cochrane Library (n = 88), ProQuest (n = 19), Ebsco (n = 10)

Records after duplication removed (n = 112)

Screening

Excluded:
- Not published in the last 5 years (n= 44)
- Not English (n= 2)
- The title and abstract did not fit the

Records screened (n = 17)

Eligibility

Excluded:
- Not experiment (n= 6)
- Not a research finding (n= 2)
- Abstract only (n= 4)

Full text articles assessed for eligibility (n = 5)

Figure 1. PISMA Flowcharts for study selection and inclusion

Quality assessment of articles

Critical appraisal was carried out to ensure that an article was reported clearly, completely, and transparently (Buccheri & Sharifi, 2017). This literature review used guidelines to analyze the quality of the selected articles. For the RCT study, the instrument used was the CASP Randomized Controlled Trial Checklist (CASP, 2018). For studies with a quasi-experimental design, the quality was assessed using the JBI Critical Appraisal Checklist for Quasi-Experimental Studies instrument. The assessment results were used to inform the synthesis and interpretation of research results (The Joanna Briggs Institute, 2017).

Data extraction

In this study, the data extraction tool was designed to guide information from records in accordance with the research objectives. Data extracted in each of the articles included: author, year, population and setting, study design, research objectives, methods and interventions, instruments used, and follow-up time and outcomes of each study. Furthermore, the data extracted in the results section included: name and year of research, research objectives, research design, research samples, instruments used, and research results.

Data synthesis

Data synthesis was carried out qualitatively. All studies using a low-salt diet education with a transtheoretical model approach are reported in this literature review.

Ethical consideration

This literature review obtained the ethics approval of the Ethics Commission of STIKES Nani Hasanuddin with a number 097/STIKES-NH/KEPK/XI/2020.

RESULTS
Search result

Diagram 1 elaborates on the literature search based on PRISMA. Out of 123 article titles identified, eight articles fit the research question but there were three duplicate articles. Thus, five articles were obtained. Next, an assessment of the quality of articles was carried out to gain five articles for literature reviews. The results of the search result are depicted in detail in Figure 1.

Characteristics of the synthesized articles

The overview of the five articles reviewed was summarized in the characteristics associated with the TTM-based intervention on the low-salt diet behavior of hypertensive patients. Regarding the interventions given, the instruments, follow-up, and results are presented in Table 1. In this literature review, there were three articles on RCT design, one article on quasi-experimental design, and one article on analytical design.

The interventions given in each study were varied such as dietary education using a self-monitoring tool for urinary sodium excretion (Yasutake et al., 2018), telephone-based tailored Stage-Matched Intervention (SMI) (Friedberg et al., 2015), CORFIS program (Karupaiah et al., 2015),

e-counseling (Liu et al., 2019), and the WASHOKU-modified DASH diet. The five studies aimed to evaluate low-salt diet behavior in hypertensive patients with TTM-based intervention. The five studies were conducted in different countries namely the USA, Japan, Canada, and Malaysia.

Table 1. Grid Synthesis

Author, Year	Research design	Aim	Sample, Intervention	Outcome measure	Outcome
Yasutake et al. (2018)	RCT	To evaluate the education of salt reduction using self-monitoring of urinary salt excretion tool	123 patients in Japan got Low-salt diet education using self-monitoring tools	Salt check sheet, questionnaire on low-salt diet behavior, measurement of blood pressure before and after the intervention for 4 weeks	Low-salt diet behavior increased significantly in the intervention group than in the control (p= 0.049). The results of the 24-hour urine Na: K ratio also showed a significant reduction in the intervention group compared to the control group (p= 0.033). However, there were no significant changes in blood pressure in either group (p= 0.736).
Friedberg et al. (2015)	RCT	To determine whether specialized TTM-based telephone counseling interventions are effective in developing stages of an individual's diet and improving compliance with the DASH dietary pattern.	533 patients in the USA were divided into three groups namely the Staged-Matched Intervention (SMI) group (n = 176), nontailored health education intervention (HEI) (n = 180), and usual care (n = 177).	The Harvard DASH Score was validated with the Willett Food Frequency Questionnaire measured at baseline and 6 months post-intervention	SMI was significantly more effective in having a higher proportion in the stage of treatment or maintenance of dietary changes compared to the usual care group (56% vs. 43%, p = 0.01). SMI increases overall adherence to the DASH-style diet DASH (p=0.02). However, for the eight DASH diet domains, there was no significant change, including the low-salt diet behavior (p = 0.29). Blood pressure significantly decreased in the SMI group compared to the control group (p= 0.001)

Author, Year	Research design	Aim	Sample, Intervention	Outcome measure	Outcome
Liu, Tanaka, Barr, & Nolan (2019)	RCT	Evaluating the effectiveness of e-Counseling to encourage healthy lifestyle behaviors and assessing changes in blood pressure and the Framingham Risk Index	A total of 264 patients in Canada were divided into an intervention group and a control group. the intervention group received emails about motivation and self-care behavior gradually over 12 months while the control group received only regular care	Dietary behaviors were assessed using 24-hour urine samples, and cardiovascular outcomes were assessed by measuring blood pressure and the Framingham Risk Index (FRI) measured before the intervention, the 4th month, and the 12th month of post-intervention.	The results showed that sodium levels in the urine at month 12 were not significantly different between the two groups (p = 0.29). However, gender analysis revealed that only women in the e-counseling group showed a significant reduction in urine sodium 24 hours towards baseline (p = 0.045) which was greater than the control group (p = 0.02). Systolic blood pressure in the intervention group decreased significantly (p = 0.045) and FRI (p= 0.54). However, if the behavior of physical activity, diet salt, and consumption of fruits and vegetables were combined much better in changing BP (p = 0.002) and FRI (p = 0.009).
Karupaiah et al. (2015)	Quasi-experiment	To examine behavior related to regular exercise, salt intake reduction, and increased consumption of fruit and vegetables in the Community-Based Cardiovascular Risk Factors	209 patients in Malaysia were given CORFIS Program for 6 months. Patients were divided into 3 groups namely non-compliance, new-compliance, and total compliance. Each group	Blood pressure consisted of systolic and diastolic, and body weight, and waist circumference was measured before and after the 6th month of intervention.	Low-salt diet behaviors reduce: - systolic blood pressure (non-adherent group (p= 0.667), new adherence group (p<0.001) and fully adherent group (p<0.001)) - diastolic blood pressure (non-adherent group (p= 0.177), new adherent group (p =0.005) and fully adherent group (p<0.001)) - body weight (non-adherent group (p=

Author , Year	Research design	Aim	Sample, Intervention	Outcome measure	Outcome
		Intervention Strategies (CORFIS) patients with hypertension through the application of Stage of Change	was given motivation and education related to physical activities, a low-salt diet, and fruit and vegetable intake.		0.779), the new group was adherent and fully adherent (p <0.001)) - waist circumference (non-adherent group (p= 0.458), the new group was adherent and fully adherent (p <0.001))
Kawam ura et al., (2019)	An open-label single-arm trial	To examine the relationship between behavior changes of hypertensive patients receiving DASH diet education on dietary adherence and self-efficacy	43 hypertensive patients in Japan were treated on the DASH-JUMP diet for 2 months and evaluated for up to 4 months after the intervention.	The survey was conducted using the modified Perceived Health Competence Scale (PHCS) questionnaire Japanese version and stage of change behavior questionare.	After the intervention for 4 months, the results were obtained that there was a significant decrease in salt intaken (p= 0.03). The decrease in salt intake had an impact on lowering blood pressure (systolic: p=0,000; diastolic: p= 0.006).

Quality assessment results

All studies with the randomized controlled trial (RCT) had good quality. As for one article conducted by Liu et al., (2019), out of 11 questions, all questions were answered "yes". Research conducted by Friedberg et al. (2015) has one answer no to the question of the number of samples used until the end of the study. Meanwhile, the research conducted by Yasutake et al. (2018) contained ten questions with "yes" answers and two questions with "no" answers. The question with the answer "no" is in the question of the number of samples used until the end of the study and the application of the research results where

according to the recommendation of the researcher it is better to take into account the characteristics of the sample similarity in applying the research. For a quasi-experimental study, there was one article by Karupaiah et al. (2015) that had good quality, in which out of nine questions, all of the questions were answered "yes". An analytical study conducted by Kawamura et al. (2019) using quasi-experimental CASP did not have a control group out of nine questions there were eight questions were answered "yes".

Effect of education on behavior change

There were three studies examining the effectiveness of TTM education on

behavior changes to a low salt diet (Friedberg et al., 2015; Kawamura et al., 2019; Yasutake et al., 2018). All studies showed a significant change in the behavior of a low-salt diet

Studies conducted by (Friedberg et al., 2015) using Telephone-based Stage-Matched Intervention (SMI) was given for six months. Every month, the patients received an education sequence on their diet, exercise, and medication. The education component provided is based on the stages of behavior change. When the patients had switched the stages in the following month, the education component provided also changed. The study showed better behavior change in the group adjusted for behavior stages than in the unadjusted group and the control group.

The findings are the same in a study conducted by (Kawamura et al., 2019). This study showed that DASH-JUMP diet education was able to encourage behavior change in hypertensive patients. In this intervention, the patients were given a DASH-JUMP diet for two months. In the next four months, they returned to their normal diet. Participants' self-efficacy and health behavior changes were examined initially and after the 1st, 2nd, 3rd, and 6th months.

Studies conducted by (Yasutake et al., 2018) also showed a significant change in the behavior of a low-salt diet. At the end of the intervention, the majority of patients were in the action and maintenance stages. In this study, the patient was given a tool for self-monitoring of urinary salt excretion. This intervention was carried out for four weeks in which the 24-hour urine was monitored daily using the tools provided. The results of monitoring are a benchmark for patients' salt intake.

Effect of education on urinary salt excretion

There was two study asses the effect of education on urinary salt excretion (Liu et al., 2019; Yasutake et al., 2018). Studies conducted by (Liu et al., 2019) assessed urinary sodium which showed no significant reduction in either group. However, when it was analyzed further, female participants in the intervention group experienced a significant reduction in urinary sodium. This study provided education using the web. Patients received 28 sessions of education that was linked to their email. In the first 4 months, patients were sent education every week, and for the next 4 months, education was given every 2 weeks, and the last 4 months were given monthly. The materials given were in the form of videos and handouts of motivation and self-care training.

In contrast to this study, a study conducted by Yasutake et al., (2018) examined the overall 24-hour urinary excretion. The results of this study showed a significant difference between the intervention group and the control group in the Na: K ratio.

Effect education on weight and waist circumference

There was one study that examined the effect of education on weight loss and abdominal circumference (Karupaiah et al., 2015). This study provided education with a community-based CORFIS program approach. In the community-based intervention, education or counseling is provided by a team consist doctors, nurses, nutritionists, and pharmacists. This education involved 209 patients who met the criteria and followed the education program provided for 6 months. Educational materials included the motivation and behavior changes related to blood pressure control such as exercise, a low-salt diet, and fruits and vegetables intake. The results of this study indicate that education on a low-salt diet in the adherent group both at the action and maintenance stages was able to lose weight and reduce waist circumference.

Effect education on blood pressure

All the studies reviewed also assessed changes in the blood. The results

showed different blood pressure changes obtained from the four studies. Studies by Karupaiah et al., (2015), Kawamura et al., (2019), Friedberg et al. (2015), and Liu et al., (2019) revealed that a patient's low-salt diet has a significant impact on lowering blood pressure. On the contrary, a study conducted by Yasutake et al., (2018) showed no impact on blood pressure in hypertensive patients. Another result obtained was a decrease but not significant in the Framingham Risk Index (FRI) which is a measurement of cardiovascular disease risk (Liu et al., 2019). Low-salt diet in the intervention group has much more impact on lowering systolic blood pressure, diastolic blood pressure, and 12 months FRI compared to the control group if combined with physical activity and consumption of fruits and vegetables.

DISCUSSION

This literature review aimed to describe the educational intervention for a low salt diet based on a trans-theoretical model in hypertensive patients.

Effect of education on behavior change

Despite yielding different results, the three studies show positive behavior changes. This is in line with researchs conducted by (Arafat et al., 2016; Lin & Wang, 2013; Plow et al., 2011; Wen et al., 2019) which suggest that TTM-based education can change patient behavior to be positive. In the application of the trans-theoretical model, the interventions given are in accordance with the stages of the changes related to the patient's readiness to change (Prochaska JO, 2013). Stages of change in the trans-theoretical model are influenced by the hypertensive patients' self-efficacy which is one of the constructs of TTM itself (Prochaska JO, 2013). This is reflected in a study conducted by Kawamura et al. (2019) which showed that an increase in self-efficacy had an impact on a patient's behavior change. Warren-Findlow, Seymour, and Huber (2012)

suggested a similar result that self-efficacy is closely related to the self-care of hypertensive patients. Further studies by (Lee et al., 2011; Plow et al., 2011) showed that through TTM-based interventions, a patient's self-efficacy can be increased for a patient's behavior change.

Effect of education on urinary salt excretion

The behavior of a low-salt diet is reflected in the amount of salt excretion in the urine. Analysis of the amount of salt excretion in the urine provides feedback regarding their salt content. Assessment of the amount of sodium excretion in the urine is a standard measurement method for assessing a person's salt consumption (Ortega et al., 2011). The results of this study are in line with a study conducted by (Ortega et al., 2011) that patients with excessive salt consumption will show an increase in the amount of sodium excretion in the urine. Conversely, a person with less salt consumption shows a low excretion of sodium as well

Effect education on weight and waist circumference

Low-salt diet behavior also has an impact on weight loss and waist circumference. The results are supported by (Stolarz-Skrzypek et al., 2011) which proved that a person with excessive salt consumption has an increase in body weight associated with diet. Adding salt and flavorings increases a person's appetite, which can lead to weight gain and stomach circumference. However, at the age of children and adolescents, excessive salt consumption does not have a significant effect on changes in body weight (Libuda et al., 2011).

Effect education on blood pressure

Patient compliance with a low-salt diet affects the human cardiovascular system. Four studies showed significant changes in lower blood pressure and one

study proved that the low-salt diet minimizes the risk of cardiovascular disease. This is corroborated with research conducted by Laatikainen et al., (2016), Ratchford et al., (2019), and Yang et al., (2018) that a low-salt diet can lower blood pressure and prevent the risk of complications such as cardiovascular disease. One study that resulted in no change in blood pressure after a low-salt diet showed that the intervention was only given for 4 weeks. The duration is much shorter than the duration of other interventions. In a literature study conducted by He, Li, & Macgregor (2013), it was suggested that reducing long-term salt intake has an impact on lowering the blood pressure of hypertensive patients. The low-salt diet affects plasma renin, aldosterone, and noradrenaline activity which is becoming more controlled. This shows that a low-salt diet needs to be carried out continuously and consistently to lower blood pressure which is the main goal of the low-salt diet behavior.

However, some studies did not only cover the low-salt diet. Increased weight loss activity, physical activity, and increased intake of fruits and vegetables also have an impact on lowering blood pressure. Research conducted by Liu, Tanaka, Barr, & Nolan (2019) showed that a low-salt diet, increased fruit and vegetable intake, and physical activity provide more significant results in lowering blood pressure. This is certainly in line with recommendations from JNC 7 regarding the self-care behavior that patients with hypertension need to do (JNC, 2003). Adhering to self-care behaviors can lower blood pressure, increase the effectiveness of antihypertensive drugs, and reduce complications and mortality associated with hypertension (Weber et al., 2014). To find out which intervention is the most effective, further studies are needed to compare the effect of the three interventions in lowering blood pressure.

Limitation

This literature review has limitations in the review, namely the lack of studies used and studies used not only focusing on low-salt diets. Intervention using the salt excretion monitoring tool which is carried out independently is also only carried out for 4 weeks whereas changing a person's behavior requires a minimum of 6 months. Thus further research is needed that takes into account the focus of the data, the number of samples, and the length of the adequate intervention so that the evaluation of changes in behavior between groups is more accurate.

CONCLUSION

The application of TTM-based education is effective in changing patients' low-salt diet behavior. Patients' readiness to change is an important thing that needs to be assessed before giving an intervention to find out which intervention is the most appropriate to be given. Low-salt diet education has an impact on changes in biochemical indicators of hypertensive patients. Among them, are decreased urine sodium, decreased body weight and waist circumference, decreased blood pressure, and risk of cardiovascular disease. Thus, education on a low salt diet in hypertensive patients can be carried out using the Trans-theoretical Model approach.

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OUTCOMES OF MANAGEMENT DEVELOPMENT PROGRAM FOR EMPLOYEES OF NADHLATUL 'ULAMA HOSPITAL

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ABSTRACT

Introduction: The various management development interventions that have been implemented seem to have not identified the characteristics of the role model, perceived control, and understanding of the Management Development Program (MDP) itself. The MDP effectiveness evaluation model also seems to have not received much attention. Analyze the influence of the characteristics of the Management Development Program, i.e., role models, feelings of control, and understanding that result in organizational commitment, utility, and participatory Behavior. **Methods:** The research population was 130 employees of NUH Jombang. Samples were taken using a simple random sampling technique of 100 employees from various work units. Statistical analysis used is path analysis to determine the direct and indirect effect on organizational commitment, utility, and participation behavior. **Results:** The higher MDP characteristics that consist of role model, perceived control, and understanding will be followed by high organizational commitment, utility, and participative behavior as positive outcomes. **Conclusion:** The study results can improve understanding of the characteristics of the relevant Management Development Program to improve employee outcomes. Employee outcome, i.e., organizational commitment, Utilities which include intrinsic – extrinsic – organizational benefits, behavior that includes the willingness to participate in development activities, innovative behavior that is beneficial to the organization, and sharing opinions.

Keywords: Management Development program, organizational commitment, participative behavior, utility

INTRODUCTION

The Management Development Program (MDP) is an educational and training development activity designed to encourage professional skills to improve managerial skills and employee competencies (Nuraini *et al.*, 2015). The purpose of MDP is to improve organizational learning and development, prepare employees to learn managerial roles (Bell *et al.*, 2017), and increase willingness to invest in self-development (Lejonberg *et al.*, 2018). MDP increases productivity, knowledge, and loyalty and contributes to the organization.

However, the factors in MDP have not reflected positive results for the organization. The evaluation of the effectiveness of MDP has received less attention from the organization (Balu, 2019). Researchers have carried out many studies on training or specific interventions in management but still, few have examined perceptions of the general characteristics of MDP. Previous studies have primarily focused on one particular type of training or development intervention but have not focused on MDP characteristics (Carballo, 2020). Previous studies have seldom examined the characteristics of MDP, which provides theoretical support for the results of MDP. Studies of the psychological

processes that affect program participants or program participants' appreciation of MDP are rare.

The weakness of the literature study makes learning development and MDP positive results appear complicated. It also complicates learning the development and positive outcomes of MDP. MDP and its results are influenced by various individual, organizational, and training design characteristics (Bell *et al.*, 2017). The variety of interventions and content of the MDP used in practice predominantly affects the number of interventions studied. Examples of management development interventions are training, mentoring, performance reviews, job rotation, international assignments, counseling, career development, group projects, and outdoor programs (Paul, 2019). Examples of management development content are communication skills, analytical, decision-making, and influencing others (Paul, 2019).

The research gap provides an idea for examining the characteristics of MDP and its relevant outcomes in business organizations that have unique characteristics. This study examines psychological process theories to select the characteristics of management development that are relevant and expected to influence outcomes. The evaluation must be used to understand the efficacy of management development programs through multiple levels of assessment. Limited understanding of MDP is due to using one or more outcome variables. The employment of a broader range of outcome factors can lead to a more successful MDP conclusion (Arthur *et al.*, 2003; Al Jabri Basel and Ghazzawi, 2019). Therefore, research should ideally include several characteristic MDP variables relevant to various categories or levels of outcomes.

This study uses three levels of outcome-based evaluation, namely feeling (affection), utility, and behavior. The result of preference is organizational commitment. Utility outcomes include extrinsic benefits (such as higher income or promotions), internal benefits (such as feeling like you have a more appealing job, feeling at ease at work, or achieving potential), and organizational benefits (results of management development that benefit subordinates, boss or team). Behavioral outcomes such as participation in development activities, sharing opinions (being critical of processes occurring within the organization), and innovative behavior (looking for ways to improve processes and implement innovations).

The essential characteristics of MDP can trigger psychological processes that enhance participant learning and achieve management development outcomes (Woolnough and Fielden, 2016). The extent to which Management Development Program participants understand is expected to generate positive employee outcomes.

The Nahdlatul Ulama Hospital (NUH) Jombang has consistently implemented education and training programs for various positions and the development needs of Human Resources (HR) in each work unit. This research took samples from one NUH organization with unique characteristics, namely a hospital that had not been established for ten years. The hospital is currently designing new education and training programs and redesigning past programs and is in a development atmosphere that urgently needs employee commitment to NUH.

A supervisor in the management hierarchy is a transitional position between managerial and non-managerial levels. MDP for supervisors is designed so that employees have the ability and professional readiness to take on executive roles at the junior manager level. MDP for supervisors

is a part of the requirements for promotion to junior manager level.

The contribution of this research is the characteristics of MDP that can increase positive results in the form of organizational commitment, utility, and participation behavior. The research was conducted in a developing hospital to provide a clear view related to human resource development, to maintain and improve the effectiveness and efficiency of human resource performance to achieve hospital development goals.

Various management development interventions do not appear to have identified the characteristics of the role model, perceived control, and understanding of MDP itself. The MDP effectiveness evaluation model also seems to have not received much attention. Based on the background, This study aimed to analyze the influence of MDP characteristics on organizational commitment, utility, and participatory behavior.

METHODS
Sample and Procedure

This research has obtained ethical approval with number 2477/KEPK/V/2021, which is issued by IIK Strada Indonesia. This study used an observational research design with a cross-sectional approach. Statistical analysis used is linear regression analysis with α=5% using SPSS 25 software to determine the effect of MDP as independent variables (e.g role model, perceived control, understanding) on dependent variables consisting of organizational commitment, utility, and participative behavior.

The study took a sample of 100 employees of the Nahdlatul Ulama Hospital (NUH) Jombang with a proportional random sampling technique consisting of 82 health workers and 18 non-health workers. The criteria for the samples taken were: 1) Male and female; 2) health and non-health workers; 3) Employees who have attended/had attended education and training; 4) 20 to 50 years old; 5) Minimum work period of 1 year; 6) Minimum education is the diploma.

Collecting data in this study using a questionnaire obtained directly from the respondents through filling out the questionnaire. The questionnaire contains questions regarding MDP which consists of three factors, namely role models (RM), perceived control (PC), understanding (UN) and organizational commitment (OC), utility (UT), and participatory behavior (PH).
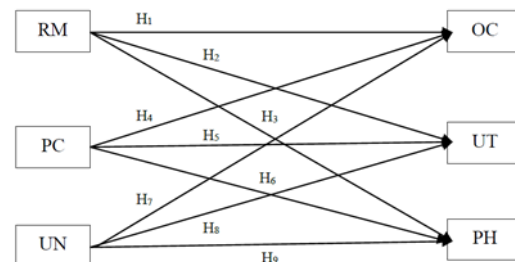

Figure 1. Conceptual framework of research

Instruments

All the constructs of this study have valid scales available in the literature. Therefore, this study adapted already validated scales to measure the constructs. All measures used in this study were part of the same survey and employed a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). Validity and reliability testing was carried out using SPSS 25 software using product moment correlation for validity testing and Internal consistency using Cronbach alpha for reliability testing. Item validity is the result of the Product Moment correlation between the scores of an item and the scores of other items in a construct (Item-Total Correlation). The item validity of the Product Moment correlation analysis is

corrected by the correlation of the score of an item with the total score of the item (Corrected item-total Correlation). This study uses an item validity index of 0.30 to state an item is declared to be valid (Corrected item-total Correlation > 0.30).

Internal consistency is the method used for reliability testing. Alpha is the estimated reliability value. Alpha values less than 0.60 are categorized as poor reliability, values between 0.60 to 0.79 are categorized as acceptable reliability, and values 0.8 to 1.0 are categorized as good reliability.

Organizational commitment is the relative strength of an individual which is measured by 14 items adapted by Kalhor *et al.* (2018) regarding the relationship with the organization. Example item: "NUH is the best place for me to work." The validity index is 0.368 to 0.664 and $\alpha = 0.740$.

The utility is the intrinsic, extrinsic, and organizational benefits perceived by individuals as a result of the management development program (MDP), which is measured by nine items arranged based on the indicators (Aguinis and Kraiger, 2009). Example items: "I participate in training activities because I want to develop my potential." The validity index is 0.435 to 0.672 and Cronbach alpha = 0.741.

Participative behavior is The Management Development Program enables employees to participate in development activities, behave in ways that are beneficial to the organization, and are willing to share opinions, measured by a 12 items scale arranged based on (Aguinis and Kraiger, 2009). Participative behavior consists of participation in development programs, innovations, and opinions sharing. Example item: "I will take the opportunity to attend courses and further education." The validity index is 0.375 to 0.607 and Cronbach alpha = 0.734.

MDP is structured based on the indicators of Arts., (2010), namely; 1) a three items scale that measures a role model. Example item: "In training, I can learn a lot from experienced managers." The validity index is 0.385 to 0.822 and Cronbach alpha = 0.825; 2) Perceived control is measured by a 3 items scale. Example item: "In NUH, employees can propose program materials that have previously been compiled." The validity index is 0.488 to 0.688 and Cronbach alpha = 0.774; 3) A five items scale measures understanding. Example item: "In NUH, there is a clear pattern in the order of management courses." The validity index is 0.506 to 0.714 and Cronbach alpha = 0.778.

RESULT

The descriptive statistics and the reliability and regression analyses were computed using the Statistical Package for Social Science (SPSS) Version 25.0, with $\alpha = 0.05$. The scores for each variable were calculated by totaling the scores of items under specific factors. It was followed by regression analysis to examine the influence of the three independent variables, i.e., role model perceived control, and understanding of the depending variables on the, i.e., organizational commitment, utility, and participative behavior.

Descriptive analysis was conducted to determine the number of respondents who have high organizational commitment, high utility, and high participatory behavior. From 100 samples, more than half of the respondents have high organizational commitment, high utility, and high participation behavior. From the results of the descriptive analysis, it can be said that the samples have a high emotional attachment, can channel their potential, the participate in organizational development.

Data collection was carried out during the COVID-19 pandemic so there was limited time and direct communication

with respondents because at that time almost all respondents had an increased workload. Only see from the perspective of employees at NUH without involving the hospital management.

From table 1, the role model has the most significant influence on organizational commitment of 0.780 because the p-value =0.001 (α=0.05). Perceived control has the most significant influence on organizational commitment at 0.747 with a p-value =0.001 (α=0.05). Understanding has the most significant influence on participatory behavior at 0.687 with a p-value=0.001 (α=0.05). From the analysis results above, that MDP can affect organizational commitment, utility, and participatory behavior.

DISCUSSION
The characteristics of MDP, which consist of role models' perceived control, and understanding of MDP, produce organizational commitment.

Role models perceived control and understanding of MDP generate organizational commitment. Employee commitment to NUH will be even stronger. These findings can be interpreted if, in training, employees can learn through interaction and observation, influence the training program's content, and have a clear understanding of the program, program content, objectives, and the sequence of learning experiences.

There is a role model in training, which means employees feel they can learn a lot from experienced managers, get various forms of learning from seniors and feel there are many opportunities to learn from others (Benbassat, 2014). A sense of control means that employees can propose previously structured program material and feel responsible for their development.

Understanding means that employees understand that education and training activities have clear, relevant objectives to be developed systematically and clearly in the order and timing required in each management course.

Role models perceived control and understanding will strengthen the commitment to NUH. Employees committed to NUH will develop and enhance practical dedication, internalization, continuous duty, and normative commitment (Al Jabri Basel and Ghazzawi, 2019). Employees with a solid affective commitment make NUH very meaningful to themselves, and the best and most proud place to work. Whatever the conditions, employees will say NUH is a progressive hospital.

Employees who experience high internalization make NUH's goals as their own goals, do their best for NUH, and make the problems encountered by NUH their problems. Employees who have a robust continuous commitment decide to work at NUH until retirement and feel that their work progress in another location will decrease if they leave and then work in another place. Employees who have a solid normative commitment will not be absent from their obligations to NUH, involve themselves in NUH activities/, cancel plans for work leave when NUH is in need, and feel very heavy and unable to leave NUH. A continuous commitment makes employees like to work extra, linger and wrestle with NUH activities. The commitment that makes employees was support for the vision and mission of NUH. Organizational commitment is considered good when employees show feelings of pleasure and pride in their work, desire to continue working, and have a loyal attitude towards the organization (Nuryanti *et al.*, 2020).

Table 1. Hypothesis testing the effect of MDP on organizational commitment, utility, participative behavior

Independent Var.	Dependent Var.	Hypothesis	Coefficient	Std. error	CR	$\wp$
Role model	Organizational commitment	H_1	0.780	0.203	12.332	0.001*
	Utility	H_2	0.468	0.178	5.247	0.001*
	Participative behavior	H_3	0.651	0.209	8.494	0.001*
Perceived control	Organizational commitment	H_4	0.747	0.279	11.126	0.001*
	Utility	H_5	0.464	0.231	5.186	0.001*
	Participative behavior	H_6	0.566	0.293	6.749	0.001*
Understanding	Organizational commitment	H_7	0.599	0.185	7.400	0.001*
	Utility	H_8	0.606	0.114	7.540	0.001*
	Participative behavior	H_9	0.687	0.142	9.355	0.001*

The characteristics of MDP which consist of role models perceived control and understanding produce utility

The research findings show that MDP characteristics of role models, perceived control, and understanding generates utility. MDP characteristics make employees feel they can reap intrinsic, extrinsic, and organizational benefits. The data of intrinsic, extrinsic, and corporate utility that tend to be high can be explained through MDP characteristics. The already high utility data is the result of MDP.

High utility indicates that employees individually believe their work is appealing, are more attractive, enjoy working, channel their potential, receive reasonable salaries and advancement opportunities, and feel useful to others at work, whether they are subordinates, superiors, or members of a work team (Gladstone and Cimpian, 2021). The utility data tends to be high as a result of MDP.

The findings of this study are consistent with previous findings. Ardts, (2010) research findings show that role models produced positive outcomes of intrinsic utility and organizational utility. The perceived control generates intrinsic, extrinsic, and organizational utility. Understanding grows extrinsic utility. The findings of this study follow a more general pattern in (Ardts, 2010), who took samples from various organizations. At the same time, this study took a selection from a hospital organization that is currently more focused on employee commitment on an ongoing basis. Role models of perceived control and understanding that tend to be high in the context of education and training are the contexts needed to enhance utility. High utility data is the result of MDP.

MDP characteristics, which consist of role models, perceived control, and understanding of MDP, produce participative behavior.

MDP, which consists of the characteristics of role models, perceived control, and understanding, produces participative behavior, namely participation in development activities, innovative behavior, and sharing behavior. Participative

behavior data which tends to be high can be explained through the characteristics of MDP.

The high tendency of participative behavior data shows that employees tend to participate in development activities, are innovative, and are willing to share opinions (William, 2015). Participation in development activities indicates that employees will take the opportunity to attend courses and further education; ready to take on a different job assignment than usual; try to find alternative solutions to the problems currently and will be faced by NUH; consult with a mentor, and; ask for feedback from participants. Innovative behavior is shown when employees find out about technology, processes, techniques, and new product or service ideas and; try to develop new approaches to carrying out work tasks. Sharing opinions shows that employees discuss developments in the workplace with management, discuss with colleagues to solve unusual work assignment problems and provide input, and receive criticism, suggestions, and feedback regarding the implementation of work assignments.

Participative behavior data, which tends to be high, shows that employees participate in the development, are more innovative, and are willing to share opinions. Behavioral data that tends to be elevated can be predicted through the existence of role models, perceived control, and understanding of MDP.

These findings show that the higher the role model, control, and understanding in MDP, the employees will be closer to actively participating in development activities, high in innovation, and like to share opinions. Employees who approach participation in development activities do not waste opportunities to attend courses and further education, volunteer to accept work assignments that are different from usual,

have high solutions, are active in learning, and expect feedback in the management development program.

A role model probably means that seniors, as more experienced personnel, feel obliged to process with juniors. In transferring experience and knowledge from the perspective of professionalism, seniors treat juniors as colleagues (Xu et al., 2021). The context of participative behavior in development activities is more democratic, innovation has more free character, and sharing opinions is closer to self-development (Philippaers et al, 2019). Professional and democratic role models stimulate involvement, production, and exchange of ideas. This is because a hospital is a typical organization that brings together health professionals.

CONCLUSIONS

MDP, in which there are characteristics of a role model, perceived control, and understanding, has a significant influence on organizational commitment, utility, and participative behavior. Based on the research results, role models have the greatest influence on organizational commitment, perceived control has the greatest influence on organizational commitment, and understanding has the greatest influence on participation experience. Role models in training mean employees feel they can learn a lot from experienced managers, get different forms of learning from seniors and feel there are many opportunities to learn from others. The feeling of control means that employees can propose program materials that have been previously prepared and feel responsible for their development. Understanding means that employees understand that education and training activities have clear objectives, and are relevant to be developed systematically and clearly in the sequence

and time required in each management course. By participating in various training organized by NUH, there are many opportunities to learn and discuss developments and various problems at NUH.

Hospitals are organizations that are always changing so they must have an MDP program on a scheduled and continuous basis. Participating in MDP is to study and try to find alternative solutions to the problems that are being and will be faced by the hospital so that they can improve their hard skills and soft skills so that it has an impact on employee performance in particular and hospitals in general.

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