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EDUCATIONAL MODEL DEVELOPMENT FOR PATIENTS AND FAMILIES WITH HYPERTENSION IN PRIMARY HEALTH SERVICES: A MIXED METHOD STUDY

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ABSTRACT

The global risk of morbidity and mortality due to hypertension highlights the importance of optimizing nurses' roles in controlling hypertension through education. This study aims to develop educational models for patients and families with hypertension. A sequential mixed-method research design was used. Focus group discussions and in-depth interviews were conducted with 28 participants to explore the phenomenon and health education needs of patients and families with hypertension, and the data were analyzed thematically. A survey of 40 people was conducted to identify the elements of a workable model using SEM analysis. The researchers then used an integration matrix to perform the data integration. Seven themes were revealed from the qualitative phase: (1) health problems, (2) scope of educational services, (3) primary service activities, (4) health education methods, (5) information needs, (6) management support, and (7) barriers. The following sub-components were also obtained from the analysis: (1) Health Education Approach, (2) Health Education Program, and (3) Learning Process. The educational model for patients and families with hypertension is complex, and nurses require support to implement such a model. Further research is needed to prove the model's effect on the personal and interpersonal conditions of hypertensive patients.

Keywords: *Health education; hypertension; model; nurses; primary health services*

INTRODUCTION
Hypertension is a highly prevalent degenerative disease with high morbidity and mortality risks. The World Health Organization (WHO) estimated that 2.83 billion persons globally between the ages of 30 and 79 have hypertension, with the majority (i.e., two-thirds) residing in low- and middle-income countries (WHO, 2023). The Basic Health Research in Indonesia showed that 34.1% of the country's population has hypertension (Ministry of Health, 2018). According to various studies, despite the global increase in life expectancy, hypertension is still a severe problem due to its relation to cerebrovascular damage, cognitive impairment, and death (Gupta et al., 2020; Iadecola et al., 2016; Kitt et al., 2019). Previous studies have also explored the awareness of hypertension treatments and control efforts in various regions worldwide. Among individuals with hypertension, the standardized rates of awareness, treatment, and control of hypertension were 44.9%, 36.5%, and 24.3%, respectively (Lv et al., 2018). A previous study also found that 87.1% of their sample had low awareness of hypertension treatment (Khoiry et al., 2022).

There has been a significant rise in higher blood pressure in low- and middle-income countries in recent decades. Nevertheless, only one in three of these countries are aware that they have hypertension, and only around 8% have their blood pressure under control (Schutte et al., 2021). Therefore, nurses need to provide education to patients and families with hypertension to help them keep their condition under control. Nurses in clinical and community settings are responsible for improving the quality of life of hypertension patients, overcoming the various problems related to managing hypertension holistically, and designing specific interventions for controlling hypertension. Previous studies showed that patient-oriented efforts are a key feature of effective care models that improve the quality of care services and help control morbidity and mortality due to hypertension (Himmelfarb et al., 2016).

Research on nurses' roles in improving hypertension control has provided a more specific view of what nurses must do within the primary care scope. Various studies show that blood pressure monitoring and patient education are among the most widely used effective strategies for improving hypertension control. Public health management and patient education are hypertension management aspects related to nurses (Himmelfarb et al., 2016). Personalized health education is a clinically effective nursing intervention (Falcão et al., 2023). Good education is determined by personal involvement in the educational program being run. Existing studies found that needs-based education is needed to achieve optimal health education outcomes for hypertension patients (Myanganbayar et al., 2018). Other studies also show that face-to-face education within treatment programs for individuals with hypertension is attributed to reducing the patient's blood pressure values (Falcão et al., 2023).

The current methods and strategies nurses employ as patient educators are not yet optimal in increasing patients' understanding and ability to care for themselves independently. Therefore, it is necessary to develop an evidence-based model for patient and family education that focuses on optimizing the role of nurses in nursing intervention strategies for controlling hypertension. This study developed an education model for patients and families with hypertension in primary care by exploring and analyzing participant perspectives qualitatively and quantitatively. This model also serves as evidence and contributes to strengthening the body of knowledge on the role of nurses as educators of patients and families with hypertension in primary care.

METHOD

Study design
This study employed a sequential mixed-method design. This method was selected to obtain adequate and relevant data on the conditions and viewpoints of the research participants. The data obtained was used to formulate a health education model for patients and families with hypertension. The linkage and integration of results in the qualitative and quantitative phases through exploratory sequential design, as explained by Creswell (2018), aims to form categories of information that are further explored and validated through the quantitative phase.

Participants
The participants in the quantitative and qualitative phases were selected based on the following inclusion criteria: patients, family members, health cadres, or hypertension program managers for at least the last year. After the researcher explained the research, the participants signed an informed consent form. A total of 28 participants, consisting of 13 nurses, 10 health cadres, and five hypertensive patients, were involved in the qualitative phase, and two experts and 40 nurses were involved in the quantitative phase. The sample for the qualitative phase was determined by the purposive sampling method based on the following inclusion criteria: community nurses working in any public health center in Palembang City, serving as the main person in charge of the non-communicable disease prevention and control program, have experience as the person in charge of the program for at least one year.

Instruments
The qualitative phase comprised Focus group discussions (FGDs) and in-depth interviews using 12 semi-structured and open-ended questions. Next, quantitative surveys using instruments developed by researchers based on themes found in the qualitative phase were distributed. The survey instrument consisted of 22 question items. The complete model was then validated with face validity involving two nursing management and community nursing experts.

Data collection
This research was conducted in 10 community health centers in urban areas in Indonesia. The participants were recruited using a snowball sampling approach. The difficulty in finding participants who met the criteria caused the researcher to use references from previous participants for potential informants who met the criteria to be interviewed. The qualitative phase of the research was conducted to explore the phenomenon and health education needs in patients with hypertension. FGDs were conducted for 60–90 minutes with program managers and health cadres. Meanwhile, in-depth interviews were conducted for 45–60 minutes with patients and families with hypertension. Next, the survey distributed in the quantitative phase was developed by the researchers based on the results and instruments tested in the qualitative phase.

Data analysis
Qualitative data analysis was performed using a thematic analysis, which involved finding meaning from transcripts, identifying keywords, formulating categories through managing keywords with a uniform meaning, forming subthemes from several categories, forming themes from subthemes that have similar relevance and meaning, and linking the suitability of the themes in the theme cluster with the research objectives.

Furthermore, survey items were developed by the researchers based on the synthesis and integration conducted. The health education model for hypertensive patients and their families was developed by (1) combining the results of exploratory research with theoretical concepts, (2) validating the model qualitatively by asking for input from two experts in community nursing and nursing management, and (3) validating the survey results in the form of confirmatory factor analysis using Structural Equation Modeling (SEM).

The qualitative findings were synthesized with theories and concepts and reduced to items developed in the survey for the quantitative phase. These findings became the basis for a substantial explanation of the model components tested in the quantitative phase. The valid and fit model components were then used to describe the model, and its completeness was evaluated by two experts in community nursing and nursing management. This process was conducted to ensure that the model can be read and understood clearly by nurses as the model's users.

Trustworthiness
In the qualitative phase, the research team frequently discussed the data analysis of the findings, from the transcription of the results to the theme analysis. The research team also relied on the themes set for the category identification of the results to improve trustworthiness.

Ethical consideration
This study was conducted with the ethical clearance approval of the Health Research Ethics Committee of the Health Polytechnic of Palembang 2543/KEPK/Adm2/V/2022.

RESULT
Qualitative Phase

Table 1. The characteristics of nurses in charge of the non-communicable diseases program (N = 13)

Participant	Age (year)	Gender	Education	Working experience (year)	In charge (year)
P1	38	Female	Bachelor	7	3
P2	34	Female	Bachelor	10	2
P3	27	Female	Diploma	4	2
P4	38	Female	Bachelor	16	5
P5	32	Female	Diploma	9	1
P6	36	Female	Bachelor	3	1
P7	37	Female	Master	5	5
P8	43	Female	Master	17	2
P9	42	Female	Bachelor	16	1
P10	32	Female	Diploma	5	3
P11	39	Female	Diploma	3	3
P12	28	Female	Bachelor	3.5	3.5
P13	47	Male	Master	20	4

On average, the participants were 36 years old and had worked in primary care for an average of 8.85 years, with 2.46 years in charge of non-communicable disease (NCD) prevention and control programs.

Table 2. The characteristics of health cadres (N = 10)

Participant	Age (year)	Gender	Education	Work experience as health cadre (year)
P14	39	Female	Senior high school	10
P15	51	Female	Senior high school	12
P16	55	Female	Senior high school	15
P17	47	Female	Senior high school	12
P18	63	Female	Senior high school	18
P19	67	Female	Senior high school	36
P20	47	Female	Bachelor	11
P21	52	Female	Senior high school	20
P22	49	Female	Senior high school	15
P23	44	Female	Senior high school	14

The participants who are health cadres are, on average, older adults aged 51.4 years with an average experience as a health cadre of 16.4 years.

Table 3. The characteristics of patients with hypertension (N = 5)

Participant	Age (year)	Gender	Marital status	Education	Long of hypertension period (year)
P24	78	Male	Married	Bachelor	8
P25	62	Female	Married	Senior high school	4
P26	60	Male	Married	Senior high school	5
P27	58	Female	Married	Senior high school	6
P28	59	Female	Married	Senior high school	4

The hypertensive participants were in the older adult category with a duration of hypertension of 5-6 years.

The thematic analysis revealed seven themes. These themes were synthesized and integrated with theories and influenced the item design used for the survey in the quantitative phase, as shown in Table 4.

The qualitative phase obtained the following themes: (1) the physical and psychological health problems of hypertensive patients; (2) service areas for hypertensive patients in the community health center category and outside the community health center building; (3) primary service activities including the screening and assessment of hypertension and risk factors, health education, treatment, referral; (4) health education method implemented by cadres and health workers, conducted repeatedly and consistently, learning aids, evaluation of the information submitted; (5) the information needs of hypertensive patients such as signs and symptoms, treatment, and care of hypertension; (6) disease management support that does affect policy changes, the role of society, government, patient groups, and families; (7) obstacles in hypertension management including low compliance of hypertensive patients, lack of health cadre participation, limited human resources, and high achievement targets.

Theories and concepts were synthesized by integrating themes with the following theoretical concepts: Patient Family Education (PFE) from Marshall (2015), the Basic Information Process from Driscoll (Gurbin, 2015), and the System Model from Neuman and Fawcett (Alligood, 2021).

The qualitative data phase produced the data used for model development. Theories and concepts were combined to create survey items, which were used to validate the model components. They were also used to formulate the model descriptions and complete the model intervention tools (Table 4). The integration of theories with qualitative research results revealed the following components of the health education model for hypertension patients and their families: (1) Health

Education Approach, (2) Health Education Program, and (3) Learning Process.

Quantitative Phase
Each component of the draft education model for patients and families with hypertension was then validated with the test results (Figure 1). The resulting components of the Health Education Model for Hypertension Patients and Families in Primary Health Care were then analyzed using Structural Equation Modeling to obtain the following results:
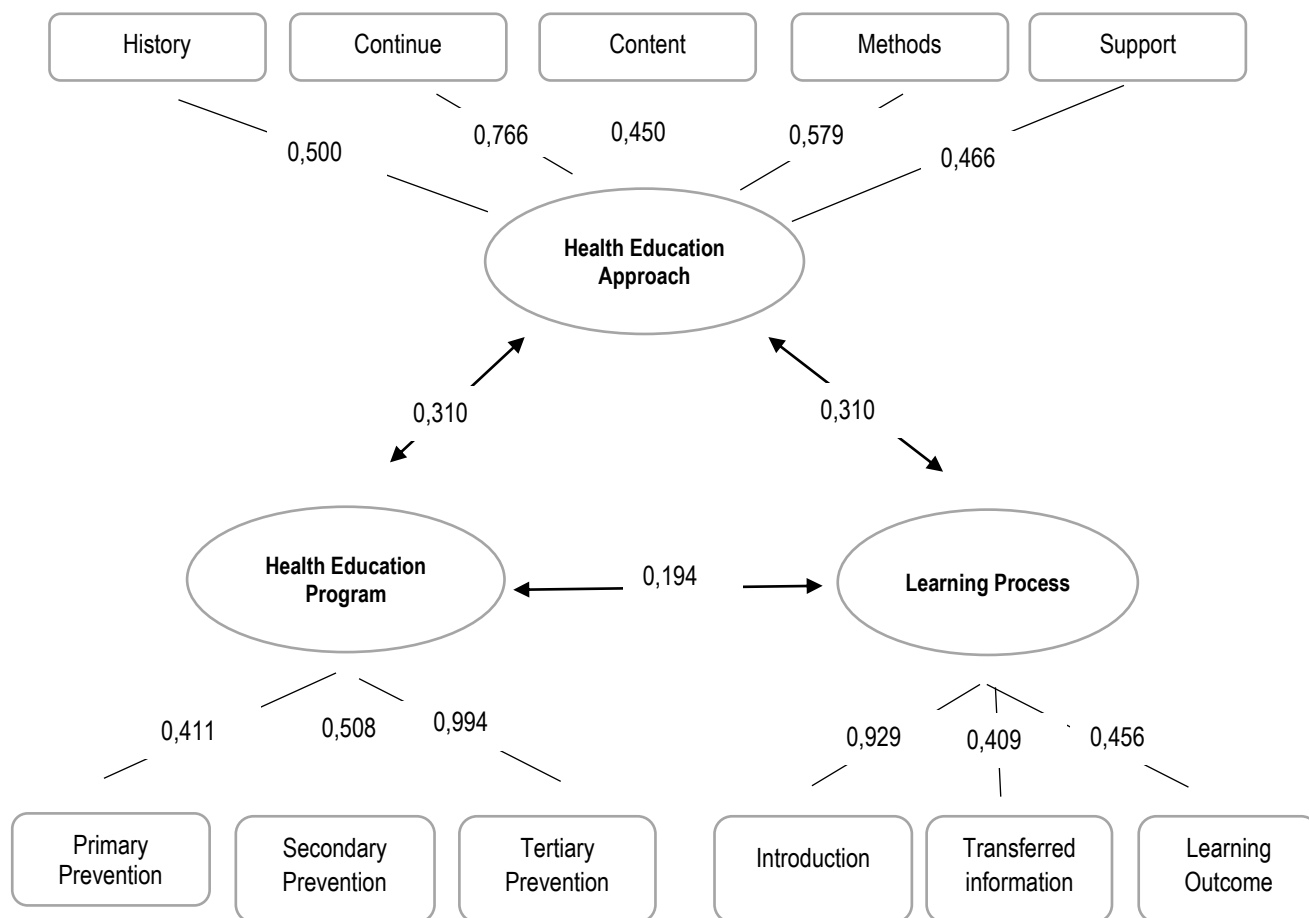

Figure 1. Health education model for hypertension patients and families in primary health care

The model comprises three main components: (1) the *Health Education Approach* with five sub-components, i.e., history, continue, content, methods, and support; (2) the *Health Education Program* components with sub-components of primary prevention, secondary prevention, and tertiary prevention; and (3) the *Learning Process* component with sub-components of introduction, transferred information, and learning outcome. All components have loading factor values close to 0.4 and over 0.5. These three components have a significant relationship with a p-value of < 0.05, the R-value of 0.310, 0.194, and 0.310. The factor loading analysis and correlation results between components show that the developed model has a good fit.

Table 4. Attachment

Qualitative phase		Theory and concept	Quantitative phase	Sub component	Component
Category	Theme		Developed survey items		
1. Physical and psychological problems 2. Recognition of signs and symptoms 3. Hypertension treatment	Health problems of hypertension patients Information needs of hypertension patients	Introduction: Health education information needs (Masrhall, 2015)	Before education was conducted, it is necessary to examine the problems caused by hypertension and the educational needs required by hypertensive patients	Introduction	Learning process
1. Lack of motivation 2. Non-compliance with treatment 3. Lack of cadre participation	Barriers to program implementation	Introduction: Motivation of patients and health workers (Yoshida et al., 2021)	It is necessary to emphasize the importance of motivation to change and the targets to be achieved before providing education to avoid obstacles to the education process		

Qualitative phase		Theory and concept	Quantitative phase	Sub component	Component
Category	Theme		Developed survey items		
4. Limited human resources 5. Tough program achievement targets					
1. Direct health education by cadres 2. Health Education by Health professional 3. Carried out repeatedly and consistently	Health education methods	Providing information and controlling the information providing process, The basic information process from driscoll (Gurbin, 2015)	During the education process, information relevant to the educational needs of hypertensive patients needs to be prepared and assessed to what extent it influences patient compliance.	Transfer information	
1. Requires learning aids 2. Evaluate compliance with the information provided			Availability of clear educational tools with a consistent recurring schedule		
1. Non-compliance with the treatment program 2. Carried out during Posbindu/Posyandu 3. Requires cooperation from patients, cadres and health workers	Evaluation of hypertension health education achievements	Learning achievement in the form of understanding and changing behavior The basic information process from driscoll (Gurbin, 2015).	Achievement indicators as the output of the education provided are the key to the success of the education process for hypertension patients	Learning outcome	
			The involvement of patients, health cadres, and nurses determines the educational outcomes provided to hypertensive patients		
1. Health education 2. Maintenance	Primary Care Activities for hypertension patients	Primary prevention, secondary prevention and tertiary prevention the system model from Neuman and Fawcett (Alligood, 2021)	Health education to reduce risk factors is an important educational material	Primary prevention	Health education program
			Maintaining a healthy lifestyle is a basic prevention effort		
1. Identify the incidence of hypertension 2. Screening 3. Identify risk factors			Identifying the incidence of hypertension through screening is part of an education program related to early detection	Secondary prevention	
			Educational programs regarding the identification of important risk factors are carried out to anticipate early findings of hypertension		
1. Treatment 2. Reference			Education regarding appropriate treatment efforts and programs is needed to maintain the quality of life of hypertension patients	Tertiary prevention	
			A good referral system is an educational point in the context of preventing		

Qualitative phase		Theory and concept	Quantitative phase	Sub component	Component
Category	Theme		Developed survey items		
			complications due to hypertension		
1. Has a long history of illness	Characteristics of hypertensive patients	Health education requires an introduction to disease history, continuity of care; accuracy of learning content (health literacy); Learning methods (management knowledge and skills) and learning support (Marshall et al, 2015)	Treatment history is one of the focuses of attention in hypertension patient education	History of hypertension	Health education approach
2. Requires continuous treatment			A history of hypertension and comorbidities needs to be educational material for hypertensive patients		
3. Sufferers from old adulthood to the elderly			Focus on hypertension education from old adulthood to the elderly	Continue	
4. Limited knowledge about care and treatment			Limited knowledge regarding the treatment and care of hypertensive patients is a material for continuing education		
1. Physical (headache, dizziness, nausea, vertigo, fatigue/weakness)	Hypertension health problems		The physical problems felt by hypertensive patients are important educational material to discuss	Contents	
2. Psychology (emotional changes, anxiety, fear			The psychological problems felt by hypertensive patients are important educational material to discuss		
1. Continuous treatment	Need for hypertension services		Self-care management and ongoing medication in the management of hypertension should be discussed with the patient and family	Methods	
2. Consistent self-care/management					
3. Health education for managing risk factors			Management of risk factors needs to be discussed in hypertension patient education programs		
1. Health program policy	Learning support		Education for hypertensive patients needs to be supported by relevant policies from the government and stakeholders	Support	
2. Government					
3. Community participation			Involvement of communities, groups and families with hypertension is an important approach for the success of the health education provided		
4. Group					
5. Family of hypertension patient					

DISCUSSION

Hypertension patients need comprehensive access to health services to maintain their health and well-being. Nevertheless, the patients and their families need to understand independent self-care so that they can manage changes and adapt their long-term hypertension-related care. Nurses play a role in educating patients and families to make them more adaptable to their illnesses and improve their physical and mental resilience.

The health education model for hypertensive patients and their families in primary care focuses on providing health education through building a relationship between health workers, including those in charge of the program, health professionals, and health cadres with patients and families. The model aims to improve the patients and their families' care skills. The developed health education model comprises learning process components, health education approaches, and health education programs.

The learning processes. The learning process begins with an introduction to the learning needs and motivations of hypertension patients and health professionals involved in the health education process. In any effort to prevent and control hypertension, it is necessary to understand the patients' needs (Khalsa et al., 2014). Koivisto et al.'s (2020) study found that lack of knowledge received through health education was associated with disease complications.

Moreover, the patient's education level and the level of knowledge received may be associated with post-discharge complications. In addition, Stuij et al. (2018) concluded that developing learning methods are considered effective if they meet individual learning needs, allow feedback on competence aspects, and provide opportunities for significant input from others, including experts, peers, or patients.

Furthermore, motivation is a critical element in implementing health education. There is a significant influence between transfer mechanism and motivation factors on knowledge sharing (Iskandar et al., 2014). Fronzetti Colladon et al. (2023) explored knowledge sharing among healthcare professionals, emphasizing the importance of open, non-hierarchical advice and idea-sharing structures. Their research used social network analysis to observe how healthcare workers form dynamic, flexible networks that facilitate effective communication, highlighting the role of both direct and indirect professional connections. This structure supports continuous learning and information flow, essential for quality improvement in healthcare settings. Meanwhile, the patient's motivation level will influence their self-training abilities and daily life activities (Yoshida et al., 2021).

Health education aims to provide information that increases understanding about hypertension. There has been an increase in the knowledge of hypertensive patients by providing information via online methods (Mahadewi et al., 2021). Providing health information to hypertensive patients increases their knowledge, forms positive attitudes, and influences changes in attitudes towards smoking, the salt content in their diet, and physical exercise (Haryani et al., 2016). Studies have demonstrated that developing health education strategies for hypertensive patients, such as creating posters, can effectively raise their knowledge (Ulya & Iskandar, 2017).

The learning process also includes a monitoring and evaluation stage in the form of an assessment to measure the participants' increased understanding and changes in behavior due to hypertension. This stage requires participation and awareness from various stakeholders, particularly when learning collaboratively. Therefore, it is important to share thoughts, perspectives, and ideas during the learning process (Wongtschowski et al., 2016). Additionally, behavior change is a vital component that is the ultimate goal in every activity of providing health information (Akuiyibo et al., 2022).

Health education program. The study results illustrate that one of the components of the health education model for hypertensive patients and their families is a health education program, which includes primary, secondary, and tertiary prevention. According to Newman (1970) in George (2014), primary prevention comprises early detection and risk recognition. For example, blood pressure screening can facilitate early diagnosis and reduce the risk of hypertension-related complications (Gulec, 2013). Early detection of increased blood pressure is the key to prevention and management of hypertensive patients before microvascular and macrovascular damage occurs (Howard et al., 2018; Khalsa et al., 2014).

Next, a secondary prevention health education program focuses on preventing further problems from occurring due to the illness experienced. In this health education model for hypertensive patients, secondary prevention efforts include providing information on hypertension treatment and care. Hypertensive patients can manage their conditions through lifestyle modifications, medications, and adherence to hypertension treatment (Unger et al., 2020).

Finally, a tertiary prevention health education program is a health activity or effort that helps patients adapt to hypertension-related changes or conditions. Self-management information is needed to help patients adapt to hypertension conditions.

Approaches to health education. The health education approach is a component of the developed educational model for hypertensive patients and their families. The health education approach includes introducing the health history of hypertensive patients and helping patients and their families understand the sustainability of hypertension management. This approach requires educating patients and their families about their treatments and care over a long period, conveying accurate health information and methods, and supporting health education efforts.

The health information provided needs to consider the patient's history of hypertension (Marshall, 2015). A history of hypertension can be due to changes in the individual's organ systems, such as the kidneys, heart, brain, eyes, or other organs (Alexander, 2022). Hypertension requires a long treatment regimen and requires consistency and adherence to medication and treatment. Additionally, continuity of care and treatment requires persistent and consistent information (Marshall, 2015). A previous study has also found that family-based interventions can increase compliance with the care and treatment of hypertensive patients (Damayanti et al., 2020).

Health education with counseling as needed significantly increases medication compliance in hypertensive patients (Prihanti et al., 2020) (Marshall, 2015). Health information material and the use of appropriate methods also help patients to manage changes caused by hypertension.

Furthermore, health education requires policy support, as well as government, community, and family participation. Collaboration between the government and educational institutions and broad community involvement is needed to develop awareness and community movement in hypertension prevention behavior (Mahadewi et al., 2021). The chronic patient care model requires collaboration between patients, health service providers, and health service systems to support hypertension control on multiple levels (Carey et al., 2018).

The family plays a vital role in reducing or increasing the progression of hypertension. Family influence can be summarized in the following subcategories: the main family support system, financial stability, health control, and well-being are subcategories of family influence on hypertension (Efendi, 2017). The limitations of this study include the fact that the research was limited to one urban area, so it does not represent the patients and families in rural areas.

CONCLUSION AND RECOMMENDATION

This qualitative and quantitative study explored the perspectives of patients, health cadres, and nurses. The results were used to formulate a health educational model for hypertension patients and families in primary care. The complex model comprises health education program components, approaches to health education, and learning process components. The results highlight the importance of building adequate support for the model's implementation and conducting further tests to prove its personal and interpersonal effects on patients with hypertension.

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<u>**ORIGINAL ARTICLE**</u>

NURSES' SELF-CARE PRACTICES: A CROSS-SECTIONAL STUDY IN PHILIPPINE DISTRICT HOSPITALS

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ABSTRACT

Nursing demands not only dedication to patient care but also a commitment to self-care. However, despite the crucial role of self-care, limited research exists to understand the nurses' self-care in district hospitals in the Philippines. This cross-sectional study assessed the self-care practices of district hospital nurses in Iloilo City, Philippines. This study involved a total population sampling of nurses working in three district hospitals, with 90% or 135 nurses responding to the survey. The Mindful Self-Care Scale was used for data collection. The findings indicated that nurses generally exhibited high self-care behaviors (M = 3.73, SD = 0.46). However, physical care (M = 3.01, SD = 0.59) emerged as the lowest domain. The t-test and ANOVA revealed significant differences in self-care practices based on age (t = 2.174, p = 0.031), monthly income (t = 2.930, p = 0.004), employment status (t = -2.017, p = 0.046), and length of experience (t = 2.065, p = 0.041). This study highlights the commitment of nurses to prioritize their overall well-being and address self-care needs. Initiatives can be established in the workplace to ensure that nurses receive the necessary support for their well-being, especially among the younger members of the profession.

Keywords: *District hospitals; nurses; Philippines; self-care*

INTRODUCTION

Nurses demonstrate resilience in their commitment to the care and welfare of their patients (Williams et al., 2022). They navigate demanding and stressful environments, attending to patients with diverse healthcare needs while juggling multiple responsibilities (Babapour et al., 2022; Goldsby et al., 2020; Murry, 2022). This challenging aspect of nursing and the high-stress work environment poses a significant burnout risk among nurses (Ashipala & Nghole, 2022; Parola et al., 2022). Such conditions are a pressing concern, given the escalating levels of stress and burnout experienced by nurses across various clinical settings (De Hert, 2020). It has been reported that 35% of nurses worldwide were burned out, indicating a severe mental health crisis among professional nurses (Katulka, 2022). High levels of burnout among nurses have detrimental effects on job satisfaction, teamwork dynamics, and the quality of patient care and outcomes (Borges et al., 2021; HaGani et al., 2022; Monroe et al., 2021).

The importance of self-care cannot be overstated, and there has been an increasing interest in self-care within the profession in recent years (Sist et al., 2022). Maintaining high motivation for self-care was identified as the most effective measure for preventing burnout (Garrosa et al., 2022; Lee & Joo, 2023). Moreover, self-care is essential for increasing nurses' work productivity and fostering individual ownership of self-fulfillment and resilience (Roussel, 2022; Sathiarajan et al., 2022). It is crucial to stay grounded, uphold healthy boundaries, and remain fully attentive while providing care in the demanding healthcare field (Hotchkiss & Cook-Cottone, 2019). Although the emphasis on self-care to avoid burnout and build resilience is not new, the normalization of self-care practices among nurses has been uncommon (Mills et al., 2018; Williams et al., 2022). Nevertheless, it is suggested that nurses must take ownership and responsibility in promoting self-care (Nkabinde-Thamae et al., 2022).

Self-care entails actively promoting one's health and well-being, encompassing various practices and activities that promote well-being and counter stress, allowing nurses to maintain their health and effectively deliver quality patient care (Mills et al., 2018; Williams et al., 2022). As a concept, self-care is connected to mindfulness, compassion, and

resilience (Sist et al., 2022). Based on empirical works and theory, Cook-Cottone (2015) defined mindful self-care as involving mindful awareness of internal needs and external demands, and intentional engagement in specific self-care practices for well-being and personal effectiveness. Moreover, mindful self-care involves three practices (Depner et al., 2021): practices nurturing the internal self (physical care, self-compassion, and purpose), practices nurturing the external self (supportive relationships and structures) and integrating practices (mindful awareness and mindful relaxation).

Self-care is a fundamental responsibility and a crucial aspect of nurses' well-being and professional functioning (Linton & Koonmen, 2020; Newell, 2017). The nursing ethical codes worldwide commonly incorporate the necessity of self-care, intertwining the duty to safeguard and enhance personal well-being with the explicit responsibility to deliver safe patients (Linton & Koonmen, 2020). In other words, self-care involves balancing care for others with care for oneself, with a core focus on promoting personal health and well-being (Hutton et al., 2016; Mills et al., 2018).

A review of the literature revealed various studies conducted on self-care practices among nurses in different countries, such as Australia (Mills et al., 2018), United States of America (Atkins et al., 2018), Poland (Babiarczyk & Sternal, 2022), South Africa (Muhlare & Downing, 2023; Nkabinde-Thamae et al., 2022), Jamaica (Udoudo et al., 2023), and Asian countries like Iran (Ahmadi et al., 2019), South Korea (Lee & Joo, 2023), and Pakistan (Zeb et al., 2022). One study in the Philippines reported a positive attitude toward self-care management among nursing students (Peprah et al., 2019). However, the study sample did not include Filipino nurses.

Despite the significance of self-care, research on the self-care practices of Filipino nurses in district hospitals remains limited. In the Philippines, nurses in district hospitals face unique challenges that may impact their ability to engage in effective self-care practices. Public district hospitals serve as crucial healthcare facilities, providing essential medical services to communities in rural and underserved areas. Nurses in these settings often contend with limited resources, a significant patient volume, and demanding workloads, contributing to stress, burnout, and decreased well-being (Collado, 2019; Gizaw et al., 2022). Understanding nurses' self-care behaviors in this context is essential for identifying areas of need and implementing interventions to support their well-being. By exploring the self-care practices of Filipino nurses in district hospitals, this cross-sectional study seeks to address this gap in the literature and contribute to a greater understanding of the current state of nurses' self-care in district hospitals. This study examined nurses' self-care practices across three district hospitals in the Philippines. It focused on identifying the extent to which various self-care behaviors are practiced and their associations with demographic and work-related factors.

METHOD
Research design
A descriptive cross-sectional research approach was used to conduct this study.

Participants
The selected participants were all nurses from three district hospitals in a district of Iloilo Province in the Philippines. The study was conducted in these hospitals because there is limited published research about self-care practices among nurses in rural areas and the Philippines. Moreover, nurses in Philippine district hospitals face challenges that hinder effective self-care, such as limited resources, high patient volume, and heavy workloads, leading to stress and burnout. Registered nurses who were willing to participate in the study and employed by the district hospital were included. However, nurse employees on leave of absence during the data collection, those with incomplete data, and those who refused to participate before, during, or after the data collection were excluded from this study. This study involved a total population sampling of 150 nurses working in three district hospitals. However, only 135 nurses responded to the survey, obtaining a response rate of 90%.

Research instrument
The researcher used a fully adopted survey questionnaire (Mindful Self-Care Scale or MSCS) developed by (Cook-Cottone & Guyker, 2018). The MSCS was chosen for this study as it has already been validated to assess mindful self-care among healthcare professionals, as demonstrated in Hotchkiss & Cook-Cottone's (2019) study. The English form of the survey questionnaire consisted of two parts. The items in the first section were intended to collect demographic and work-related details such as age, sex, marital status, average monthly income, employment status, length of experience as a nurse, and area of assignment. For the second part, the participants rated each item based on the frequency (1-never to 5-regularly) of their self-care behaviors within the past week. The MSCS consists of 33 items designed to assist individuals in identifying areas of strength and weakness in mindful living and self-care habits. The MSCS covers six aspects or domains of self-care: mindful relaxation, physical care, self-compassion and purpose, supportive relationships, supportive structure, and mindful awareness. It aimed to assess and evaluate the variety and frequency of self-care strategies to improve overall well-being. This analysis did not include the three additional general items (engaging in a variety of self-care activities, planning self-care, and exploring new ways to bring self-care into the individual's life) that examined the individual's general or more global self-care practices.

According to the tool developers, the instrument's content validity was validated by four classes of graduate students and four experts. The brief MSCS had acceptable reliability, construct, and concurrent validity among healthcare professionals (Hotchkiss & Cook-Cottone, 2019). Based on the actual data of the current study, Cronbach's alpha coefficient was also acceptable, with a value of 0.90 for a total of 33 items in the MSCS. The following were the reliability coefficients for specific domains: 0.75 for mindful relaxation, 0.90 for supportive relationships, 0.92 for self-compassion and purpose, 0.90 for supportive structure, 0.95 for mindful awareness, and 0.67 for physical care. The following interval and descriptions were used to analyze and interpret the findings in this study: Very Low = 1.00-1.79, Low = 1.80-2.59, Moderate = 2.60-3.39, High = 3.40-4.19, Very High = 4.20-5.00.

Data collection
The researcher secured the permission and approval of the head of the Hospital Management Office (HMO) in the Iloilo Provincial Government. Once approved by the director of the HMO and endorsed by the different medical chiefs in the district hospitals, the researcher contacted the hospital's medical chief through a letter to arrange a schedule of onsite visits and conduct the study with the nurses in the three district hospitals. Provisions on the minimum health standard protocol were always observed, such as wearing masks and maintaining hand hygiene during the data collection. The

survey questionnaire was printed and personally distributed among nurses working in the hospitals before, at the end of their duty hours, or at their most convenient time to ensure the accuracy and consistency of data collection. Data collection was conducted for about 15 days per hospital. The participants took approximately 5-10 minutes to finish answering the questionnaire. However, if the participant wished to have more time to answer the questionnaire, they were given an additional one week to ensure that they answered it at their most convenient time. The researcher personally collected all the questionnaire forms after the participants had completed them. The data collection process lasted from October to November 2023.

Statistical data analysis
The statistical computations were calculated using the IBM Statistical Package for the Social Sciences (SPSS) software version 26.0. The data obtained was described through the frequency count, percentage, mean, and standard deviation. A test for the normality of data distribution was done first with the Kolmogorov-Smirnov result of 0.20, suggesting a normally distributed data set. The *t*-test for Independent Samples was used to test for differences in self-care practices according to age, sex, marital status, monthly income, existing illness, employment status, position, and length of experience. Meanwhile, one-way ANOVA was employed for the area of assignment. The level of significance was set at alpha less or equal to 0.05.

Ethical consideration
The Unified Research Ethics Review Committee approved the study and received Protocol No. WVSU.URERC-2023. GS-1_009. Consent to participate was obtained, and participants were informed that they could refuse to answer or withdraw from the survey at any point without any repercussions, and all data would remain confidential.

RESULT
The study involved 135 nurses, representing the entire participant pool that responded to the survey. Analysis of Table 1 discloses that a significant proportion of these nurses were characterized as younger individuals (65.2%), predominantly female (86.7%), married (61.5%), fall into a higher income bracket (61.5%), hold non-permanent positions (63%), possess less than a decade of nursing experience (69.6%), and have no chronic disease or existing illness (94.8%). A predominant (55.6%) assignment to the ward was observed, with the other nurses distributed across various specialty areas, centers, and the Outpatient Department (36.3%) of the hospital and the Nursing Service Office (8.1%). The participant pool predominantly consisted of staff nurses (80.7%). However, this sample also included nurses holding managerial positions but were stationed in the ward or special areas.

Table 1. Demographic and work-related profile (n = 135)

Demographic and work-related profile	n	%
Entire group	135	
Age [M =40.10 years, SD=10.48]		
Younger (40 years old and below)	88	65.2
Older (Above 40 years old)	47	34.8
Sex		
Male	18	13.3
Female	117	86.7
Marital status		
Single	52	38.5
Married	83	61.5

Demographic and work-related profile	n	%
Monthly income [M=31,079.95]		
Lower (PHP 25,999.00 and below)	77	57.0
Higher (above PHP 25,999.00)	58	43.0
Presence of chronic disease or existing illness		
With	7	5.2
Without	128	94.8
Status of employment		
Permanent/plantilla employment	50	37.0
Non-permanent/non-plantilla	85	63.0
Position		
Staff	109	80.7
Managerial (head nurse, supervisor, chief nurse)	26	19.3
Length of experience		
Shorter (10 years and below)	94	69.6
Longer (above 10 years)	41	30.4
Area of assignment		
Wards	75	55.6
Special Areas, OPD, Centers	49	36.3
Nursing Service Office (NSO)	11	8.1

Table 2 illustrates the self-care behaviors observed in nurses employed at district hospitals. The analysis of nurses' responses indicates that mindful awareness (M=4.12, SD=0.69), supportive relationships (M=4.10, SD= 0.70), self-compassion and purpose (M=4.06, SD=0.86), supportive structure (M=4.04, SD=0.70), and mindful relaxation (M=3.56, SD=0.71) are all characterized as having a high level of self-care practices. However, the self-care behavior for the physical care (M=3.01, SD=0.59) domain was only moderate. Overall, the nurse's level of practice of self-care behaviors was high, with a mean score of 3.73 and a standard deviation of 0.46.

Table 2. Level of self-care practices

Self-care practices	*M*	*SD*	Interpretation
Mindful awareness	4.12	0.69	High
Supportive relationships	4.10	0.70	High
Self-compassion and purpose	4.06	0.86	High
Supportive structure	4.04	0.70	High
Mindful relaxation	3.56	0.71	High
Physical care	3.01	0.59	Moderate
Overall	3.73	0.46	High

Note: very low = 1.00-1.79, low = 1.80-2.59, moderate = 2.60-3.39, high = 3.40-4.19, very high = 4.20-5.00

Table 3 compares nurses' overall self-care behaviors per variable, considering age, sex, marital status, comorbidities, monthly income, employment status, region of assignment, position, and duration of experience. The results of Independent Samples t-tests indicate significant differences in the self-care behaviors based on age (t=2.174, p=0.031), monthly income (t= 2.930, p=0.004), employment status (t=-2.017, p=0.046), and length of experience (t =2.065, p=0.041).

Table 3. Differences in self-care practices according to profile

Variables	M	SD	Test statistics	p-value
Age			2.174*	0.031
Younger	3.79	0.47		
Older	3.61	0.41		
Sex			1.523	0.130
Male	3.88	0.37		
Female	3.70	0.47		
Marital status			0.838	0.404
Single	3.77	0.45		
Married	3.70	0.46		
Monthly income			2.930*	0.004
Lower (25,999 and below)	3.82	0.50		
Higher (above 25,999)	3.60	0.36		
Presence of illness			-.399	0.691
With	3.66	0.48		
Without	3.73	0.46		
Status of employment			-2.017*	0.046
Permanent	3.62	0.38		
Non-permanent	3.79	0.49		
Position			1.591	0.114
Staff	3.76	0.46		
Managerial	3.60	0.42		
Length of experience			2.065*	0.041
Shorter (10 years and below)	3.78	0.48		
Longer (above 10 years)	3.60	0.37		
Area of assignment[b]			.180	0.835
Wards	3.73	0.51		
Special Areas, OPD, Centers	3.70	0.38		
NSO	3.78	0.37		

Note*: significant if *p<.05, [a]t-test for Independent Samples, [b]one-way ANOVA*

DISCUSSION

This study examined nurses' self-care behaviors. District hospital nurses generally demonstrated a high level of self-care behaviors. Nevertheless, although the Filipino nurses in this study must be praised for their high self-care practice, it must be noted that this did not reach a very high level. This result may suggest that while nurses engage in self-care activities in this study, these behaviors may not be done consistently. Nurses' self-care may not be optimal as nurses might have limited time to practice self-care due to understaffing and heavy workloads (Alibudbud, 2024).

Similarly, a study in Jamaica also reported that while nurses engage in some self-care activities, many do not consistently maintain this practice (Udoudo et al., 2023). A moderately high self-care among nurses in the hospitals in Iran was also noted (Ahmadi et al., 2019). Higher than average mean scores in self-are practice were disclosed among nursing students in a study conducted elsewhere (Brouwer et al., 2021). The nurses in this study may be more attuned to the importance of preventive health measures, including self-care, and more aware of the importance of self-care to cope with stress and prevent burnout. In addition, nurses in district

hospitals may have developed a high degree of personal resilience due to the diverse challenges they face. This resilience can translate into a proactive approach to self-care, as they recognize the importance of maintaining their health to continue providing quality care to patients (Chen & Kao, 2023).

Notably, the physical self-care domain was only moderately practiced and received the lowest scores among the six domains. Physical self-care involves drinking 6 to 8 glasses of water, eating nutritious foods, and regularly exercising. While it has been reported that nurses primarily focused their self-care efforts on enhancing their physical health and diets (Babiarczyk & Sternal, 2022; Udoudo et al., 2023), several studies revealed that many nurses are overweight, have sedentary lifestyles, do not regularly exercise, have irregular eating schedules, poor eating habits, or seldom eat healthy food (Muhlare & Downing, 2023; Ross et al., 2017; Ross et al., 2019). Other studies noted that physical activity was rated least among the behaviors promoting health (Diana et al., 2023). Unexpectedly, although nurses possess knowledge of healthy living practices, they struggle to implement these measures effectively for their self-care (Ross et al., 2017). Prolonged working hours and emotionally taxing situations may lead to exhaustion, diminishing the inclination for physical care (Skovholt & Trotter-Mathison, 2016).

Moreover, nurses often contend with irregular schedules, including night shifts and rotating shifts, disrupting sleep patterns and complicating establishing a consistent routine for exercise and other physical care practices (Wilson, 2002). Such conditions can be particularly true among Filipino nurses, who may struggle to prioritize self-care activities due to understaffing and low wages, potentially limiting their available time (Alibudbud, 2024). This study's findings suggest a need for interventions to bridge the gap in nurses' actual implementation of healthy practices. A scoping review presented strategies for promoting self-care through various interventions, including mindfulness-based approaches, educational programs, multimodal strategies, and mind-body practices (Sist et al., 2022).

This study also found that younger nurses with lower income, non-permanent employment status, and shorter length of experience had a higher level of self-care practice. Therefore, the influence of lower income status should not be overlooked. While it might be expected that lower-income individuals face more significant challenges in adopting self-care practices, the observed trend could result from the possibility that younger nurses in this study are those with shorter work experience, non-tenured status, and lower monthly incomes. Age, income, and years of employment were also noted to influence the self-care practices of nurses in Jamaica and Iran (Ahmadi et al., 2019; Udoudo et al., 2023). A similar trend to this study was also noted in another study among nurses in Pakistan, wherein significant negative correlations were observed between nurses' mindful self-care levels and their age and clinical experience (Zeb et al., 2022). Younger nurses, confronted with challenges such as lower income and non-permanent employment, may perceive self-care as a vital coping mechanism to manage stress and uphold resilience.

Furthermore, due to the accessibility provided by the Internet, younger nurses have been exposed to a wide range of information related to self-care and how to better take care of themselves. This accessibility may have empowered and influenced them to practice better self-care choices compared to their older counterparts. Younger Millennial and

Gen Z nurses are witnessing revitalized enthusiasm for self-care practices and a newfound respect for boundaries (Ferrer, 2024). Additionally, millennials exhibit a significant investment in self-care compared to preceding generations (Reflect, 2023). Their financial commitment to areas such as diet plans and therapy is reported to be twice that of previous generations. Meanwhile, the younger generation, Gen Z, stands out as avid users of mental health applications (ETHealthWorld, 2023). Given the rising prevalence of mental health challenges among young individuals, it is unsurprising that Generation Z has developed distinct coping mechanisms to address stressors and has elevated the importance of mental well-being as a component of self-care (Brown, 2023). Recognizing the significance of emotional and mental well-being in a world filled with stress and negativity may explain why younger individuals have greater self-care practices (Dulin, 2023).

An earlier study among Filipino millennials also showed satisfaction with their nursing careers (Oducado, 2020). Moreover, in a 2024 State of Healthy Eating and Well-being Report (2024) from Lifesum, 71% of Generation Z and Millennials were willing to leave their current job immediately if they find one that prioritizes their well-being more effectively. Given that the younger generation of nurses puts a premium on self-care and well-being, nurse managers and administrators may reconsider prioritizing work-life balance and workers' wellness to attract, engage, and retain this generation (Silva Júnior et al., 2020). Additional initiatives and programs may be developed to guarantee that this demographic of professionals at work receives the necessary training, resources, and assistance to safeguard their well-being (Fredenburg, 2024).

However, this study is limited to identifying the self-care practices of nurses using the behaviors covered in MSCS in three district hospitals in Iloilo, Philippines. Therefore, the result applies only to the participants of this study and will not be used to measure the self-care behaviors of other nurses who do not belong to the study sample. Additionally, because this study utilized a descriptive cross-sectional design, it cannot follow changes in the self-care behavior of nurses over time. Given the use of printed self-administered survey questionnaires, self-report bias is also a limitation of this study. There may have been other aspects that influenced the practice of self-care, but this study only focused on selected personal and work-related characteristics. Moreover, the study did not strictly adhere to generational cut-offs, suggesting the need for future research to validate potential generational differences in self-care practices and to confirm this generalization noted in this research. Given these limitations, the researchers warrant caution in the use of the findings and conclusions of the study.

CONCLUSION AND RECOMMENDATION
In conclusion, this research highlights that nurses are dedicated to caring for themselves. However, among all its dimensions, nurses were less proactive in the physical care domain. Further initiatives and interventions should be considered to support the nurses' physical self-care needs to sustain a resilient and healthy nursing workforce, ensuring that nurses are dedicated to patient care and adequately supported in their well-being. Additionally, this study underscores that nurses, particularly those in the early stages of their careers, demonstrate better self-care practices. This result underscores nurses' internal motivation to prioritize their well-being and maintain holistic self-care, which is evident among the younger generation of nurses starting their careers. Efforts and programs could be established to ensure

that this generational cohort or group of professionals in the workplace receives the essential training, resources, and support to protect their well-being.

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INTER DIALYTIC WEIGHT GAIN AND ULTRAFILTRATION GOAL OF POST COVID-19 AMONG HEMODIALYSIS PATIENTS IN RIAU PROVINCE: A DESCRIPTIVE STUDY

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ABSTRACT

Key indicators for assessing the adequacy of hemodialysis include Inter-Dialytic Weight Gain (IDWG) and Ultrafiltration Goal (UFG), both of which are closely related to patients' hemodynamic status. However, there is limited information on the specifics of IDWG and UFG, particularly in Riau Province. This quantitative study with a descriptive design aims to describe IDWG and UFG in the aftermath of the COVID-19 pandemic in Riau. The research was conducted across three regional hospitals in Riau Province, involving 138 hemodialysis patients. This study employed univariate statistical analysis, using secondary data as the primary source. The findings indicate that in the first four months following the COVID-19 pandemic among hemodialysis patients in Riau Province, the average UFG and IDWG levels exhibited fluctuations, with IDWG in the three hospitals ranging from 2.28 to 3.12, while UFG was be 2.13 to 3.09. The results suggest that stabilizing of IDWG and UFG is crucial to prevent complications arising from these fluctuations, such as activation of the renin-angiotensin-aldosterone system, stimulation of the sympathetic nervous system, and increased cardiac output.

Keywords: *Inter-dialytic weight gain; ultrafiltration goal; haemodialysis*

INTRODUCTION

During the Covid-19 pandemic, significant changes occurred in hemodialysis patients, both in terms of patient conditions and hemodialysis therapy services provided. No study has specifically assessed hemodialysis therapy in patients receiving adequate hemodialysis in the province, especially in the post-Covid-19 in Riau, most research has concentrated on diseases affecting coastal communities or the behavior and influence of the coastal environment on public health (Indonesian Renal Registry, 2017; Neuman, 2019; Linberg, 2020; Muttaqin, 2019; Widyastuti, 2020).

Riau Province covers an area of 87,023.66 km^2. It comprises both land and water, featuring numerous islands along the Malacca Strait (Indonesian Renal Registry, 2017). Many residents inhabit coastal areas, but environmental conditions and community habits can affect health. One prevalent disease among coastal communities is chronic kidney disease (Septiwi, 2019).

According to the Indonesian Renal Registry report (2017), the number of patients undergoing hemodialysis increased from 30,554 patients in 2015 to 52,835 patients in 2016, and further rose to 77,892 patients in 2017. If each patient undergoes hemodialysis 2 to 3 times a week, this results in approximately 155,784 to 233,676 hemodialysis treatments performed weekly. In Riau Province, it is estimated that around 800,000 individuals suffer from chronic kidney disease, yet only 2-5% of them receive hemodialysis treatment.

An essential aspect of assessing hemodialysis therapy is measuring IDWG (Interdialytic Weight Gain) and UFG (Ultrafiltration Goal). The IDWG is crucial because the increase in fluid volume, shown through an increase in body

weight, serves as the basis for determining the amount of fluid that enters during the interdialytic period (Istanti, 2020).

According to Neuman (2013), the IDWG indicates that the body can tolerate more than 3% of its dry body weight. Dry body weight refers to the weight of body when there are no clinical signs of fluid retention (Linberg, 2020). A higher IDWG, a greater amount of excess fluid in the patient's body, which can lead to more severe negative impacts, such as hypotension, muscle cramps, hypertension, shortness of breath, nausea, and vomiting, and others (Muttaqin, 2019).

An essential condition that must be considered is the UFG. During the hemodialysis process, the removal of excess body fluids is achieved through ultrafiltration process. This process effectively eliminates excess fluid volume, thereby, reducing oedema in the patient's body (Wong & Sarjana, 2017). However, if excess fluid is not removed, it can accumulate over time, leading to conditions such as anasarca or even pulmonary edema, which can interfere with breathing and pose a risk of death (Sulastri, Septimar & Winarni, 2021).

Several previous studies have discussed the relationship between the length of time on hemodialysis and the IDWG, the impact of health education on patients' knowledge regarding fluid restrictions and IDWG in hemodialysis patients, and the significant correlation between IDWG and the occurrence of hemodialysis complications. These studies focused on one health area in Riau during the pre-pandemic period (Bayhakki, Utomo & Dewi, 2021; Cholina, et al, 2021)

This study provides valuable insights into the hemodialysis procedure following the lifting of COVID-19 pandemic restrictions. It serves as a foundation for optimizing hemodialysis adequacy, ensuring that patients receive optimal benefits from their treatments. Additionally, hemodialysis adequacy can be used as an indicator of patient compliance with fluid restrictions and possible negative effects on their health.

METHOD
Research design
This research design employed quantitative approach utilizing statistical techniques and descriptive analysis methods to characterize the IDWG and UFG of post-COVID-19 hemodialysis patients in Riau Province. The data processing was conducted using SPSS version 20 software. The study was carried out at Regional General Hospitals (RSUD) across various regencies or cities in Riau Province, including Dumai General Hospital, Puri Husada General Hospital, and Arifin Achmad General Hospital.

Population and sample
This study used total sampling with a sample size of 138 patients. The inclusion criteria encompassed all hemodialysis patients who underwent treatment between June 22 and September 30, 2023. The use of total sampling of respondents was intended to gather more heterogeneous set of results from a non-general target population of patients receiving hemodialysis.

Instruments
The data collection technique utilized a secondary data obtained from hospital medical records. This study did not use a specific instrument; the demographic data included only gender, age, and hemodialysis duration, and the average of the patients' IDWG and UFG.

Statistical analysis

Statistical analysis in this study was univariate Secondary data from hemodialysis patients were obtained from medical records in three hospitals in Riau Province were input and processed using the SPSS 2.1 application and presented in graphical format.

Ethical consideration
This study has been approved by the Ethics Committee of Nursing and Health Research at Riau University, under the approval number 146/UN19.5.1.8/KEPK.FKp/2023.

RESULT
The data collection results from three hemodialysis units, which are RSUD Arifin Achmad, RSUD Dumai, and RSUD Puri Husada Tembilahan, yielded a total of 138 hemodialysis patient records available for analysis. Specifically, there were 60 patients from Dumai Regional Hospital, 49 patients from Puri Husada Tembilahan Regional Hospital, and 29 patients from Arifin Achmad Regional Hospital. The characteristics of the 138 patients are presented in the table below.

Table 1. Respondent Characteristics

| Hospital	Variable (n= 138)			
	Gender		Age	HD Timing
	Female	Male		
	Presentage		Mean	
Arifin Ahmad General Hospital	9 (3.03%)	20 (68.97%)	49 (17-66)	4 hours
Dumai General Hopital	28 (46.67%)	32 (53.33%)	47 (23-74)	5 hours
Puri Husada General Hospital	19 (38.78%)	30 (61.22%)	48 (25-70)	5 hours
Total	56 (40.58%)	82 (59.41%)	48 (17-74)	5 hours

Table 1 shows the data from three hospitals, indicating that the total number of male respondents (59.42%) exceeded that of female respondents (40.58%). Furthermore, the average age of respondents from RSUD Arifin Achmad was 48.48 years old, while the average age from RSUD Dumai was 46.98 years, and from RSUD Tembilahan, it was 47.89 years old. The youngest respondent was 17 years old, and the oldest was 74 years old. On average, the duration of each hemodialysis sessions at RSUD Arifin Achmad was 5 hours.

The following information presents the results of the descriptive analysis of the average Inter-Dialytic Weight Gain (IDWG) and Ultrafiltration Goal (UFG), which refers to the amount of fluid removed during each session of hemodialysis from June 22 to September 30, 2023.
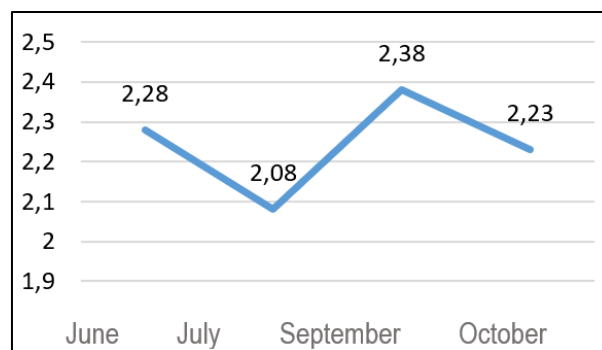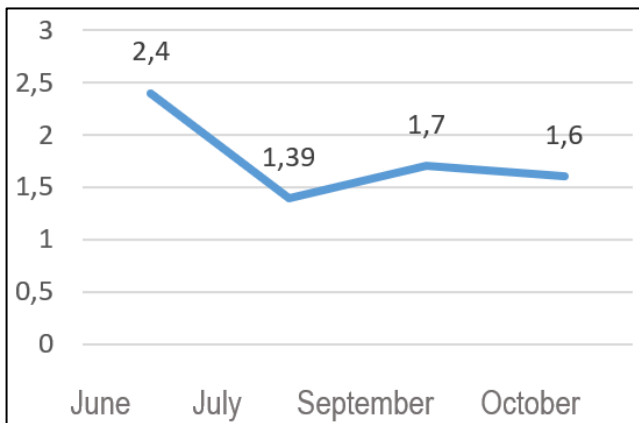

Graphic 1. The Average of IDWG during June until September 2023 in Arifin Achmad Pekanbaru Hospital

Graphic 1 above illustrates the average IDWG of respondents at RSUD Arifin Achmad from June to September 2023. Initially, the IDWG was 2.28 kg at the end of June, then decreased to 2.08 kg in July, before increasing again to 2.38 kg in August. However, from August, the average IDWG dropped to 2.23 kg in September 2023. The average IDWG during the early post-COVID-19 Pandemic as shown fluctuations, with minimal differences in the rates of increase or decrease.
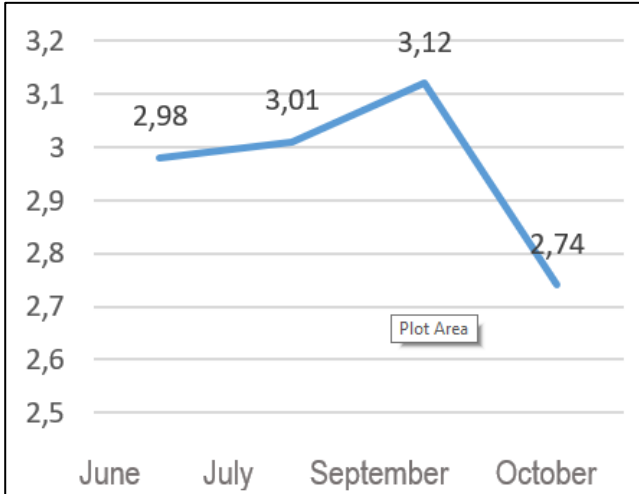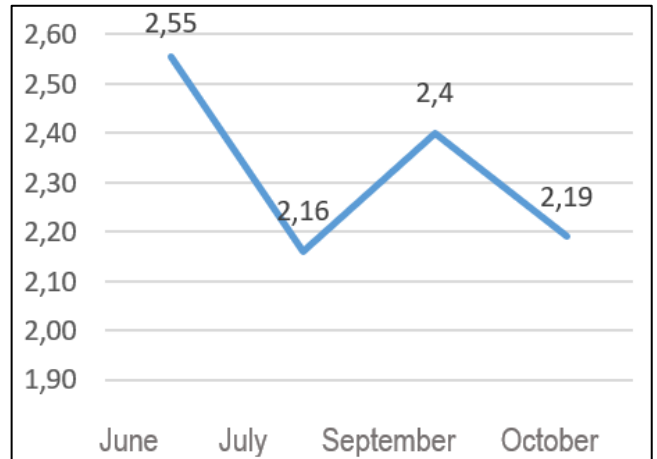

Graphic 2. The Average of IDWG during June until September 2023 in Dumai Hospital

Graphic 2 depicts that from the end of June to September 2023, the average IDWG of respondents at RSUD Dumai was 2.98 kg. This figure increased slightly to 3.01 kg in July, continued to rise to 3.12 kg in August, and then experienced a rapid decline to 2.74 kg in September 2023.
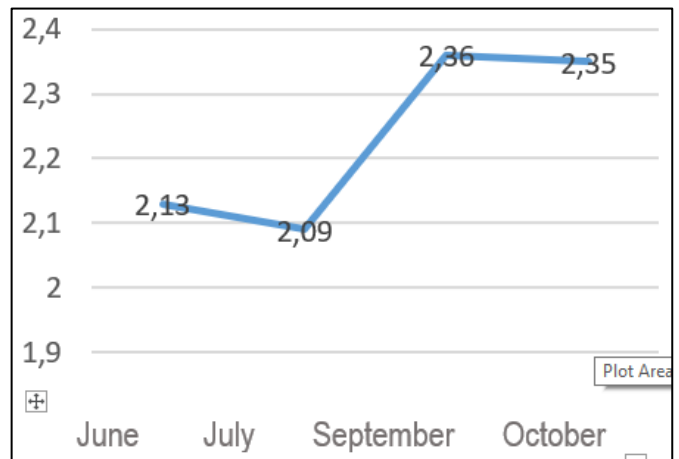

Graphic 3. The Average of IDWG during June until September 2023 in Puri Husada Tembilahan Hospital

Graphic 3 shows the average IDWG of respondents at RSUD Tembilahan. In June 2023, the average IDWG was 2.4 kg; however, it decreased to 1.39 kg in July. There was a slight increase in August, bringing the average to 1.7 kg, but it fell again in September 2023 to 1.6 kg. Overall, the average IWDG of respondents in this hospital decreased during the first four months after the declaration of post-COVID-19 pandemic status in Indonesia.
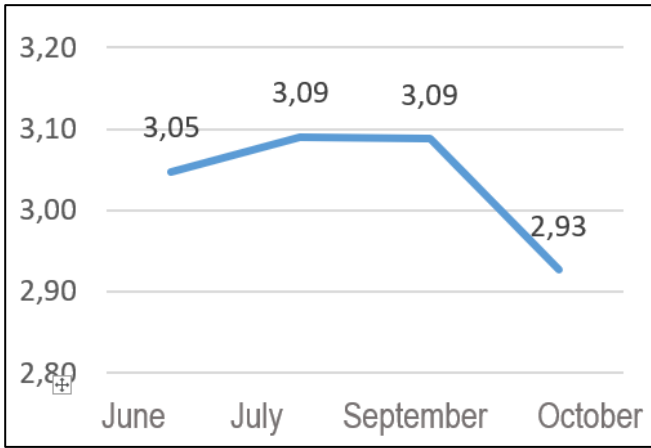

Graphic 4. The Average of IDWG during June until September 2023 in three Hospital

Graphic 4 illustrates that the average IDWG of the three hospitals decreased from 2.55 kg at the end of June to 2.16 kg in July. Subsequently, the average IDWG increased to 2.4 kg in August, before dropping again to 2.19 kg in September 2023. trend indicates that, in general, IDWG in the first 4 months following the post-COVID-19 pandemic status in the three research hospitals is fluctuating downward.
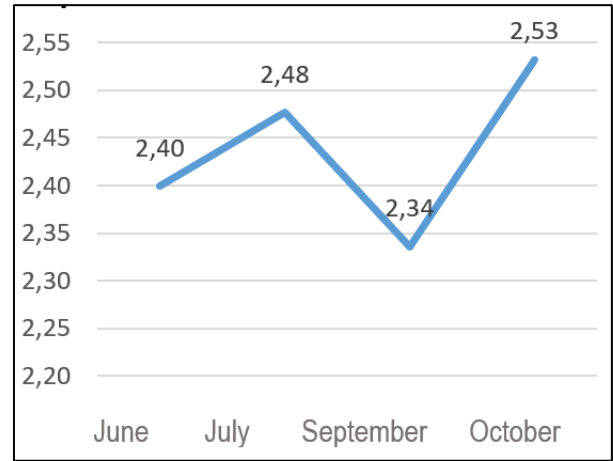

Graphic 5. The Average of UFG during June until September 2023 in Arifin Achmad Pekanbaru Hospital

Graphic 5 depicts that the average UFG in June 2023 was 2.13 kg. Following the Covid-19 Pandemic status, it decreased to 2.09 kg in July, then then increased to 2.36 kg in August. From August to September, it decreased again to 2.35 kg, yet remined above the average UFG recorded in July. Therefore, it can be concluded that from June to September 2023, the average UFG at RSUD Arifin Achmad exhibited a fluctuating trend.

Graphic 6. The Average of UFG during June until September 2023 in Dumai General Hospital

Graphic 6 shows that the average fluid removed during hemodialysis in June was 3.05 kg, which increased to 3.09 kg in July and remained stable until August. However, there was a significant decrease in September, dropping at 2.93 kg. From this graph, it can be concluded that the average UFG at RSUD Dumai tends to increased, then stabilized, and subsequently decreased.

Graphic 7. The Average of UFG during June until September 2023 in Puri Husada General Hospital

Graphic 7 illustrates that the average UFG of respondents at RSUD Tembilahan increased from 2.02 kg in June to 2.25 kg in July 2023. However, this figure declined to 1.56 kg in August before rising again to 2.32 kg in September. It can be concluded that the average UFG of respondents at RSUD Tembilahan exhibited fluctuations during the period from the end of June to September 2023.

Graphic 8 shows that when the data from the three hospitals are combined, the average UFG rose from 2.4 kg the end of June to 2.78 kg in July, before decreasing to 2.34 kg in August. Subsequently, the average UFG rose again to 2.49 kg in September 2023. This graph demonstrates that the average UFG fluctuated upward between the end of June and September 2023.

Graphic 8. The Average of UFG during June until September 2023 in three Hospital
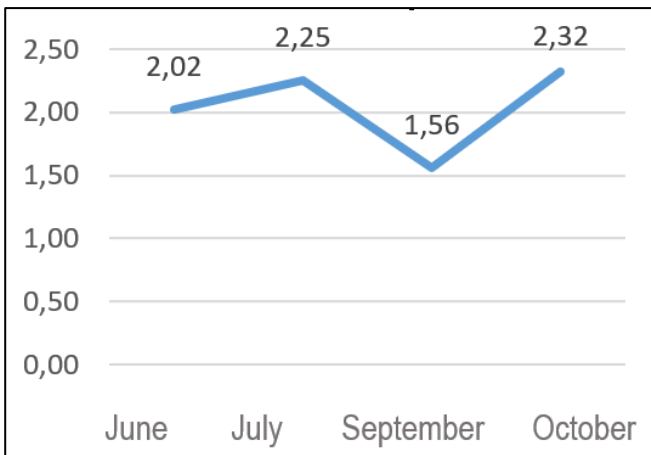
DISCUSSION

The high number of reported COVID-19 related deaths has caused anxiety and fear among many people, deterring them from seeking treatment services at hospitals. Research indicates that the prevalence rate of fear and various psychosocial problems has increased during the COVID-19 pandemic (Özdin & Bayrak Özdin, 2020; Al-Balas et al., 2022).

This finding is supported by another study that analysed the level of fear among hemodialysis patients during the COVID-19 pandemic, which reached 57.5, showing thata these patients experienced severe stress (Syahrizal et al., 2020). However, despite the researchers conducted, the number of patient visits remained stable even after entering the endemic period. Therefore, it is crucial to monitor the adequacy of the hemodialysis process, which can be assessed through the stability of IDWG and UFG.

The status of IDWG is influenced by several factors, including fluid intake. The human body is composed of approximately 60% water, and healthy kidneys excrete and reabsorb water to balance blood osmolarity. Meanwhile, patients with chronic kidney disease who undergo hemodialysis experience impaired urine formation of urine, which can lead to excess fluid volume in the body. In addition, patients with kidney issues often experience excessive thirst, which as a stimulus for the sensation of thirst. This thirst or the desire to drink can be triggered by various factors, including high sodium levels, decreased potassium levels, angiotensin II, increased plasma urea, post-dialysis hypovolemia, and psychological factors (Dewi, 2022).

In addition, age also contributes to changes in IDWG status. This study found that the majority of respondents were male (59%), with total body water constituting 60% of their body weight, while the total body water in female accounted for 50% of their body weight. Males have a different body composition than women, possessing a higher proportion of muscle tissue. Since fat is a substance that contains little water, a lower fat percentages results in a higher percentage of water relative to a person's body weight (Prasetyo, 2020).

Mild to moderate IDWG thresholds are generally well-tolerated by patients, allowing the hemodialysis process to proceed comfortably. In addition, some patients adapt to these conditions, experiencing leg swelling and tightness that are not overly disruptive (Wibowo & Siregar, 2020; Sridhar et al., 2023). However, patients with moderate to severe IDWG are primarily found among those with further disease complications (Ayunarwanti & Maliya, 2020).

The IDWG status in this study exhibited fluctuating conditions, although it did significantly exceed the maximum limit. Nonetheless, other studies have raised concerns about rapidly declining IDWG, as this condition is a particularly dangerous as an indicator of short-term mortality risk due to frailty and malnutrition, which often precedes a patient's death (Hecking et al., 2018).

High IDWG-induced excessive ultrafiltration during hemodialysis can activate the sympathetic nervous system, the renin-angiotensin-aldosterone system (RAAS), and cardiac output. This process may lead to reduction during the intradialytic ultrafiltration. The decline in the total blood volume (TBV) and relative blood volume (RBV) stimulates Renin release, which subsequently kidney blood flow. The conversion of Angiotensin I to angiotensin II by renin causes vasoconstriction and the release of aldosterone. Consequently, vasoconstriction and aldosterone secretion can result in an increase in intradialytic blood pressure (Armiyati, et al., 2021).

A significant increase in interdialytic weight gain (IDWG) due to fluid fluctuations can have serious effects, resulting in complications like impaired physical function, hypertension, and shortness of breath from pulmonary edema, all of which can disrupt hemodialysis. Furthermore, heart failure associated with these fluctuations is linked to a higher risk of ventricular hypertrophy (Robinson, Akizawa, & Jager, 2016). These more severe cardiac complications are caused by increased vascular resistance, which is triggered by excessive pre-dialysis fluid overload. This overload leads to elevated vascular resistance, resulting in patients experiencing high blood pressure during dialysis (Chiaranai, 2016; Badawi & Ryoo, 2022). Eventually, monitoring by healthcare professionals to limit fluid intake can help maintain health and prevent excessive increases in IDWG, thereby preventing the risk of mortality (Sari, Isro'in & Andayani, 2023).

The adequacy of hemodialysis is also determined based on the UFG. Ultrafiltration occurs due to the pressure differential between the positive pressure in the blood compartment and the negative pressure in the dialysate compartment, which is generated by the dialysate pump. The ultrafiltration rate should not exceed 13 ml/kg/hour, as higher rates are associated with increased mortality and morbidity (Widiana, 2017). These methods of fluid transfer are commonly used to facilitate the removal of excess fluid. UFG should be adjusted according to the patient's clinical condition and blood pressure to prevent hypotension and hypertension (Lim & Wah, 2018; Tita & Szychowski, 2022).

Multiple factors such as male gender, the duration of hemodialysis session, the presence of medical history, are associated with a high proportion of UFG (Naverraete et al., 2022). This finding is consistent with the previous research indicating that males dominate at 59% of the population studied, with an average hemodialysis duration of 5 hours. Hemodialysis is directly affected by fluid management.

Therefore, maintaining the appropriate volume is crucial for enhancing patient health outcomes (Loutradis, 2021).

The study demonstrated a significant increase in UFG in the final month. This increase can be attributed to unstable hemodynamic conditions, such as hypotension, which may arise hemodialysis due to excessive ultrafiltration or inadequate vascular filling compensation mechanisms. These factors can lead to autonomic and vasoactive response disorders, as well as a reduction in cardiac volume. Notably, even a decrease in blood volume can cause hypotension (Kandarini & Winangun, 2021).

However, in reality the practice of UFG remains constrained. This limitation arises from the need for precise interventions to assess volume status and decide the appropriate amount of fluid should be removed during the dialysis process. Other studies have shown that higher ultrafiltration rates contribute to a poor prognosis for hemodialysis patients (Zhang et al., 2023). Therefore, in case of adverse condition, the patient is positioned in Trendelenburg position as an initial treatment to restore blood circulation volume, receiving a normal bolus of 0.9% saline as indicated, along with vasopressors to reduce the ultrafiltration rate.

UFG and IDWG are ultimately interconnected, as impact of inadequate UFG is assessed by evaluating dry body weight (Kandarini & Winangun, 2021). In addition, it is known that high IDWG or short treatment times require high ultrafiltration, but the rapid fluid removal from this process can lead to the potential recurrent episodes of intradialytic hypotension, which negatively affects clinical outcomes, resulting in increased morbidity and mortality (Lee et al., 2020).

The strength of this study lies in its clear analysis of IDWG and UFG over the past 4 months, utilizing a diverse sample obtained from 3 different hospitals in Riau province following COVID-19 pandemic. The data obtained is varied and comprehensive. The results indicate that both IDWG and UFG exhibit a similar trend, with both showing an increase, which aligns with findings from another underlying research. Through this study conveyed that the need for ongoing monitoring by the medical personnel to prevent potential complications arising from these increases.

This study has several limitations, use of descriptive research design, which provides an outline of the discussed variables rather than in-depth causal conclusions. Additionally, the limitations of the demographic data displayed restrict the analysis of the core variables. Therefore, further study development such as case studies and qualitative research, is necessary to explore the phenomena of IDWG and IFG in patients and to identify influencing factors.

CONCLUSION AND RECOMMENDATION

This illustrates that the average UFG and IDWG tend to fluctuate during the first four months following the declaration of the COVID-19 pandemic in the three research hospitals of Indonesia. IDWG monitoring offers an overview of the effectiveness of fluid and urea management, while UFG assignment sets the goal of ensuring optimal fluid balance and metabolic control. This approach is based on clinical conditions and patient care needs, but comprehensive monitoring is necessary, along with health education, to stabilize conditions and prevent complications arising from fluctuations in ultrafiltration and IDWG. Such fluctuation can activate sympathetic nervous system, trigger activation of the renin-angiotensin-aldosterone system, and increase cardiac output.

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ORIGINAL ARTICLE

THE SYNERGISTIC EFFECT OF WARM SALT FOOTBATH AND FOOT-ANKLE EXERCISES IN INDIVIDUALS WITH TYPE 2 DIABETES MELLITUS: A STUDY PROTOCOL FOR MULTICENTER RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Individuals with type 2 diabetes mellitus (T2DM) experience issues with their sleep quality and elevated level of the neutrophil-lymphocyte ratio (NLR). Warm salt footbaths and foot-ankle exercises play a significant role in addressing inflammation and improving sleep quality. Nevertheless, no studies have examined the synergistic effects of warm salt footbaths and foot-ankle exercises. This study aims to investigate the synergistic effects of warm footbath water and foot-ankle exercises on sleep quality and NLR. A randomized controlled trial with a total of 108 individuals with T2DM randomly assigned to one four groups: a warm salt footbath, a foot-ankle exercises, a combination of both interventions, or a control group. The interventions administered over a period of 4 weeks (three times per week). Evaluations were performed by blinded evaluators at baseline, as well as after 2 and 4 weeks of interventions. Chi-squared test, one-way analysis of variance, and generalized estimating equations were employed for data analysis. The results of this trial were expected to elucidate the synergistic effects of warm salt water footbath and foot-ankle exercises on sleep quality and NLR. Furthermore, the combination of warm salt water footbaths and foot-ankle exercises is more effective either intervention alone or conventional treatment.

Keywords: *Foot-ankle exercises; synergistic effect; type 2 diabetes; warm salt footbath*

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a group of chronic metabolic disorders distinguished by abnormal insulin sensitivity and escalated blood glucose levels (American Diabetes Association, 2019; Buse et al., 2020). This condition can lead to increased inflammation (Halim & Halim, 2019; Rias, Gordon, et al., 2020; Rias, Kurniasari, et al., 2020) as well as sleep disturbances (Nanayakkara et al., 2020; von Schantz et al., 2021). Annually, it is estimated that four million deaths result from diabetes-related complications, which equates to one death every eight seconds (Internatonal Diabetes Federation, 2017). In Indonesia, the number of individuals with T2DM is projected to grow from 10.7 million in 2019 to 16.6 million by 2045 (Saeedi et al., 2019). To mitigate the increasing prevalence and reduce both macrovascular and microvascular complications associated

with T2DM, it is essential to understand and investigate individuals characteristics related to good exercise behaviors and relaxation techniques that may help prevent the development complications(Anusruti et al., 2020; Vaghasloo et al., 2020; Zhang et al., 2020).

Low levels of sleep quality have been identified as a risk factor for vascular complication associated with T2DM. While T2DM is a leading cause of mortality on its own, it exacerbates health problems when integrated with sleep disturbances. Increased neutrophil-to-lymphocyte ratio (NLR) levels in individuals with T2DM may result from the differential effects of hyperglycemia on neutrophils and lymphocytes, potentially contributing to the elevated levels of pro-inflammatory cytokines associated with insulin resistance (Mertoglu & Gunay, 2017). Currently, the physiological

mechanisms underlying the interaction between sleep quality indicators and the inflammatory pathway remains unclear. Additionally, previous study has revealed that poor sleep quality and a higher number of wakeful events during the night might induce a slight increase of sympathetic activity via the hypothalamus-pituitary–adrenergic system, which has been shown to enhance leukocytosis and the inflammatory response (Rangaraj & Knutson, 2016).

Remarkably, the previous randomized clinical trial study has shown that the use of warm footbath water was significantly declined the pain among individuals withT2DM (Vaghasloo et al., 2020). Also, pain has been linked to poor sleep quality (Choi et al., 2021), suggesting that the warm footbath therapy may escalate the sleep quality in patients with T2DM. The causal association between pain and poor sleep quality cannot be definitively established, prior research has indicated that inflammation and oxidative stress may contribute to poor sleep quality (Choi et al., 2021). Therapeutic exercises targeting the foot and ankle have proven beneficial for individuals with T2DM and were recommended for the first time in the most recent guidelines from the International Working Group on the Diabetic Foot (Silva et al., 2021). Moreover, it has been shown that foot–ankle exercises help reduce markers of vascular inflammation markers (Loader et al., 2018), but physical activity levels among in patients with T2DM remain relatively low in Indonesia (Rias, Gordon, et al., 2020). Foot-ankle exercise have also been associated with improved sleep quality in patients with T2DM (Win et al., 2020). To prevent the progression of vascular inflammation deficiencies in patients with diabetes, foot-ankle exercises have been recommended for investigation (Silva et al., 2021), but there is a lack of studies examining this approach.

As mentioned above, no study has examined the synergistic effect of warm footbaths and foot-ankle exercises on sleep quality. Therefore, in this project investigates the primary focus and novelty of this study: to assess the impact of warm footbath water and foot-ankle exercises on ameliorating NLR and improving sleep quality among Indonesians with T2DM in West Java, Indonesia. These two interventions which can address low sleep quality and elevated NLR levels. We firmly believe that the interaction of multiple therapeutic strategies (the combination of warm footbaths and foot-ankle exercises)

to yield an effect greater than simply the sum of the individual effects of each intervention when used separately. Besides, the effects of warm footbaths and foot-ankle exercises have not been systematically compared, nor has the potential for a synergistic effect from combining these two therapeutic modalities been evaluated. Consequently, the feasibility of a preventive treatment program should first be explored in Indonesia among individuals with T2DM. This highlights the fact that combination of foot-ankle exercises and warm footbath water may have positive effects on reducing inflammation, which consequently increase sleep quality in individuals with T2DM.

METHOD

Study design

This trial investigation employed a 2×2 factorial design within a randomized controlled trial. The experimental design featured an equivalent control group with pre-test and post-test measures, repeatedly conducted at with 2 weeks and 4 weeks.

Participants

This study will recruit 240 eligible patients aged 21 years or older who suffer from sleep problems, encompassing difficulty falling asleep, inability to remain asleep for more than 30 minutes, waking up in the middle of the night or early morning, and who have Type 2 Diabetes Mellitus (T2DM).. Respondents were selected from six public health care centres located in 3 urban areas and 3 rural areas. The inclusion criteria for the study consisted of 108 cases with fasting plasma glucose levels greater than 126 mg/dL or 7.0 mmol/L (American Diabetes Association, 2018), with these conditions confirmed by physicians. Also, respondents must be Indonesian nationals aged between 21 and 79 years and provide signed informed consent. Exclusion criteria for this study encompassed the individuals who (1) were pregnant or had diabetic foot ulcers or wounds; (2) had a previous cancer, thrombotic autoimmune diseases, any auditory deficiencies, or other chronic and acute diseases; (3) had a disability; (4) consumed antidepressants; (5) participants did not practice the intervention procedure prior to study, or (6) participated in other clinical trials that could influence the findings of this study. Table 1 shows a trial process chart illustrating the participant recruitment process.

Table 1. Trial process chart

Items	Enrolment	Baseline	Allocation	2 Week	4 week
Inclusion criteria	x				
Exclusion criteria	x				
Informed consent	x				
Randomization	x				
Allocation			x		
Baseline		x			
Intervention		x		x	x
Follow up				x	x
Adverse events				x	x

Sample size

This current study utilized G-Power sample size program based on previous literature (Rias, Kurniawan, et al., 2020). We conducted a priori power analysis to project the sample size, with power (1- β) of 0.8, an α level of 0.05, and an effect size of 0.25 for four groups. This formula provided a sample size of 97 participants, with each group consisting of 24 participants. Ultimately, the present study calculated a 10% dropout rate, which escalated the sample size to 27 participants per group, resulting in a total of 108 participants.

Blinding

Given the characteristics of intervention, it is not feasible for the participants in this study to remain unaware of their group assignments. After a patient consented to participate, the research assistant communicated to a clinical nurse. The nurse then will assign patients to groups using an opaque, sealed envelope containing identifiers, in the order they entered the trial. The inherent characteristics of the therapies precluded blinding the subjects. To mitigate detection bias, each participant will be assigned a unique three-digit

research code. Consequently, the researchers will not be aware of the participants' responses when entering data using the study code. Furthermore, during data analysis, the initial researcher will remain unaware of the group assignments, while the statistician will perform the analysis alongside the initial researcher. Five years after the study's conclusion, all data, both digital and hard copies, will be deleted.

Study Fidelity
Study fidelity was ensured by organizing meetings with investigators, the project leader, clinical nurses, research assistants, research fellows, and physicians. These sessions were held to examine the processes, verify the accuracy of the measurements, and align a shared understanding and implementation of the research.

Randomization and allocation
The permuted block randomization technique will generate the random allocation sequence, and a random number generator available at www.randomizer.org will facilitate the sampling process. To ensure the internal validity of the data, we will randomly and blindly assign the eligible patients to the study groups (IG1, IG2, IG3, CG), adhering to the equal percentage guideline of 1:1:1:1. A designated research assistant, who is not participating in this trial and will remain unaware of screeners and assessors until the final patient outcome assessment, will supervise the random allocation sequence. The project manager will notify the eligible members of their assigned group. The flow diagram for this trial is shown in Figure 1.
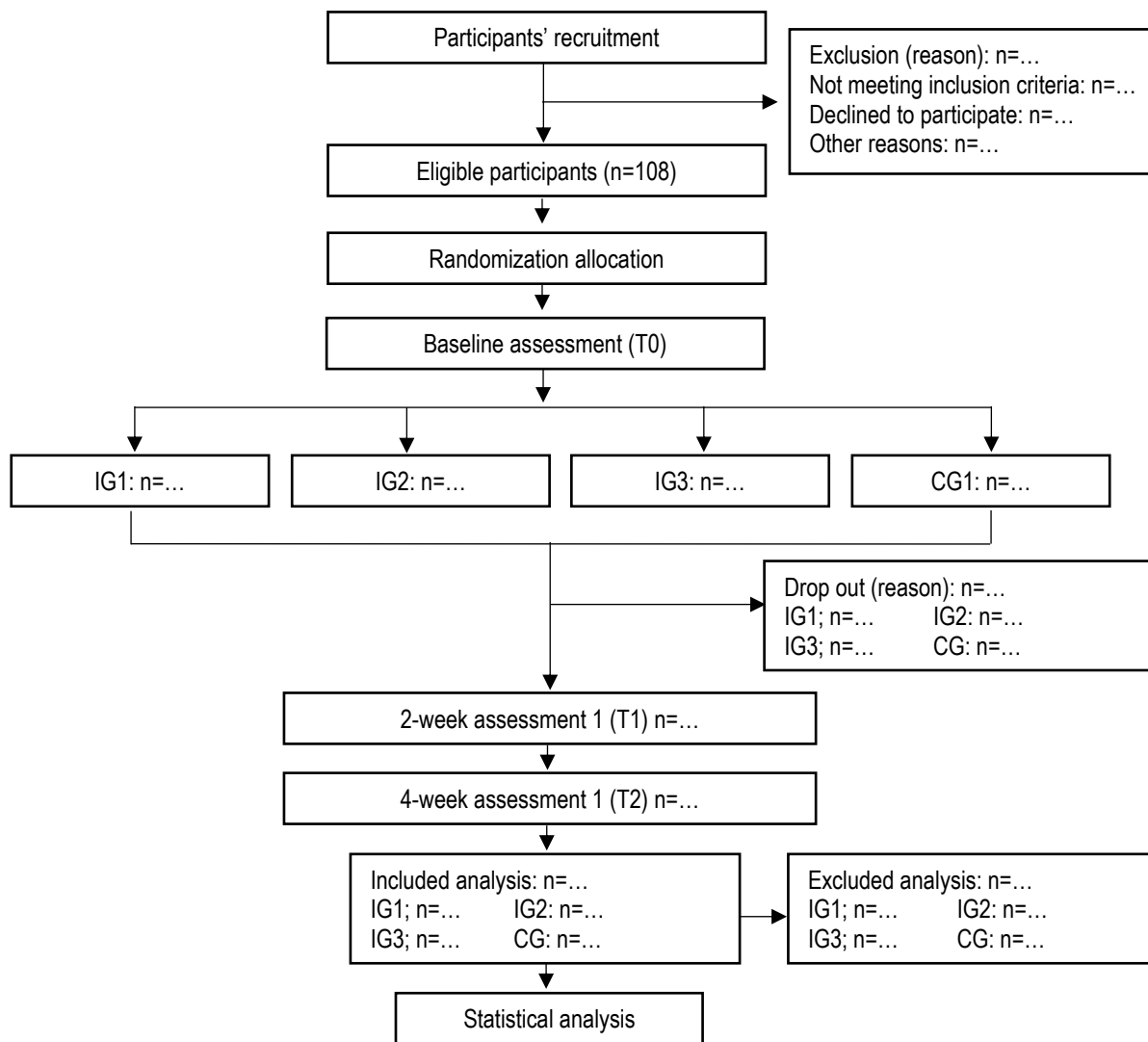
Note: CG: control group; IG1: warm salt footbath group; IG2: foot-ankle exercises group; IG3: a combination of both or control group

Figure 1 Flow diagram of participants

Treatment allocation
The trial will implement the intervention three times a week for a total of four weeks. Each session will consist of a 15-minute for a warm salt footbath followed by 30 to 45 minutes of ankle-foot exercises. The case report forms (CRFs) will contain precise documentation of the intervention, medication, and related lifestyle influence factors, such as

physical activity. The first intervention session intervention was supervised by clinical nurses, who instructed to instruct the participants on how to perform the warm salt footbath and ankle-foot exercises using the video. They also provide an exercise kit containing the materials needed to perform the exercises (pail for footbath, thermometers, cotton balls, a towel, a pencil, mini elastic bands, balloons, light and

moderate resistance elastic bands, a massage ball, and finger separators). Participants were instructed to perform the exercise program at home three times a week for four consecutive weeks. Adherence to the intervention will be confirmed through telephone follow-ups and a logbook where participants will record related to the warm salt footbath and foot-ankle exercises.

Control group
Respondents in the control group were advised to continue their exercise and receive pharmacological treatment, such as insulin injections, oral medications or a combination of both. They were advised against engaging in any extra physical activities or taking other antioxidant supplements.

Warm salt footbath protocol
Participants will undergo a 4-week home-based intervention in which both feet will be immersed in a pail filled with 5 litters of warm, tolerable water (approximately 42 °C) for 15 minutes. Prior to immersion, 250 grams of powdered mineral salt will be added and dissolved in the warm water. This intervention will take place in plastic tubs with a water depth of 15 cm, carried out before bedtime (Vaghasloo et al., 2020).

Foot-ankle exercises protocol
Participants will receive a 4-week physiotherapeutic home-based foot exercise program guided by an educational video lasting 30 to 45 minutes. This video consists of an informative session and an exercise program session. The informative session provides details about autonomous footcare, vascular inflammation, appropriate footwear, and the benefits of exercising the foot and ankle. The exercise program includes six exercises categorized into three difficulty levels. The physiotherapeutic exercise program aims to strengthens both the intrinsic and extrinsic foot–ankle muscles, while increasing the range of motion in ankle joints. It features three warm-up exercises, four exercises targeting the intrinsic foot muscles and joints, and two exercises targeting to the extrinsic foot muscles and joints. Participants could adjust the difficulty level based on a perceived effort scale.
Warm salt footbath combined foot-ankle exercises. For the combined group, participants will receive a warm salt footbath along with foot-ankle exercises (at the same time)

Measurements of The Pittsburgh Sleep Quality Index (PSQI)
The PSQI a 19-item questionnaire designed to assess sleep quality and disruptions over the preceding month. The PSQI consists of seven components: subjective sleep quality, sleep latency, sleep length, habitual sleep efficiency, sleep disruptions, and usage of sleeping medication (Buysse et al., 1989). Each question is scored on a four-point Likert scale (0–3), where a score ranging from 0 (better) to 3 (worse). The scores for the seven components are summed to generate a global PSQI score. The overall rating ranges from 0 to 21, with a value of > 5 indicating poor sleep quality. The Indonesian version of the PSQI exhibited a satisfactory internal consistency (Cronbach's coefficient = 0.8) and high concurrent validity (r = 0.89) (Alim, 2015).

Measurements of clinical and biochemical measures
The data involved Body Mass Index (BMI) and Platelet-to-Lymphocyte Ratio (PLR). Research assistants assessed participants' height and weight and checked these measurements using medical records. Height and weight were examined by research assistants, who ensured accuracy by cross-referencing with the medical reports. The BMI was calculated using the formula: body weight (kg)/height^2 (m^2). Participants were categorized into two groups: obese (BMI ≥ 25 kg/m²) and non-obese (BMI < 25 kg/m²; (Purnell, 2018). After a 12-hour fasting period, blood samples were drawn from the antecubital vein, all respondents were invited to attend each clinical examination. Neutrophil, lymphocyte counts, platelet counts and FBG were calculated using an automated haematology analyser XP-100.

Measurements of Incidence of Adverse Events
The safety of the method involving four parallel intervention groups was assessed based on the incidence of adverse events during the trial study period. Potential adverse events included fatigue, which participants self-reported and monitored by physicians weekly. Clinical nurses also maintained thorough documentation of these events. In the event of a side effect, the physician and investigators should promptly discontinue the intervention and take appropriate action.

Data collection and management
After receiving permission, a designated research assistant will collect demographic and baseline characteristic data without knowledge of the treatment assignment. The assistant will be trained to administer questionnaires consistently. The data will include demographic information such as medical history, current medications, age, duration of diabetes, body mass index, fasting plasma glucose levels, income, education, physical activity, family history, and any medications received in the past month, as well as any concurrent medications. Data will be gathered through direct patient inquiries and medical records The outcome assessors will conduct an outcome measurement following the intervention. The research assistant will oversee quality control for data collection and perform data entry tasks. The project leader will be responsible for performing the initial data cleaning, as well as identifying, coding, and converting the data into the appropriate format for data analysis. Each form must contain a date and signature from either the responsible investigator or an authorized staff member.

Ethical issue
Each participant will receive an information sheet along with a verbal briefing and explanation. All participants will provide written informed consent prior to the interview and examination of their medical records. This protocol obtained ethical approval from the Clinical Research Ethics Committee of Universitas Prima Nusantara Bukittinggi, under number 161/KEPK/UPNB/XII/2023, dated 17 December, 2023.

Statistical analysis
The statistical analyses will be conducted using SPSS version 25.0 (Chicago, IL, USA). A *p*-value of less than 0.05 will be deemed statistically significant. Descriptive statistics for continuous data will be presented as mean (standard deviation, SD), while categorical data will be reported as n (%). The Chi-squared test and one-way analysis of variance (ANOVA) will be used to compare sociodemographic and baseline results across the four groups, respectively. Generalized Estimating Equation (GEE) models, utilizing appropriate link functions and distribution assumptions, will be used to look at how outcomes change over time and between different groups. Multicollinearity will be assessed using the variance inflation factor (VIF). The models will be modified to account for potential confounding variables. Missing data resulting from loss to follow-up (n = ...) will be treated as missing completely at random, and the data will be analysed based on the intention-to-treat principle.

DISCUSSION

To the best of the authors' knowledge, this is the first RCT to examine the synergistic effects of warm footbath water and foot-ankle exercises on sleep quality and NLR among individuals with T2DM. Prior research, particularly studies on footbaths, has indicated that footbaths enhance blood flow by dilating peripheral blood vessels, alleviating sensory symptoms, stimulating tactile sensation, reducing activity in the sympathetic nervous system activity, improving the skin's ability to facilitate blood flow inf small vessels, and enhancing the medication absorption in the lower limbs (Emine & Gulbeyaz, 2022). Furthermore, a previous randomized clinical trial study has shown that the use of warm footbath water was significantly declined pain among individuals with T2DM (Vaghasloo et al., 2020). Interestingly, the physiological changes linked to warm footbath water are similar to those associated with foot exercises and a decreased sleep problems-related stress (An et al., 2019). A prior study revealed that warm footbath water effectively declined fatigue (Ozdemir & Can, 2021), which is aa key factor influencing sleep quality (Jehan et al., 2018; Yadav & Cho, 2018). By using the osmotic gradient across the skin, a hypertonic saltwater solution enhances the extraction of excess moisture and inflammation from the affected limbs. Consequently, the reduction in tissue inflammation leads to improved recovery of injured neurons and a potential decrease in fatigue (Akyuz Ozdemir & Can, 2021; vakilinia et al., 2020), which may enhance sleep quality. Moreover, footbaths have been found to regulate blood and lymph circulation, boost levels of endorphin plasma, reduce inflammation in the extremities, and promote the healing of damaged neurons by mitigating inflammation (Moradi et al., 2017; Zainiyah et al., 2019).

Performing foot-ankle exercises can enhance neurological health by assessing the degree of foot sensation (Laake-Geelen et al., 2019). Physical activity, including foot-ankle exercises, generally improves sleep quality through a variety of mechanisms. Initially, it increases the production of melatonin, a hormone that regulates the circadian rhythm (Alnawwar et al., 2023). Consequently, engaging in foot-ankle exercises can be expedite the process of falling asleep and enhance sleep quality. Furthermore, engaging in physical activity enhances one's emotional state, resulting in heightened motivation for exercise and favourable reinforcement. This implies that individuals who participate in physical activity experience a favorable emotional state and tranquillity, which that aid in regulating body temperature (Wang & Boros, 2021). This regulation is crucial for facilitating the process of falling asleep, as the rise in body temperature during physical activity leads to a subsequent decrease in body temperature within 30 to90 minutes after exercising. Consequently, this decrease in body temperature makes it easier to fall asleep (Alnawwar et al., 2023; Wang & Boros, 2021). In fact, the vascular inflammation (Demirdal & Sen, 2018; Korkmaz et al., 2015), including a high level of the neutrophil-lymphocyte ratio (NLR), has been linked to escalated severity of glycosylated haemoglobin and fasting blood glucose (Rias, Gordon, et al., 2020; Rias, Kurniawan, et al., 2020). Interestingly, the relationships between total sleep time and NLR were of moderate insignificance. Additionally, sleep quality was linked to neutrophil counts and NLR (Fang et al., 2016). Engaging in regular, moderate-intensity physical exercise can effectively regulate blood sugar levels and manage blood pressure. This approach helps minimize the risk of complications by preventing various pathophysiological mechanisms, such as reducing oxidative stress and NLR levels, which are significant factors in diabetes (Rias, Kurniawan, et al., 2020). Nonetheless, there remains lack of compelling evidence. Hence, our experiment seeks to elucidate these concerns and potentially offer a definitive response to the inquiries through the use of a randomized factorial controlled trial.

If the effectiveness of the intervention is demonstrated, the synergistic effect of warm footbath water and foot-ankle exercises has the potential to circumvent of barriers such as sleep disturbances and high levels of inflammation. In fact, sleep problems and high levels of inflammation can exacerbate complications associated with T2DM, leading to a decline in quality of life and escalated mortality rate (Ellulu & Samouda, 2022). Thus, our proposed randomized controlled trial will highlight important additional information on the effect of synergistic effects of warm footbath water and foot-ankle exercises on sleep quality and NLR among individuals with T2DM. Furthermore, this study will determine whether combined or alone of warm salt water footbath and foot-ankle exercises is more effective than conventional treatment.

The limitation of the protocol study lies in its reliance on a questionnaire rather than objective equipment to assess physical activity levels. According to the guidelines for physical activity in individuals with T2DM, subjective assessments are preferred for assessing exercise status due to their convenience and personalization. We will request that our study participants maintain an exercise diary that records the duration of their workouts. The process evaluation will incorporate this aforementioned data. At the participant level, the primary challenges will be the failure to exercise and forgetfulness. To mitigate these risks, we will instruct participants on how to complete their intervention diary and conduct video calls to evaluate and comprehend the intervention, and on how to adhere to the exercise video during the first meeting.

CONCLUSION

In conclusion, the results of this trial are expected to clarify the synergistic effects of warm salt footbaths and foot-ankle exercises on sleep quality and NLR. Furthermore, the study aims to determine whether the combination of warm salt foot baths and foot-ankle exercises is more effective than either intervention alone or the control group. If the synergistic effect of warm salt footbaths and foot-ankle exercises is proven effective, this approach could represent a low-cost intervention that is easily implemented and has significant potential for routine care.

TRIAL STATUS

Recruitment opened in February 2024 and concluded in November 2024. Data gathering is expected to conclude by December 2024 after completing the final participants. The trial closing is set for February 2025 after the completion of data analysis.

DATA AVAILABILITY

In order to maintain openness in the study, after the trial has ended, the datasets and statistical analysis will be made available upon reasonable request from the corresponding author.

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ORIGINAL ARTICLE

THE DETERMINANT MOTHER FEEDING ON CHILDREN UNDER FIVE STUNTING HEALTH CENTER IN RURAL AREA

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ABSTRACT

Stunting is a significant nutritional issue affecting children that has been the world's concern in recent years, especially in developing countries. The study aims to identify the determinant factors affecting mothers' feeding practices for children experiencing stunting. The research used an observational and correlation design involving 258 respondents from three health centers. Data were collected through a questionnaire conducted between December 2022 and January 2023. The data analyzed utilized chi-square tests and logistic regression. The variables that dominantly contribute to the practice of meal provision included economic factors for children under five with stunting (P = 0.001, OR = 4.276), compared to other variables such as knowledge (P = 0.004, OR = 2.632), attitude (P = 0.001, OR = 3.237), hygiene (P = 0.013, OR = 3.552), and cultural factors (P = 0.001, OR = 3.216). Economic factors emerged as the primary determinants influencing meal provision practices for stunted toddlers. Economic factors were also dominantly associated with maternal feeding practices for stunted children under five in rural areas.

Keywords: *Children; feeding; practice; stunted; toddlers*

INTRODUCTION

Stunting in toddlers, a result of chronic malnutrition, causes children to appear shorter than their peers (Mbuya & Humphrey, 2018). Globally, there are 149.2 million toddlers, or 22% or 22 who suffer from stunting (WHO, 2021). According to data from Ministry of Health, Republic of Indonesia (2021), Indonesia currently ranks second in Southeast Asia, with a stunting rate of 30.8% among children. In 2022, the number of toddlers experiencing stunting in the Ciamis Regency area reached 2334 children or 3.4% (Dinas Kesehatan Ciamis (Ciamis Health Office), 2022).

The issue of stunting in children affect the resilience of body, cognitive development, mental health development, motor skills, and even lead to death (Vonaesch *et al.*, 2018). Stunting is multifactorial problem, with various interrelated factors contributing to its prevalence. One critical factor is the feeding practices that mothers apply to their infants. Addressing these feeding practices for children is essential, as early malnutrition is leading cause of long-term issues in infants. Research by Utami (2022) prove that Infant and Young Child Feeding Program or Program Pemberian Makan

Bayi dan Anak (PMBA) significantly deal with improved nutrition status in babies. Besides, Tette et al. (2015) reported that 50 % of child mortality is associated with malnutrition, with two-thirds of these cases caused by inadequate feeding practices, such as insufficient breastfeeding or introducing complementary foods too early or too late. This situation often result in illness and failed growing (Wahyuningsih, 2015). Failure to practice exclusive breastfeeding and appropriate complementary feeding for toddlers by mothers is influenced by various factors, including knowledge, attitudes, hygiene, economic conditions, and cultural factors. The researchers are motivated to carry out further research on feeding practices for toddlers experiencing stunting because the handling of stunting in toddlers within the Ciamis Regency area remains suboptimal. This is largely due to the inadequate parenting style among mothers, which contribute to poor feeding practices. The study aims to identify the determinant factors that affect mothers in their feeding practices for stunted toddlers within the District Health Center area.

METHOD

Research design
This research was a quantitative study with a cross-sectional design.

Sample and setting
In this study, the population consisted of 580 mothers with stunted children across 3 primary health care facilities. The inclusion criteria for the research sample encompassed mothers with stunted children aged 1 to 5 years, as well as mothers who were the primary caregivers and resides in the same house as the stunted children. Sampling was conducted using cluster random sampling, applying Lemeshow formula ($\lambda 2.N.P.Q/d2(N-1) + \lambda 2.P.Q$) at a 95% confidence level, resulting in a sample size of 232 respondents. To anticipate for potential respondents who did not meet the criteria, an additional 5% was added to the sample, calculated using $n1 = n/(1 - f)$, bringing the total number of respondents to 258 people. Sampling was carried out using cluster random sampling within each class, following formula $N = (NS: NS+Nt) \times nt$, yielding the results: Panawangan District had 91 respondents, Rancah District had 88 respondents, and Pamarican District had 79 respondents. This research was conducted within the work area of the Ciamis Health Center and took place from December 2022 to January 2023.

Variables
Feeding practices consist of knowledge, attitudes, hygiene, economics factors, and cultural variables.

Instruments
In this study, both primary and secondary data were collected. The primary data were obtained through a questionnaire assessing eeding practices, knowledge, attitudes, hygiene, economics and culture factors from respondents. The secondary data were sourced from the health center and included the information such as names of children experiencing stunting, the ages and gender of the children, and their mothers' age, the mothers' highest level of education, and mothers' occupations.

The study began with an application for permission from Padjadjaran University and the head of the health center, followed by the preparation and approval of research ethics. After obtaining permission, from the Office of National and Political Unity and the Health Office, the researchers collected data using a questionnaire. Data collection was facilitated by health center cadres through a door-to-door method, replacing any unavailable samples. The researcher explained the purpose of the study to the respondents, asked for consent, and accompanied them in completing the questionnaire to ensure the completeness and accuracy of the data.

The instrument used in this study, adopted from the eating research by Maudina (2018), consists of 49 questions. This instrument has been tested for both validity and reliability, yielding a validity range of 0.80 to 0.91 and a reliability value of 0.80 to 0.90. The measurement criteria classify scores as poor if they are below 45 and good if they are 45 or above. Instruments measuring knowledge and attitudes were adopted from research by Andriyanti (2017). The knowledge instrument consists of 25 questions, while the attitude instrument comprises 10 questions. Each instrument has been tested for validity and reliability, with the knowledge instrument showing a validity value of 0.22 to 0.53 and a reliability value of 0.777. Knowledge is categorized as poor if the score is < 47 and good if the score is ≥ 47. The attitude instrument has the validity range of 0.29 to 0.75 and a reliability value of 0.873. Attitudes are considered poor if the score is < 45.7 and good if the score is ≥ 45.7. The instrument regarding hygiene was adopted from the research by Wulandari (2020) consists of 7 questions. This instrument has been tested for validity and reliability, yielding a validity range of 0.741 to 0.834 and a reliability value of 0.798. Hygiene is classified as poor if the score is < 45 and good if the scores is ≥ 45. Instruments measuring economics and culture were adopted from Dwiwardani (2017). The economic instrument consists of 4 questions, while cultural instrument comprises 8 questions. Each instrument has been tested for the validity and reliability, with the economic instrument showing a validity value of 0.344, a reliability value of 0.754, and the cultural instrument demonstrating a reliability value of 0.923. Economic scores are considered poor if they are less than 44.2 and good if they are 44.2 or higher. Cultural scores are categorized as poor if they are less than 44.7 and good if they are 44.7 or higher. Reason: Improved clarity, readability, and technical accuracy while correcting grammar, punctuation, and mechanics.

Data collection
The procedure using a questionnaire administered door to door by health cadres. The respondents filled out the questionnaires voluntarily, without any coercion, and their responses remain and anonymous. All respondents provided informed consent prior to participation. Those who choose to continue are encouraged to complete the questionnaire, while individuals who prefer not to participate are free to decline without any pressure. The questionnaire consists of variables related to knowledge, attitudes, hygiene, economy, and culture. The final results of this study were analyzed in relation to variables affecting mother's feeding practices in stunting among toddlers.

Data analysis
The research data that had been cross-tabulated were subsequently analyzed using statistics software. The results were presented descriptively through frequency distribution tables and cross-tabulations between variables. The analysis of the factors influencing mothers' feeding practices in relation to stunted was carried out using bivariate statistical tests and logistic regression, with a significance level of $p < 0.05$.

Ethical Considerations
This research has obtained ethical approval from the Padjadjaran University Ethical Commission, as indicated by certificate number No. 33/UN6.KEP/EC/2023. The management of research ethics involves evaluating proposals and research designs in accordance with established ethical principles of health research. The ethical review was carried out at the Faculty of Nursing Padjajaran University for one month and was analyzed by with expertise in the field of research.

RESULT
The data collection process obtained the demographic characteristics of the respondents (Table 1).

Tabel 1. Demographics Data (N=258)

Characteristics	n	%
Mother's age (years)		
17-25	22	8.5
26-35	134	51.9
36-45	88	34.1
36-55	14	5.4

Characteristics	n	%
Child age (month)		
12-23	32	12.4
24-35	81	31.4
36-47	71	27.5
48-59	74	28.7
Gender		
Male	148	57.4
Famale	110	42.6
Mother's Last Education		
Primary School	32	12.4
Middle School	105	40.7
High School	68	26.4
College	53	20.5
Work		
Housewife	197	76.4
Labor	11	4.3
Private Employee	18	7.0
Civil Servant	17	6.6
Self Employed	15	5.8

Based on Table 1, the distribution of mothers' feeding practices for stunted toddlers predominantly fell in the less category, with 139 respondents (53.9%). In the frequency distribution of mothers' knowledge regarding the feeding practice for stunted toddlers, 149 respondents (57.8%) also fell into the poor category. The frequency distribution of mothers' attitudes towards feeding stunted toddlers shows that the majority were in the poor category, with 151 respondents (58.5%). In the frequency distribution of maternal hygiene practices in feeding stunted toddlers, the majority were in poor category, as many as 195 respondents (75.5%). The frequency distribution of the mother's economy in the practice of feeding the majority of stunted toddlers shows the poor category of 174 respondents (67.4%) and the distribution of the frequency of mother's culture in the practice of feeding mothers to the majority of stunting toddlers shows the poor category of 137 respondents (53.1%).

Table 2. Univariate Analysis

Variable/category	n	%
Feeding Practice		
Poor	139	53.9
Good	119	46.1
Knowledge		
Poor	149	57.8
Good	109	42.2
Attitude		
Poor	151	58.5
Good	107	41.5
Hygiene		
Poor	195	75.6
Good	63	24.4
Economy		
Poor	174	67.4
Good	84	32.6
Culture		
Poor	137	53.1
Good	121	46.9

Table 2 and Table 3 present a cross-tabulation of the factors influencing feeding practices among mothers with limited knowledge in this area. The majority of respondents, totaling 104 (69.8%), fell into the poor category regarding their feeding practices. In terms of maternal attitudes towards feeding, 108 respondents (71.5%) also exhibited a poor category. Regarding maternal hygiene during feeding practices, 129 respondents (66.2%) were categorized as having inadequate hygiene. When considering the economic status of the mothers, 123 respondents (70.7%) were classified in the poor category for their feeding practices. Lastly, in relation to cultural influences on feeding, 101 respondents (73.7%) demonstrated inadequate practices.

Table 3. Cross Tabulation of Bivariate Analysis

Variable	Feeding Practice				χ^2	p	OR CI 95%
	Poor		Good				
	n	%	n	%			
Feeding Practice							
Poor	104	69.8	45	30.2	35.982	0.0001	4.886 (2.868 – 8.326)
Good	35	32.1	74	67.9			
Knowledge							
Poor	108	71.5	43	28.5	45.629	0.0001	6,158 (3.563-10.642)
Good	31	29.0	76	71.0			
Attitude							
Poor	129	66.2	66	33.8	48.444	0.0001	10.359 (4.952-21.668)
Good	10	15.9	53	84.1			
Economy							
Poor	123	70.7	51	29.3	60.799	0.0001	10.250 (5.432-19.341)
Good	16	19.0	68	81.0			
Culture							
Poor	101	73.7	36	26.3	46.303	0.0001	6.128 (3.569-10.521)
Good	38	31.4	83	68.6			

Table 4. Analysis of Candidate Variables in the Multivariate model

	B	S.E.	Wald	Df	Sig.	95% C.I For EXP (B)		
						Exp	Lower	Upper
Knowledge	0.968	0.335	8.352	1	0.004	2.632	1.365	5.074
Attitude	1.175	0.366	10.288	1	0.001	3.237	1.579	6.636
Hygiene	1.268	0.511	6.156	1	0.013	3.552	1.305	9.669
Economi	1.453	0.424	11.750	1	0.001	4.276	1.863	9.815
Culture	1.168	0.367	10.158	1	0.001	3.216	1.568	6.596
Constant	-8.390	1.004	69.906	1	0.000			

In Table 4. shows multivariate analysis using logistic regression on variables that demonstrate significant values from the bivariate analysis. The practice of feeding mothers to stunted toddlers illustrates that the factors affecting this practice, ranked from greatest to least impact, are as follows: economic factors (p=0.0001, OR=4.276), hygiene (p=0.13, OR=3.552), attitudes (p=0.0001, OR=3.237), culture (p=0.0001, OR=3.216), and knowledge (p=0.0004, OR=2.632). Among these, economic factors have the most substantial influence on the feeding practices, as indicated by an odds ratio (OR) of 4.276. This suggest that economic factors play a critical role in determining the feeding practices of mothers with stunted toddlers.

DISCUSSION

The practice of feeding mothers to stunted toddlers shows that economic factors are the most significant influence compared to other variables such as knowledge, hygiene attitudes, and culture. This predominance is attributed to the low purchasing power for food necessary to meet family nutritional needs. Low family incomes often leads to feeding practices that hinder effective nutritional improvement, especially in children. According to research by Raniati (2023), field observations reveal that the family economy play a crucial role in provision of food. Consequently, even with high levels of education, knowledge, and positive hygiene families may still struggle to implement Infant and Young Child Feeding (IYCF) practices that adhere to food diversity, meal frequency, and minimum acceptable meal standards if their income is inadequate to purchase and provide sufficient food for their children.

In line with the research by Nisa (2022),family income is the most significant factor affecting the nutrition of children, particularly in families with low incomes, which limits their ability to provide for daily needs. This finding is further supported by Devi (2018), which reports that socioeconomic level is closely related to family purchasing power. In addition, money is needed to meet aterials necessary to prepare food with high nutritional value; thus, families with limited purchasing power struggle to provide adequate nutrition. . This condition hinders stunted toddlers to obtain adequate nutrition so they cannot catch up proper growth. Moreover, income generation primarily depends on the head of the household, resulting in restricted financial resources. To address this issue, mothers are encouraged to enhance their skills and empower themselves by utilizing natural products and their own abilities to improve the family economy, ideally surpassing the minimum wage. This can be achieved by working with PKK organizations at both the sub-district and village levels on increasing the market value of existing agricultural products or creating handicrafts that can be produced at home.

In this study, a lack of knowledge contributed to poor parenting behaviors. As a result, poor child feeding behavior negativeky impacted the nutritional status of children, leading to stunting. In contrast, respondents with sufficient and good knowledge have an adequate frame of reference for understanding of child nutrition, which facilitated their ability to recall relevant information that influences parenting behavior (Sari & Ernawati, 2018). During feeding practices, toddlers depend entirely on the care and feeding of their mothers. Therefore, a mother's knowledge is very instrumental, because good knowledge of feeding practices enables her to create nutritious menu for her toddler. The better a person's nutritional knowledge, the more thoughtfully they will consider the type and quantity of food provided for consumption.

Another factor in this research is that attitudes are formed from a combination of knowledge and belief. Attitude is often closely related to knowledge. The better the mother's knowledge, the more positive her attitude toward health it will be. If a person possesses good knowledge about healthy foods, then their attitude foods is likely to be more favorable. This positive attitude can support actions in providing nutritious food to toddlers. In this study, many mothers did not fully understand the concept of balanced nutrition, leading to incorrect feeding practices within their family, especially for toddlers. Although mothers have been advised to exclusively breastfeed for the first 6 months, many still introduce additional foods to their babies before this age, often citing reasons such as frequent crying and fussiness. This study aligns with the research by Syarifuddin & Najmi (2020), which revealed that maternal knowledge shapes maternal attitudes and beliefs in providing children's nutritional intake. A A lack of knowledge about nutrition correlates with a diminished attitude towards providing adequate nutritional support. The strategy to prevent and reduce the incidence of stunting in toddlers emphasizes the importance of hygiene. Hygiene refers to the effort to prevent disease, focusing on individual health and the surrounding environment (Silalahi & Putri, 2017). One effective hygiene carried out by a person to avoid germs or pathogens is washing hands with soap and running water (Mbuya & Humphrey, 2016). In addition, Kwami (2019) notes that proper hygiene using soap and water, along with accessible handwashing facilities, such as handwashing tubs or water storage buckets equipped with taps, as well as liquid or bar soap.

Based on the results of this study, there remains a lack of awareness among mothers regarding the importance of washing their hands with soap at five critical times, namely before eating, after eating, after defecating, and before feeding their child. This finding is in line with Dwipayanti (2020), which indicates hand washing behavior, specifically, the failure to use soap and the neglect of three essential times (before eating, before preparing food, and after using the toilet)—is associated with the incidence of stunting.

Hand washing with soap during critical times is one of the efforts to prevent diarrhea, environmental enteric dysfunction (EED), and worm infectionin children, all of which can contribute to stunting. Dirty hands can serve as a medium for pathogenic microorganisms to enter the body , either directly through the mouth or indirectly through feeding and drinking by the mother (Permatasari, Soerachmad, & Hasbi, 2021).

Based on the results of this study, it is evident that the incidence of stunting in children is influenced by family eating habits, particularly those of mothers. This includes improper feeding practices and a lack of attention to the nutritional intake contained in the food consumed by children. Respondents still hold beliefs that certain food restrictions such as eggs and fish, are detrimental to a child growth. In addition, mothers always establish a habit of giving crushed bananas and coconut water to infants under six months old, believing that these practices will promote health and strength. Furthermore, they believe that their children who experience stunting due to heredity factors from their parents. This aligns with Fariq (2021), which reported a relationship between cultural factors and child feeding practices. Another study conducted by Rahmadiyah and Nursasi (2021) found that culture influences on feeding highlight the importance of family support, especially from grandmothers, in feeding toddlers. The role of grandmothers also significantly impacts toddler feeding, in many cases, the voice of the oldest household member or the closest person to the mother in the

household is highly regarded. Other studies have shown that mothers are not sole decision-makers when it comes to feeding their children. Grandmothers play a key advisory role in addition to potentially being caregiver. Apart from being a health worker, grandmothers also play a crucial part in this process. Most mothers recognize and value the advice provided by grandmothers (Faye, Fonn, & Levin, 2019).

During the research, the researcher found several limitations. Specifically, some mothers had difficulty understanding the questions in the questionnaire, necessitating additional explanations from the researchers and research assistants. Additionally, some mothers were less focused while filling out the questionnaire due to the large number of question items and frequent crying of their children. As a result, the researcher and the research assistant read aloud each question from the questionnaire.

CONCLUSION AND RECOMMENDATION

Stunting is a public health problem and a global challenge in achieving sustainable development goals. It is a main focus of government health initiatives. One of the key factors contributing to stunting is improper feeding practices applied by parents, which can lead to early malnutrition. Additionally, the feeding practices of mothers with stunted toddlers are heavily influenced by economic factors, which are considered to have a more dominant influence.

DECLARATION CONFLICT OF INTEREST

This manuscript does not have any conflicts of interest with anyone, and the authors of this study also declare no conflict of interest.

DATA AVAILABILITY

This research study has completed data saved by the authors and the authors just present the important data that was suitable for this research. If the reader needs to share the data, they can get more information from corresponding author.

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ORIGINAL ARTICLE

DETERMINANTS OF NUTRITIONAL STATUS AMONG MALNOURISHED CHILDREN IN AGRICULTURAL AREAS

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ABSTRACT

Stunting in children is a major global issue, especially in rural agricultural areas of Indonesia. Despite ongoing efforts to eliminate stunting, its prevalence remains high, adversely affecting children's cognitive and physical development. This study aimed to determine the factors influencing the nutritional status of stunted children in Indonesia's agricultural districts. A cross-sectional analytical study was conducted in Jember District, Indonesia, involving 236 malnourished children aged 0 to 59 months. Using stratified random sampling, structured questionnaires were utilized to collect data on family functioning, child feeding attitudes, and practices. The results are Family Function (B=0.038; 95% CI= 0,535 – 1,658, p value= 0.047); Child Feeding Attitude (B=0.030; 95% CI= 0,882 – 1,681, p value= 0.023); and Child Feeding Practice (B=0.120; 95% CI= 0,686 – 1,971, p value= 0.000). There were significant correlations between family function (p value= 0.047), child-feeding attitudes (p value= 0.023), and child-feeding practice (p value= 0.000) with children's nutritional status. This study highlighted a significant relationship among family function, child-feeding attitude, and practices concerning the nutritional status of children experiencing stunting. It emphasizes the importance of improving family function and supporting healthy child-feeding practices. Targeted interventions based on local cultural understanding are critical for effectively reducing stunting.

Keywords: *Agricultural; rural; nutritional status; stunting*

INTRODUCTION

Malnutrition in children, particularly underweight (stunting), is when the body fails to reach its optimal growth potential, specifically in terms of ideal body weight and body mass index. This condition essentially represents an unresolved nutritional crisis at both national and international levels. (Lupiana et al., 2019). The Indonesian Ministry of Health reported a decrease in the prevalence of stunting from 27.7% to 24.4% in 2021; however, this figure remains significantly higher than the World Health Organization's

recommendations of below 20% (Ministry of Health Republic of Indonesia, 2021). According to data from Bappenas, East Java was identified as a priority area for stunting from 2018 to 2019. In 2022, the stunting rate in East Java reached 21.6%, with its prevalence in Jember Regency at 39,4% Ministry of Health Republic of Indonesia, 2022). Stunting adversely affects cognitive, motor, and verbal development, increases morbidity and mortality rates, and permanently shorter body posture in adulthood (Syahrul et al., 2016). Therefore, caring for stunted children in families by optimizing local food sources and local families is essential in family nursing care.

The issue of stunting requires a comprehensive approach that optimizes various local resources through the active involvement of all segments of society, including both central and regional governments (Syahrul et al., 2016). Convergence, coordination, and consolidation of balanced nutrition programs to address child nutrition need to be implemented in different regions using local cultural wisdom approaches and the potential of local food sources to combat stunting (Ministry of Health Republic of Indonesia, 2018). The population in the Jember area is characterized by a blend of Javanese and Madurese cultures, collectively called Pandalungan culture (Susanto et al., 2019). The local wisdom inherent in Pandalungan culture, particularly in family parenting patterns, plays a crucial role in shaping the structure and function of the families in meeting the nutritional fulfillment of children (Susanto et al., 2016).

The Pandalungan ethnic group, a society formed through the acculturation and integration of the Madurese and Javanese races, possesses distinct health beliefs and practices. The uniqueness of the Pandalungan lifestyle results in specific health beliefs and practices that shape their dietary habits. For instance, the community's aversion to consuming eggs arises from the belief that they can lead to health ailments, particularly ulcers, showcasing their traditional dietary taboos and the significance of cultural perceptions regarding food. Additionally, their dietary patterns reveal a preference for rice as a staple, often accompanied by modest portions of vegetables and side dishes, emphasizing the cultural significance of specific food combinations and proportions. Furthermore, providing additional food to infants below six months reflects a unique nutritional tradition within the Pandalungan community, suggesting a complex interplay between cultural norms, beliefs, and dietary practices contributing to their distinctive lifestyle and nutritional intake (Yani et al., 2023).

In an agricultural context, the Pandalungan community's environment and lifestyle contribute to a distinct social construction of the community and a unique approach to infant nutrition. The agricultural setting and lifestyle of the Pandalungan community considerably impact their dietary habits and nutritional intake practices, notably in terms of baby nutrition. The unique combination of local food resources and the social-cultural context of the Pandalungan community is expected to play a crucial role in influencing the types and nutritional quality of food provided to children. This may encompass traditional food choices, cooking methods, and cultural beliefs surrounding infant feeding practices, all of which contribute to the overall nutritional intake of children in the community. Understanding these patterns is critical for establishing targeted treatments to improve nutrition outcomes for children in the Pandalungan community (Rahmawati et al., 2019).

The mapping of factors related to nutritional issues, specifically stunting in children residing in agricultural and plantation areas of Indonesia, requires further investigation. This tone arises from the controversy that, despite the agricultural sector's abundant natural resources, stunting persists in these regions, especially in Jember, a rural agricultural area. The functioning of families in childcare, children's feeding patterns, and mothers' attitudes toward nutrition and children's nutritional status are essential to be analyzed. Previous research conducted in agricultural areas with a focus on the Pandalungan community showed that factors such as food value, beliefs about foods, and food taboos (abstinence from eating) significantly influence nutritional caregiving patterns, ultimately impacting improved nutritional parenting patterns (Ainy et al., 2021; Febrianti et al., 2022; Jannah et al., 2022; Ningtyias et al., 2022; Susanto et al., 2021). Therefore, this study aims to explore family functioning patterns, maternal attitudes, and child-feeding practices within the Pandalungan community concerning the prevalence of stunting among children in this agricultural setting.

METHOD
Study design
The study was an analytical cross-sectional design to examine the determinants of nutritional status among malnourished children in agricultural areas of Indonesia.

Participants
The study was conducted in the Jember District from May to August 2023. The study population consisted of malnourished children in three public health centers in Jember, East Java, Indonesia (Sukorambi, Panti, and Banjarsengon). A stratified random sampling was employed to select the sample. The sample size was calculated using the G*Power program, with a statistical significance level set at 0.05. The effect size was 0.25, the power was 0.80, and two samples yielded a sample of 236 participants. A total of 236 participants were randomly selected using a randomizer of a computer application. The inclusion criteria were determined as follows: (1) Parents and children residing in agricultural, rural areas; (2) Children aged 0-59 months who experience stunting, defined as having a Z Score = less than -2 SD (for height-for-age), on data available at the Community Health Center; (3) Parents who were willing to participate in the research and provide the necessary information. The parents and children who have medical disorders or serious health conditions, such as chronic illnesses, genetic disorders, severe infections, metabolic disorders, or severe physical or neurological disabilities, were excluded from this study. Researchers gathered information regarding medical conditions from medical records, parental interviews, health assessments, and collaboration with healthcare facilities. A series of informed consents were provided to parents for approval as a legal form requirement for the research.

Instrument
The data collection tools in this study consisted of two parts. The first part was focused on the demographic information of the participants. This demographic data included both parents and children. The parental demographic data encompassed age, family role, religion, ethnicity, number of children, number of stunted children, employment status, education level, family income (per month), mother's age during pregnancy, and childbirth history. Meanwhile, the child demographic data consisted of age, gender, and the Z-score based on weight for age. Meanwhile, the second part consisted of three questionnaires: (1) The Family

Assessment Device (FAD), (2) The Child Feeding Questionnaire (CFQ), and (3) The Child Feeding Assessment (CFA).

The Family Assessment Device (FAD) was utilized to assess the family functioning and the patterns of transactions among family members. Grounded in the McMaster Model of Family Functioning (MMFF), the FAD measures families' structural, organizational, and transactional characteristics. It consists of 60 questions divided into six scales that evaluate the six dimensions of the MMFF - affective involvement, affective responsiveness, behavioral control, communication, problem-solving, and roles. Previous assessments of the FAD have demonstrated good validity and reliability (Byles et al., 1988). The answers to the questionnaire were scored with a maximum total score of 240 points. Based on the scoring distribution, family functioning was categorized into three levels: low (scores ≤ 105), moderate (scores between 106 and 195), and high (scores ≥ 196). These categories were determined using quartiles calculated manually based on 25%, 50%, and 75% of the total score range.

The Child Feeding Questionnaire (CFQ) assessed feeding patterns from parent to child, focusing on domain monitoring, eating restrictions, and eating pressure. The CFQ was first developed by Birch et al. in 2001 to evaluate parental beliefs, attitudes, and practices related to feeding among 2–to 11-year-old children in the United States. The Child Feeding Questionnaire (CFQ) has been used in a few studies in various communities. Previous studies tested acceptable CFQ reliability or validity (Mosli, 2020). The CFQ consisted of 31 questions with a maximum score of 155. Based on the scoring distribution, child feeding practices were categorized into three levels: low (scores ≤ 86), moderate (scores between 87 and 120), and high (scores ≥ 121).

The child-feeding practice from family to child was measured using a questionnaire developed based on WHO guidelines for indicators to assess infant and young child feeding practices (Child Feeding Assessment (CFA)) (WHO, 2021). The questionnaire comprises 35 questions organized into several subscales: 1) Questions About Feeding Immediately After Birth (3 questions); 2) Questions About Current Breastfeeding and Bottle Feeding (2 questions); 3) Questions About Liquids (10 questions); and 4) Questions About Foods (20 questions). The child feeding practice questionnaire has a minimum score of 35 and a maximum score of 70. Based on the scoring distribution, child-feeding practices were categorized into three levels: low (scores ≤ 46), moderate (scores between 47 and 58), and high (scores ≥ 59).

Data collection
A set of questionnaires, accompanied by detailed instructions, was administered and completed by the subject's mother or primary caregiver. The day before data collection, parents were informed by the data collection team about the time and location of data collection. On the day of data collection, respondents were provided with a set of questionnaires and informed consent sheets to complete, which were then collected and checked for completeness. During the questionnaire completion process, six enumerators assisted in ensuring that all respondents understood the instructions given for the questionnaire. Once the questionnaire was completed, the respondent returned it to the researcher and enumerator for re-checking. Each respondent who completed the questionnaire received the measurement results, a small prize, and a participation certificate at the end of the research.
Data analysis

Data were entered, cleaned, and checked before analysis (Susanto et al., 2021b). Researchers employed IBM SPSS software version 24 for the study. Univariate analysis was performed on demographic characteristics of respondents, which are presented as frequency distributions and percentages. Data related to family functioning, feeding patterns in children, and child feeding practices are reported as Mean and standard deviation (SD). A data normality test using the Kolmogorov-Smirnov test was carried out on each sub-variable, yielding an overall value of <0.001, which indicates the data are not normally distributed. This suggests that the phenomenon of responses to variables varies greatly among respondents. Each variable X was categorized into three groups (high, medium, low) based on the cut-off point. Bivariate analysis with chi-square was carried out on three variables (X) to the child's nutritional status variable (Y). Subsequently, multiple logistic regression was used to analyze the data. Bivariate and multivariable logistic regression was also performed to assess the probability [odds ratio (OR)] of encountering malnutrition in a child, which was calculated using the exponential of beta (Exp(B)) and compared to the reference category. An association was deemed significant if the p-value < 0.05 and very significant if the p-value < 0.01.

Ethical considerations
The Health Research Ethics Committee, Faculty of Nursing, Universitas Jember, approved this study under certificate 2049/UN25.8/KEPK/DL/2023.

RESULT
This study aims to evaluate the factors influencing the nutritional status of children experiencing stunting in agricultural areas. Table 1 presents the characteristics of respondents, which include both parents and children, with a total of 236 respondents. Most parents involved in this research were mothers (84.3%), while a smaller proportion were fathers (15.7%). All respondents to this study were Muslims (100.0%), with the majority being Madurese ethnicity (62.7%). The education level of parents with stunted children is predominantly senior high school (35.2%). Most respondents were between 21 and 40 years old during pregnancy (85.6%), and most reported a normal childbirth history (86.4%). Among the malnourished children who participated in the study, most were aged between 12 and 59 months (92.8%). The malnutrition conditions observed in these children primarily included underweight (72.9%), while the remainder were classified as very underweight (27.1%).

Table 1. Characteristics of respondents (parents and child) (N=236)

Characteristics	Frequency	
	n	%
Parents		
Age (year)		
<20	3	1.3
20-30	45	19.1
30-40	183	77.5
>40	5	2.1
Role		
Mother	199	84.3
Father	37	15.7
Ethnic		
Javanese	88	37.3
Madurese	148	62.7
Number of malnutrition child		

Characteristics	Frequency	
	n	%
1	221	93.6
2	15	6.4
Work		
Government employees	11	4.7
Private employees	2	0.8
Entrepreneur	14	5.9
Not working	160	67.8
Education Level		
Not Attending School	14	5.9
Elementary School	59	25.0
Junior High School	65	27.5
Senior High School	83	35.2
Diploma Program	15	6.4
Family income (/months)		
< Rp 2.550.663	229	97.0
Rp 2.550.663	-	0.0
> Rp 2.550.663	7	3.0
Mother's Age during Pregnancy (year)		
<21	33	14.0
21-40	202	85.6
>40	1	0.4
Childbirth History		
Normal	204	86.4
Section Caesarea	32	13.6
Child		
Age (Month)		
0 – 11	17	7.2
12 – 59	219	92.8
Gender		
Male	113	47.9
Female	123	52.1
Weight/Age		
Underweight	172	72.9
Very Underweight	64	27.1

Table 2 describes the results of the analysis of various factors influencing the nutritional status of children experiencing stunting in agricultural rural areas, focusing on three primary variables: family function, child-feeding attitudes, and child-feeding practices. The results of the one-sample test indicated that the distribution of values for each sub-variable within family function -- such as problem-solving ability, communication, roles, affective responses, affective involvement, and behavioral control, yielded significant values ($p < 0.001$). Similarly, child-feeding attitudes, encompassing sub-variables such as perceived responsibility, perceptions of parent and child weight, worries about child weight, restrictions, pressure to eat, and monitoring, also showed significant results ($p < 0.001$). Furthermore, child-feeding practices, which included providing nutrition after birth, breastfeeding and bottle-

feeding, fluid administration, feeding, and re-examination, also exhibited significant values ($p < 0.001$). These findings indicate substantial variation in each aspect studied, highlighting the complexity and diversity in family functioning, attitudes, and child-feeding practices among stunted children in rural agricultural areas.

Table 2. Determinants of nutritional status of stunting children in rural agricultural areas

Variable	Mean	SD	p
Family Function			
Problem-Solving	16.96	2.091	< 0,001
Communication	19.02	2.928	< 0,001
Roles	24.43	3.102	< 0,001
Affective Responsiveness	24.43	1.969	< 0,001
Affective Involvement	13.09	1.969	< 0,001
Behavior Control	18.94	2.048	< 0,001
General Function	31.93	2.790	< 0,001
Total	136.39	10.629	< 0,001
Feeding Patterns in Child			
Perceived Responsibility (PR)	12.56	2.372	< 0,001
Perceived Parent Weight (PPW)	11.20	2.949	< 0,001
Perceived Child Weight (PCW)	12.35	6.581	< 0,001
Concern about Child Weight (CN)	12.55	2.084	< 0,001
Restriction (RST)	30.46	5.289	< 0,001
Pressure to Eat (PE)	16.81	2.970	< 0,001
Monitoring (MN)	11.59	2.716	< 0,001
Total	107.53	16.043	< 0,001
Child Feeding Practice			
Providing Nutrition After the Child is Born	3.21	0.655	< 0,001
Current Breast and Bottle Feeding	3.72	2.826	< 0,001
Giving Fluids to Children	36.71	26.013	< 0,001
Feeding Children	35.33	18.831	< 0,001
Feeding Monitoring	9.55	1.582	< 0,001
Total	88,95	38,97	< 0,001

Table 3 presents a bivariate analysis that evaluates the influence of family functioning, child-feeding attitudes, and practices on the nutritional status of children experiencing stunting, categorized as underweight and very underweight. The results illustrate a significant relationship between these variables and children's nutritional status. Families with low functioning, negative child-feeding attitudes and poor child-feeding practices exhibit a higher proportion of children in the underweight and very underweight categories compared to those in the medium and high categories. This is supported by a p-value that is less than alpha ($p < 0.05$), indicating statistical significance in the impact of these variables on children's nutritional status.

Table 3. Effect of family function, child feeding attitude, child feeding practice on nutritional status

Indicators	Underweight		Very Underweight		Total		p
	n	%	n	%	n	%	
Family Function							
Low	16	9.4	6	9.5	23	9.7	
Moderate	121	71.2	44	69.8	166	70.3	0,019*
High	33	19.4	13	20.6	47	19.9	
Child Feeding Attitude							0,039*

Indicators	Underweight		Very Underweight		Total		p
	n	%	n	%	n	%	
Low	25	14.7	17	27.0	42	17.8	
Moderate	122	71.8	34	54.0	158	66.9	
High	23	13.5	12	19.0	36	15.3	
Child Feeding Practice							
Low	96	56.5	42	66.7	141	59.7	0,020*
Moderate	7	4.1	2	3.2	9	3.8	
High	56	39.4	19	30.2	86	36.4	

Note:*p<α, α=0,05

Table 4. Effect of family function, child feeding attitude, child feeding practice on nutritional status

Indicators	B	SE	t	95% CI	Sig
(Constant)	2,373	0,146	16,234		0,832
Family Function (X1)	0,038	0,032	1,193	0,535-1,658	0,047
Child Feeding Attitude (X2)	0,030	0,054	0,567	0,882-1,681	0,023
Child Feeding Practice (X3)	0,120	0,056	0,212	0,686-1,971	0,000

Table 4 presented the results of multiple logistic regression analyses that evaluate the effects of family functioning, child-feeding attitudes, and child-feeding practices on children's nutritional status, as indicated by the variable "Y=Nutritional Status." The regression findings revealed that all independent variables significantly influenced children's nutritional status. The coefficient value (B) showed both the direction and magnitude of this influence, while the significance value (Sig) reflected the level of statistical significance. The family functioning variable (X1) had a coefficient value of 0.038 and a significance value of 0.047, suggesting that improved family functioning correlates with better nutritional status in children. Similarly, the variables of child-feeding attitudes (X2) and child-feeding practices (X3) also significantly affected children's nutritional status, with coefficient values of 0.030 and 0.120 and significant values of 0.023 and 0.000, respectively. These results underscored the vital role of these factors in determining the nutritional status of children experiencing stunting in agricultural rural areas.

DISCUSSION

This research aims to analyze the factors contributing to malnutrition in children under 5 years old in Indonesian plantation agricultural areas. The findings showed that family functioning, child-feeding attitudes, and child-feeding practices significantly influence the determination of the nutritional status of stunted children in rural agricultural areas.

Family functioning is the first factor that has a pivotal influence on children's nutritional status. The research findings show that family functioning has a notable relationship with the incidence of child malnutrition (X1), with a p-value of 0.038. This research aligns with previous research, demonstrating a significant correlation between family functioning and the prevalence of child malnutrition (Febrianti et al., 2022). The way families implement their functions can affect children's feeding practices. Well-executed family functions positively impact the nutritional status of children within the family (Rachmawati et al., 2021).

Other findings in this study also depict that children from families with weaker functioning are at a higher risk of experiencing malnutrition. These findings align with research conducted in other populations that have explored the relationship between the level of family functioning and children's food intake, revealing that low family functioning is linked to inadequate food intake among children (Colón-Ramos et al., 2021; Khotibuddin & Shellia, 2022). We

assume that the study's results highlight the critical role of family functioning in determining the nutritional status of children in agricultural rural areas. Good family functioning can help children receive an adequate and balanced diet for their growth and development.

Family functioning plays a pivotal role in children's nutritional status, encompassing various domains that collectively influence how families address and manage their children's nutritional needs (Febrianti et al., 2022). The primary domains of family functioning that impact nutritional status include problem-solving, communication, roles, affective responsiveness, affective involvement, behavioral control, and general functioning (Khotibuddin & Shellia, 2022). Problem-solving evaluates a family's ability to address challenges and make effective decisions, which is crucial for tackling nutritional issues such as nutritional deficiencies or food insecurity (Fazrin et al., 2022). Effective communication within the family is vital for discussing and implementing healthy eating practices, ensuring that all family members understand the significance of nutrition and adhere to dietary guidelines (Dev et al., 2017). A clear division of roles facilitates an effective allocation of tasks related to food provision and preparation, enabling family members to collaborate in ensuring that children receive nutritious meals (Karmali et al., 2020). Affective responsiveness measures the family's ability to emotionally respond to a child's nutritional needs. In contrast, affective involvement assesses the extent to which family members engage in the child's emotional life, including their attention to their food intake. Behavioral control pertains to the family's ability to implement rules and supervise children's eating habits. At the same time, general functioning reflects the overall well-being and harmony within the family that supports healthy eating patterns (Rahmadiyah et al., 2024). These domains are interconnected and collectively influence the nutritional status of children within the family environment.

Child Feeding Attitude (X2) also has a significant relationship with the incidence of malnutrition in children. This attitude encompasses parents' responsibilities in feeding their children, their perceptions of their children's weight, parents' concerns about their children's weight, restrictions on food provided to children, pressure to eat, and supervision of children's eating patterns. Research displays that parents' attitudes toward child feeding notably impact children's nutritional status. Parents who maintain a positive attitude toward feeding their children are likelier to have children with better nutritional status.

Mothers' less assertive attitudes toward the nutritious food served to children have been identified as a barrier to optimal feeding practices (Pedroso et al., 2019; Rakotomanana et al., 2020; Zakaria et al., 2022). It can be argued that a mother with a positive attitude can help reduce the stunting rate in children under two years old. A mother's attitude is critical to ensuring her child's nutritional status. Cleanliness, safety, and proper preparation for storing and serving food are essential, as they directly impact food safety and the overall enjoyment of meals (Aparício et al., 2015; Husna et al., 2024). Previous studies explain that maternal nutritional knowledge is significantly related to attitudes. Mothers with limited nutritional knowledge tend to exhibit poor nutritional attitudes toward their children (Ikhsan et al., 2018). We hypothesize that parents' attitudes toward feeding their children have a significant relationship with the incidence of malnutrition. Research demonstrates that parents with a positive attitude toward feeding their children are likelier to have children with better nutritional status. However, mothers' lack of assertiveness regarding nutritious food for their children is a barrier to optimal feeding practices. Therefore, it is essential to foster positive parental attitudes and maternal nutritional knowledge as intervention strategies to reduce stunting rates in children.

Several critical domains related to parental attitudes toward feeding include Perceived Responsibility (PR), where parents who feel entirely responsible for their children's nutrition tend to be more attentive and consistent in providing nutritious food (Te Ku Nor et al., 2024). Perceived Parent Weight (PPW) also plays a critical role, as parents' perceptions of their weight can influence their feeding practices; for instance, parents who perceive themselves as overweight may be more likely to offer healthier foods (Sarker et al., 2024). Perceived Child Weight (PCW) refers to a parent's perception of their child's weight, which can modify their eating patterns to pursue an ideal weight (García-Blanco et al., 2022). The Concern about Child Weight (CN) also affects the type and quantity of food provided, as highly concerned parents tend to be more selective in choosing healthy and nutritious food. Food restrictions (RST) imposed by parents can limit the variety and balance of nutrition that children need, while pressure to eat (PE) exerted by parents can have a negative impact; children who feel forced to eat may develop an unhealthy relationship with food (Dalimunthe et al., 2021). Finally, monitoring (MN) by parents of children's eating patterns by parents is crucial, as those who actively monitor their children's food intake are more likely to ensure that their children receive adequate and balanced nutrition (Sahu et al., 2019). Thus, parents' attitudes and approaches to feeding significantly impact children's nutritional status, with a positive and responsible attitude from parents contributing to better nutritional outcomes for children.

Child Feeding Practice (X3) has the most significant relationship with the incidence of malnutrition in children. These practices encompass how parents feed their children from birth, giving breast milk or formula, offering fluids, the type of food served, and the frequency of meals. The research results indicate that parents' child-feeding practices also significantly influence their children's nutritional status. Parents who adopt effective feeding practices, such as providing adequate early, balanced, and nutritious meals, tend to have children with better nutritional status.

This research aligns with previous studies demonstrating a positive correlation between feeding practices and children's nutritional status. The better the feeding practice, the more favorable the nutritional status of children, and vice versa

(Christian et al., 2023; Palupi et al., 2019). Feeding children according to their developmental stage ensures that growing children receive nutrient-rich foods. Strengthening mothers' skills in child feeding through health service initiatives is one of the crucial efforts to enhance children's nutritional status (Ganesan et al., 2021). Preceded research has shown that utilizing existing health services can significantly improve infant and child feeding practices (Arifa et al., 2024; Talapessy et al., 2023). Attention should be directed to socio-economic empowerment, particularly in girls' education, regular health service visits, and access to community-based growth and development counseling support systems that promote knowledge on optimal feeding practices. Apart from that, support from other family members is crucial for a mother in deciding which complementary foods to provide alongside breast milk. Increased autonomy and authority for women in decision-making related to child nutrition have been associated with improved feeding and nutrition practices for children (Heckert et al., 2019).

The domain of child feeding practices addressed in this research questionnaire consists of several main components that have a significant relationship with the incidence of malnutrition in children. Factors such as nutrition provided after birth, current breastfeeding and bottle-feeding practices, fluid intake, feeding methods, and the re-evaluation of nutritional status all play a crucial role in determining children's nutritional health. Providing adequate nutrition to children from an early age profoundly impacts the child's nutritional status. The quality of infant and young child feeding practices in Indonesia, which includes early initiation of breastfeeding, exclusive breastfeeding, and provision of complementary foods following recommendations, remains relatively low. Consequently, IYCF interventions to educate and assist pregnant women must be implemented as sustainable programs (Simbolon et al., 2024). Methods for measuring children's feeding practices should be complemented by observational data collection to assess behaviors, and these assessments should be carried out both formatively and summatively to obtain comprehensive results (Schwendler et al., 2024). Good feeding practices encompass the type and frequency of food provided and the timely initiation and quality of interactions between the mother and child during the feeding process. Therefore, comprehensive and evidence-based interventions are essential to improve the quality of child feeding practices in Indonesia, ultimately helping to reduce malnutrition rates and improve the overall nutritional status of children.

Regarding the results of this study, we believe that child-feeding practices have the most significant impact on the incidence of malnutrition in children. This encompasses how parents feed children from birth, the types of food provided, and the feeding frequency. Parents who implement effective feeding practices tend to have children with better nutritional status. Socio-economic support, health service visits, and access to community-based counseling are needed to implement optimal feeding practices. Family support for mothers in making child nutrition decisions is also crucial. The limitations of this study include potential recall bias in self-reported data, a cross-sectional design that restricts causal inference, and geographical specificity, which limits the generalizability of the findings to other agricultural areas.

CONCLUSION AND RECOMMENDATION

This study shows that factors such as family functioning, child-feeding attitudes, and child-feeding practices significantly determine the nutritional status of stunted children in rural agricultural areas. These findings highlight

the critical role of the family environment and feeding practices in enhancing the nutritional status of stunted children. There is a pressing need for intervention programs that aim to improve family functioning and promote healthy child-feeding practices to tackle the issue of stunting among children in rural agricultural areas.

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ORIGINAL ARTICLE

QUALITATIVE STUDY TO DETERMINE THE MEANING OF EMERGENCIES AMONG ELDERLY PEOPLE IN THE COMMUNITY

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ABSTRACT

Emergency services play a vital role in addressing the needs of the elderly in the community. Proper adjustments to service policy are necessary, but the current policies fail to adequately address these needs. This study investigated the emergency needs of the elderly and emphasized the definition of the emergencies from the perspective of those involved. A qualitative research approach was employed, utilizing data gathered from observations, in-depth interviews, demographic information, and group discussions. Initial data access was facilitated through gatekeepers, who selected information providers using purposive sampling, and employed the snowball sampling method to identify individuals with relevant experiences and involvement. A total of 63 participants were involved in this study, comprising local administrative organizations, community leaders, government officials, community members, and elderly individuals. The results revealed three dimensions:1) the perspective of emergency service users, 2) the perspective of emergency service providers, and 3) the perspective of administrators in emergency management for the elderly. Consequently, the emergency medical policy, management strategies, and community nurse competency framework should be adjusted to meet the emergency needs of the elderly in the community, ensuring alignment with the emergency situation within in the community.

Keywords: *Emergency management; elderly; elderly patient; experience; qualitative study*

INTRODUCTION

Emergency situations involving the elderly are varied, encompassing medical emergencies, accidents, natural disasters, instances of violence, and, loss of property, among others. A review of emergency events found that 71% of individuals accessing emergency services were elderly. Furthermore, it is projected that by 2030, there will be a 47% increase in these incidents. Notable disaster events, such as the Indian Ocean tsunami in 2004, which affected India, Indonesia, Sri Lanka, and Thailand, resulted in approximately 92,000 elderly individuals being impacted. During the sudden flooding in Japan between 2004 and 2010, 65% of the total victims were elderly. In the United States, more than 50% of the fatalities from Hurricane Katrina were elderly individuals (Regina et al., 2018). Emergency management for the elderly is increasingly critical due to their unique vulnerabilities during crises. Integrating specialized care, such as advanced wound management within geriatric emergency management

(GEM) nursing, exemplifies a tailored approach to addressing the complex needs of older adults in emergency settings (Garcia, 2024).

Emergency medical services for the elderly in Thailand have been experiencing an annual increase in the number of services provided. Among the 8,116,969 eligible emergency calls, the majority originated from the Northeast region (45.5%), while the Western region reported the fewest calls (4.6%) (Thepmanee, Tanaka, & Takyu, 2022). The most common medical issue reported included severe weakness (27.06%), difficulty breathing (19.27%), loss of consciousness or fainting (15.22%), falls and accidents (9.80%), and diabetes (6.62%) (Isabella et al., 2021). The reported fatality rates from accidents were 5.3%, from falls 25%, from acute myocardial infarction 29.09%, and from stroke 6.8%. The trend of deaths occurring outside hospitals is also on the rise (McCabe and Kennelly, 2015; Thanuchit et

al., 2017). Additionally, instances of violence within communities have been noted, with 115 cases of elderly individuals being abused within families and 52 cases occurring outside families (Rosen et al., 2018).

The elderly deserve significant attention due to age-related decline, limited self-care abilities, increased susceptibility to injuries, and a higher likelihood of having chronic illnesses, which make them more prone to mortality than other age groups. Consequently, there are still gaps in emergency services that fail to address their specific problems and needs. Research has shown that the elderly continue to require assistance. Consistent with findings of this paper, there has been no specific focus on the annual increase in emergency medical services for the elderly in Thailand (Thepmanee, Tanaka, & Takyu, 2022).

The majority of individuals affected by emergency events are often the elderly. The impact of emergencies, which can include severe illnesses or injuries ranging from minor to critical encompasses wounds, pain, swelling, intracranial bleeding, fractures, disabilities, and even death (Muntinga et al., 2016). Disabilities resulting from emergencies can lead to bedridden conditions, home confinement, reduced functional abilities, and diminished societal roles (Eagles, 2018). Consequently, the elderly may experience fear and isolation from society as result of these emergencies (Zulfitri et al., 2022). Additionally, there are significant economic repercussions, as the elderly and their families incur expenses related to healthcare, loss of income for caregivers, and potential job resignations to provide full-time care for elderly family members. This results in financial burdens and an increased need for additional support (Huang et al., 2020; Doheny et al., 2019). Families may face challenges such as loss of income and the necessity of full-time caregiving, which can adversely affect their financial stability (Bell et al., 2021). The problems and needs of the elderly in the community are complex and diverse, encompassing medical emergencies, emergency accidents, natural disasters, instances of violence, and loss of property, among others. These issues include concerns related to family relationships, societal dangers, violence, illness, and accidents both within and outside the home, as well as community environmental factors. Community members need immediate and safe assistance during emergencies. Furthermore, post-recovery measures, symptom monitoring, welfare services, and follow-up care are essential aspects of supporting the elderly in the community (Cacchione, 2020; Chung, 2016).

In reviewing emergency management within the community, it was found that when emergencies arise, certain segments of the community offer assistance, while the elderly and their families feeling fearful, often decide to call emergency services or seek help from others (Vera et al., 2021). The elderly need support from the community, and key organizations in the community must be actively involved in managing emergencies to enhance potential for effective emergency management. The elderly and their families are unable to independently care for and manage emergencies, relying instead on community and organizational assistance (Craswell et al., 2016; Jessica et al., 2021).

However, in in Thailand, there are still significant gaps in emergency medical services for the elderly. While some preparations have been made for specific situations, many areas remain unaddressed, with most efforts focusing solely on the first aid only. Individuals involved in providing assistance are eager to enhance their capacity to manage emergencies within the elderly community, aiming to address their unique problems and needs. However, they often feel frustrated by their limited potential. Some individuals offer help based on their previous experiences and instincts to resolve issues (Fazal et al., 2023). Currently, there is no emergency medical service specifically tailored for the elderly in Thailand. Previously, there were few guidelines for emergency management for this age group, and the existing teaching and learning arrangements were neither comprehensive nor adequate according to the international standards (Thepmanee, Tanaka, & Takyu, 2022).

Therefore, the researcher aimed to study how elderly individuals in the community interpret emergencies, with the goal of reflecting actual emergency situations and perspective of those with direct experience in a designated model area. This area has been developed as a center of expertise for creating a care system for older adults at the national level. To achieve this, this study employed a qualitative approach to explore emergency situations within the specific contexts and culture of the study area, thereby enhancing understanding phenomena involved. This methodology facilitated an examination of ideas, emotions, worldviews, meanings, and interpretations from an emic perspective, all within cultural contexts of the commun. It also aimed to ityand to summarize inductive knowledge. Qualitative research methodology was used to give access into socio-cultural contexts, thoughts, beliefs, values, and the meanings of behaviors arising from interactions among community members. Additionally, the research sought to understand conditions that enable stakeholders to deliver health services during emergencies, as well as to propose the roles and responsibilities for organizations and affiliates involved in providing these health services, tailored to the studied context, society, and culture.

METHOD
Study design
This study was qualitative research methods to understand the phenomena surrounding emergencies faced by elderly in the community, as well as to critique existing practices in order to foster change. The researcher collected data through interviews, focus groups, and observations. Phase 1 involved an examination of community context and emergencies encountered by the elderly. Phase 2 focused on synthesizing emergency management, identifying key determining factors, and providing recommendations for improving emergency management for elderly in the community.

This study was conducted in northern Thailand among people with practical experience in managing emergencies involving older adults within the community. This research took place at a learning center that has been upgraded to serve as a model area and a center of expertise in developing care systems for older persons, supported by local communities at the national level. In sub-district areas, practical management of emergencies concerning older adults included the sub-district emergency management center, rehabilitation centers, facilities aimed at enhancing quality of life and supporting the occupations of older persons, civil defense volunteer groups, and substance abuse treatment centers, among others.

Sample/ Participants/ Informant
The researchers classified the data providers into two groups: (1) Key informants, who could provide firsthand information, including elderly individuals with experience in emergencies and disasters, as well as those directly involved in emergency management, such as volunteers, healthcare personnel, local authorities, and relevant organizations; and (2) General

informants, who were supportive of emergency management and included various professionals and community funds representatives. In total 63 individuals were interviewed until data saturation was achieved. The qualitative research aimed to understand and generate knowledge from informants while collecting in-depth data using a small sample size. However, data must be collected in great detail (Dworkin, 2012). researchers studying related phenomena and cultures can Utilize a sample size of only 25 to 50 participants (Moser & Korstjens, 2018).

Table 1. Demographic characteristics of the participants (n =63)

Characteristics	Quantity
Types of technical team expertise/participant position	Nurse = 5 participants
Public health academic = 1 participant
Emergency Medical Technician-Intermediate = 1 participant
Older person groups and their family caregivers = 15 participants
Local administrative organizations = 11 participants
Community leader = 6 participants
Community members = 12 participants
Supporters in the community = 12 participants
Age	Average= 58.39 years; Minimal= 28 years; Maximal= 80 years
Sex	Women= 38.10%; Men= 61.90%
Marital status	Married= 70.15%; Not married/divorced/widowed= 29.85%

The sample group consisted of following categories:1) Public health officials, which included seven individuals: two directors of the sub-district health promotion hospital, three professional nurses, one public health academic, and one Emergency Medical Technician-Intermediate; 2) Community members, comprising twelve individuals: one volunteer organization manager, two rescue workers, three community volunteers, two representative of the Elderly Club, two student representatives from the senior school, and two caregivers; 3) Community supporters, which included twelve individuals; 4) Local Administrative Officials (LAO), comprising eleven individuals; 5) Community leaders, which included six individuals; and 6) Older adult groups and their family caregivers, consisting of fifteen distinct individuals.

The researchers employed gatekeepers to gain initial access and utilized purposive and snowball sampling methods to select participants who had direct experiences relevant to emergency management for the elderly.

Instrument
The research tools consisted of (1) in-depth interview questions characterized by open-ended formats focusing on emergency situations and management. These questions were developed through a comprehensive literature review and content validity checks prior to their implementation. The researcher examined literature related to emergencies affecting elderly individuals in the community in order to formulate questions for in-depth interviews and focus groups. Subsequently, the interview form was submitted to the advisor for verification of content and adjustment based on

feedback. After refining the interview form, it was tested with a sample group whose context closely resembled the research area. Details of the interview guide consisting of main open-ended questions for key informants and respondents regarding emergency definitions for elderly people in the community are as follows.: 1) How was the situation for elderly people in your community? 2) What is your perspective on defining an emergency for the elderly in the community? 3) What operations and activities had you organized in order to mitigate impacts from emergency for older persons? and 4) What were the results of emergency management for older persons? (Fetterman, 2023) (2) Data recording tools included audio recording equipment and field notes to summarize key issues. The researcher prepared a voice recorder with blank audio tapes to capture data during focus groups and interviews, ensuring that audio recording were utilized to verify and prevent data discrepancies. (3) The researcher played a crucial vital in qualitative research, by developing their skills as a quality researcher by studying relevant concepts and theories and practicing qualitative research technique through field exercises in advisory professors' research project over a period of three years. The researchers considered essential tools for data collection. The researcher received training in qualitative research data collection skills, which provided them with the confidence and understanding necessary to synthesize the data effectively.

Data collection
Data collection was conducted from May 2022 to June 2023. (1) Participant Observation: The researcher conducted participatory observation by systematically observing and engaging in and activities at Tambon Health Promotion Hospitals, Tambon administrative organizations, and sub-district emergency management centers. This included participating in observing health services delivery during both normal situations and emergencies. Participatory observation allowed for a deeper understanding of the context surrounding emergency involving the elderly, and the data collected was analyzed in conjunction with other information.

(2) Focus Group Discussions: The researcher conducted a two-hour focus group discussion with community leaders, civil defense volunteers, village peacekeeping teams, and members of the Tambon administrative organization. Additionally, the researcher held a separate focus group discussion with health service unit members. The Data was collected from these focus groups to check the accuracy of the information and to confirm the situations being studied with key individuals in the community.

(3) In-depth Interviews: the researcher carried out in-depth interviews wlasting 45 to 60 minutes with key informants, utilizing targeted interview questions to determine meaning behind situations involving emergency needs. During these interviews, the researcher employed topic-capture techniques, took detail notes, and made audio recordings to obtain comprehensive information.

(4) Document Study: First, the researchers obtained documents from the Faculty of Nursing at Khon Kaen University to study documents related to the emergency management of elderly people in the community. Second, the researcher studied various local documents, including village plans, community plans, local development plans, sub-district information systems, and data from health service units. The information gathered was synthesized and compared with other relevant information.

(5) Field Notes: Immediate and post-observation notes were recorded to document the date, time, location, individuals involved, actions taken, activity plans, relationships, and participants' perceptions. This process facilitated the interpretation of data and the sequencing of significant events.

The researcher tested by triangulation in the following ways: 1) triangulating data was conducted through as follows: (1) gathering information from various individuals, including older adults, family members, community organization leaders, disaster and rescue volunteers, and community hospital staffers, etc. (2) collecting data at different times, such as morning, afternoon, and evening, as well as across the week from Monday to Friday, Saturday, and Sunday; (3) obtaining data from diverse locations, including elderly's homes, community hospitals, older persons' clubs, emergency management centers, and Tambon administrative organizations.. The researcher spent 13 months in the field, with intermittent breaks to review data, examined the researcher's insights, and participated in academic activities with advisory professors. This approach aimed to broaden ideological worldviews and minimize bias before re-entering the research area. The researcher also transferred information, provided updates on research, and periodically debriefed with advisory officers to enhance understanding and evaluate the research process. 2) Methodological triangulation was performed by analyzing and comparing data from observations, in-depth interviews, focus group discussions, and document studies conducted on various dates and times, ensuring data validation and completeness.

Data analysis

Qualitative data analysis, interpretation, component sorting and organization, as well as the identification of information correlation, contributed to a comprehensive understanding of the phenomenon of managing emergencies among elderly in the community. Data analysis was conducted concurrently with data collection to refine the data collection guidelines. Data analysis encompassed field data evaluation, content organization, data categorization, content analysis, periodic analysis, and matrix analysis.

The data analysis process consisted of two main components: (1) field note analysis and (2) post-data collection analysis. In the first component, field note analysis, the researcher recorded observations during each visit to the research area and observed situations encountered. This included documenting the date, time, location, events, individuals involved, actions, activity patterns, relationships, and the perceived meaning of each event. This documentation helped clarify interpretations and created a systematic sequence of important events. The information was then synthesized to reflect the opinions and perspectives of those with direct experience and involvement. Subsequently, the collected information was presented to participants to confirm its, accuracy. The second component, post-data analysis, involved organizing the content of the data, categorizing data types, and conducting various analysis including content analysis, time-based analysis, and matrix analysis. Text data were analyzed using field note analysis and content analysis. The transcript were read, and response were analyzed and listed. The codes sample of the transcript were checked for similarities and differences. During the study, the data will be identified to reflect the problem situation and the definition of emergency of the elderly in the community and important players or social groups, community organizations and related organizations. We conducted the analysis along with the data collection **and**

reviewed all the data with the informants afterward for triangulation purpose. (Fetterman, 2023) To determine the reliability of the study, Lincoln and Guba criteria including credibility, transferability, dependability, and Confirmability were considered.

Trustworthiness

Trustworthiness-building established through several key components: 1) Credibility from Prolonged Engagement Over 13 Months – The researcher developed a strong relationship with the community, collaborating with the community research team, health service unit staff, and community leaders for debriefing and validation of the knowledge obtained. Furthermore, the researcher, who had a background in community nursing, provided health services during emergencies from the perspectives of health service providers. To gain a deeper understanding of the roles of community nurses in providing health services during emergencies, the researcher employed the method of bracketing personal biases and engaged in debrifing with advisory professors; 2) Transferability – Knowledge gained from this study can be applied to similar contexts, offering potential benefits; 3) Dependability – The researcher invested time in key areas to foster relationships within the community, ensuring the data collected had closest meaning to the status of an "inside person"; 4) Confirmability – The researcher rigorously tested the findings, objectives, and research questions, while also examining data collection process and triangulation methods.

Ethical considerations

The researcher recognized the significance of research ethics, particularly in protecting and safeguarding individual rights. The study has received ethical approval from the Research Ethics Committee of Khon Kaen University, reference number HE 642210. The researcher has coordinated with relevant authorities to secure permission for fieldwork and has communicated the research objectives and benefits to the community. The study adhered to the ethical guidelines for human research in Thailand, which encompassed international ethical principles, respect for human rights and dignity, consideration of benefits and non-maleficience, as well as fairness and equitable distribution.

RESULT

Table 2. Themes and sub-themes code perspectives on defining emergencies

Category	Sub-category
The perspective of emergency service users	– Emergencies faced by the elderly regarding the dimensions of causes and threats of illness
	– Emergencies faced by the elderly regarding the dimensions of causes of danger within the community.
	– Emergencies faced by the elderly in terms of their impact on the lifestyles.
	– Emergencies faced by the elderly, dimensions affected by natural disasters.
The perspective of emergency service providers	– Emergencies faced by elderly according to medical criteria.
	– Emergencies faced by the elderly according to disease-specific symptom criteria.
	– Emergencies faced by the elderly in crisis situations.

Category	Sub-category
The perspective of emergency management administrators of the elderly	– Emergencies faced by the elderly, serious illness dimension.
	– Emergencies faced by the elderly, dimensions of suffering.
	– Emergencies faced by the elderly as a aftermath of disasters.
	– Emergencies faced by the elderly due to problems of essential needs.
	– Emergencies faced by the elderly due to disasters in the community

Perspectives on defining emergencies for the elderly in the community. This analysis synthesized the perspectives on emergencies and emergency management as viewed by three distinct groups: 1) the perspective of emergency service users, 2) the perspective of emergency service providers, and 3) the perspective of emergency management administrators of the elderly, the findings as follows:

1. Perspective of Emergency Service Users. The researcher synthesized definitions of emergencies as understood by the elderly from the perspectives of the elderly and their families. An emergency services user was defined as an individual who has experienced emergencies. The finding revealed a variety of meanings and differences, including:

1) Emergencies of the elderly concerning the dimensions of causes and threats of illness. Elderly people and their families often expressed their feelings about recognizing abnormal physical and mental symptoms associated with various conditions, including chronic illnesses. Sudden severe discomfort and injuries could occur, leading to significant changes and profound impacts that induce fear and anxiety. Elderly people and their families might find themselves unable to cope independently. Such situations were considered life-threatening and necessitate to alleviate the symptoms and restore the body to normal state.

"...I fell and had a broken arm. While there was a small child in the house. I didn't know the child was there, so I accidentally stepped on it, causing me to slip. At that time, I felt very frightened. After a while, the pain began to increase. I couldn't lift my arm..." (PEO-005)

2) Emergencies faced by the elderly regarding the dimensions of causes of danger in the community. Elderly people and their families interpreted dangerous situations in the community as behaviors that contribute to risk, such as substance addiction and vulnerability to harm. An unsuitable environment posed risk danger, including desolate forests, water canals with no boundaries, slippery, rough roads, and others.

"...Elderly people were stranded in the forest. He had a job burning rice to sell. He went to find the firewood. Firewood in the forest preserved water near the temple. He lost consciousness while looking for firewood. This time, the rescue vehicle was unable to help..." (LAO-003)

3) Emergencies of the elderly in terms of their impact on lifestyles. Elderly people and their families gave meaning to distressed situations. Various factors can significantly impact their lifestyles, including homelessness, shortages of essential resources, unemployment, and financial instability. Elderly people and their families are afraid and worried about their lifestyle.

"...Elderly people have always been bedridden and visually impaired. Recently, the caretaker's daughter had

a problem with muscle weakness. When it was apparent that the daughter's condition was worse than the mother's at present, there is no occupation and no income, so assistance has been provided to receive a living allowance according to the rights ..." (LO-002)

4) Emergencies faced by the elderly, dimensions affected by natural disasters. Elderly people and their families interpreted the situation of their exposure to natural disasters. The severity of natural disasters can lead to substantial property damage, loss of belongings, and decreased income. For instance, a house fire can render individuals homeless, a garden fire causes financial losses, flooding of livestock pens can lead to both property and income loss, and a storm cause the roof to collapse, making a house unsafe.

"...In the case of a house fire, when the incident occurred, the villagers immediately called to report the problem when they thought they could not solve the problem. What was found was that the fire had spread and the damage was widespread. Unable to manage by myself…" (LAO-002)

2. Perspective of Emergency Service Providers. The researcher synthesized the meaning of emergencies for the elderly from the perspective of emergency service providers, including relevant medical personnel. It was found that the interpretation of meaning varied depending on the circumstances surrounding the incidents and the factors influencing the risk of illness. This is determined based on the criteria of a medical emergency and specific disease symptoms, as outlined below:

1) Emergencies faced by the elderly according to medical criteria. Defining emergencies situations in the elderly based on medical criteria that may threaten illness. Physical symptoms may include severe headaches, high fevers, diarrhea, food poisoning, unconsciousness, nausea, vomiting, poisoning, exacerbation of pre-existing medical conditions, physical abuse, and accidents.

"...responds to the incident when contact is made and notified directly to the emergency department. I will coordinate and call a team consisting of professional nurses. Emergency personnel ..." (HS-002)

2) Emergencies faced by the elderly according to disease-specific symptom criteria. Defining emergency conditions for the elderly from guidelines for specific disease symptoms, including stroke, diabetes, heart disease, etc.

"...in the case of an emergency case coming to the Subdistrict Health Promoting Hospital, they will be referred to a community hospital, for example, if they are found to have numbness, drink water and spill it. Patients will receive an initial evaluation, such as a blood sugar test and blood pressure measurement. When an abnormality is found, a rescue vehicle will be called to help take the person to the hospital..." (HS-001)

3) Emergencies faced by the elderly in crises.. Defining emergency conditions for the elderly in crisis situations. This includes serious illnesses or the need for monitoring the spread of diseases, such as during the COVID-19 outbreak and other disease control measures..

"...There is help for elderly people who are infected with COVID-19. Assist them by having a rapid mobile unit pick up patients at home and transport them for treatment..." (LAO-003)

3. Perspective of emergency management administrators for the elderly. The researcher synthesized the definition of

the emergency management framework for the elderly according to the challenges and needs possessed by the elderly, the hardship experienced by the elderly and their families, and illness problems that necessitate immediate assistance. This approach aligns with the policies and missions of local government organization leaders and local organization leaders, ensuring that assistance operations are carried out effectively across all dimensions. Services are provided in response to problems and needs, as follows:

1) Emergencies faced by the elderly: serious illness dimension. Defining emergency situations among the elderly related to illnesses in the community and outlines emergency medical criteria. It also details the roles and responsibilities that must be adhered to according to established regulations. Additionally, it provides guidelines for delivering assistance and addressing the challenges and needs of elderly individuals and their families.

> *"...Local government organizations adhere to the announcement of the National Institute of Emergency Medicine regarding the criteria for local government organizations to operate and manage local emergency medical systems to assist disaster victims in emergencies." (LAO-005)*

2) Emergencies faced by the elderly, dimensions of suffering. This section defines the emergency situations faced by the elderly, focusing on the various sources of distress that impact their lives and the lives of their families. These sources include inadequate housing, lack of stable livelihood, homelessness, unemployment, and insufficient income. The elderly require assistance with their employment opportunities and access to welfare benefits.

> *"...Opportunity for the elderly to have work. I work here because I have no income. Leaders open learning development centers to employ the elderly…." (PEO-015)*

3) Emergencies faced by the elderly as a result of disasters. This section defines emergencies affecting the elderly in the context of disasters, including floods that damage property and agricultural land, result in loss of income, and create hazardous situations such as storm impacts, damaged houses, collapsed roofs, and unsafe living conditions. This aligns with the mission and decentralization efforts of local administrative organizations, which are tasked with addressing these issues.

> *"...from the policies of the Prime Minister since 2000, operations or development depend on the leader's policies so they can continue to develop. In the past, there was a strong community of leaders rooted in emphasizing the issue of sufficiency economy..." (LAO-004)*

4) Emergencies of the elderly due to problems of essential needs. The elderly's emergency is defined as problems or essential needs that they cannot manage independently and require assistance, such as transportation or treatment at a regional hospital.

> *"...for the main citizen assistance center is the duty of the Permanent Secretary's Office. However, it will be forwarded for further action and consideration related to other parties.. The Permanent Secretary's Office will send it to the Executive Committee to consider suitability..." (LAO-006)*

5) Emergencies of the elderly due to disasters in the community. This section defines the emergency situations faced by the elderly, including physical abuse within families and harm from the community. It highlights the importance of ensuring the safety of both life and property for older adults.

Many elderly individuals experience both physical and mental suffering and require assistance to mitigate risks and enhance their safety within the community.

> *"...Policies come from the central government and are included in plans to carry out operations such as managing drug problems, organizing projects, and allocating budgets. Mostly, the directors of each department share responsibility by including it in each department's plan..." (LAO-006).*

DISCUSSION

1) The results emphasized the definition of emergencies from the perspective of older adults who have experienced emergencies. It was found that emergencies are associated with threats to life, stemming from both from illness and dangers presented in the community. Elderly people often struggle to manage on their own and require immediate assistance. It was consistent with the emergency definition as outlined in Emergency Medical Act, which describes an emergency as an event in which a person is injured or suddenly becomes ill, threatening life or the functioning of vital organs, and necessitating evaluation (Morgans & Burgess, 2011). Additionally, a research study examining the needs of the elderly regarding emergency medical services revealed that the greatest need was for access to assistance services. These services include channels for reporting incidents, helping providers understand local conditions, and transportation to access assistance (Khansakhon et al., 2018). This literature review indicates that Thailand's emergency medical policy does not currently include a specific policy for addressing the needs the elderly. Therefore, to meet the this gap, there should be a policy in emergency medicine that prioritizes emergency medical services specifically for the elderly in the community.

2) The research results underscored the definition of emergencies from the perspective of service providers. It has been determined that emergencies are closely related to established practices and service system standards. This aligns with the International Council of Nurse's definition of emergencies in the context of emergency and disaster nursing, which emphasize risk reduction, disease prevention, and health promotion for individuals, families, and communities (Tillman, 2011). This perspective is consistent with the role of those involved in emergency management for the elderly within the community, where community nurses can serve as effective managers. Furthermore, it aligns with contemporary study on nursing leadership and management, which reflects the importance of leadership and management competencies for modern nursing leaders who must navigate changes across various world contexts. Nursing managers have qualifications in 5 dimensions: 1) general qualifications, including age, experience, and working position, and human relations; 2) knowledge; 3) work ability; 4) attitudes of nursing leaders; and 5) specialized expertise skills (Konkanghana, 2021). It is evident that community nurses play a role that extends beyond merely providing health services. Research highlights the perspectives of community service providers on the emergency needs of older adults. It has been found that community nurses have a role in dealing with urgent illness problems in accordance with the International Council of Nurses' competencies in emergency and public disaster nursing. Therefore, when preparing the competency framework for community nurses, it is essential to incorporate skills in emergency nursing management that are relevant to the specific situations and address the emergency needs of the elderly in the community.

3) The research finding highlight that the definition of an emergency, as perceived by community leaders, is closely tied to the issues and needs of the elderly, particularly concerning their suffering and that of their families. This includes health-related problems that necessitate timely assistance. This was consistent with the emergency definition of the community health system concept, which emphasizes the importance of community relationships. For people in a community to maintain, good health conditions must be managed by leveraging the community's strengths and social capital through collaborative efforts (Keon et al., 2013). This viewpoint is consistent with Ottawa Charter's commitment to enhancing community health, which includes fostering population participation in identifying health issues, planning, decision-making, and developing strategies for addressing health challenges. It also emphasizes building empowerment and instilling a sense of ownership so that communities can self-manage their health (Kim et al., 2013). Furthermore, It is consistent he mission of administrative organizations in emergency management, ensuring that support for the elderly is effectively managed in accordance with their specific problems and needs (Petri et al., 2016). It can be seen that the research emphasizes defining emergencies from the perspective of community administrators who are involved in dealing with the problem. Therefore, adjusting the national policy to be in line with this importance should adjust the emergency management policy for the elderly. This could involve creating suitable staffing plans for local government organizations and revising regulations and procedures to effectively address the identified problems and necessary needs.

This study has limitations in that it did not collect data on instances where the elderly experienced acts of violence in the community. The researcher opted to gather information through in-depth interviews with individuals involved in managing emergencies. These individuals include welfare officers. Additionally, community leaders, village volunteers, and local administrative officers.. Additionally, general community behaviors were observed to prevent conflicts and to understand their impact on the mental well-being of the elderly.

CONCLUSION AND RECOMMENDATION
This study examined the definition of emergency among elderly people in the community, considering the perspectives of emergency medicine, emergency nursing, and community health system concepts. The research indicates that emergency medical policies needs to be revised. Emergency management for the elderly in Thailand, as well as the competency framework for community nurses, require to be adjusted to meet the needs of the elderly in the community. This study helps open the door to further studies aimed at exploring the definition of emergency from the perspective of service users, service providers, and emergency management for the elderly. Such research could lead to the development of a policies and competency frameworks for community nurses. Additionally, long-term studies could yield valuable insights into the effective methods.

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ORIGINAL ARTICLE

CHANGES IN WOMEN'S MENSTRUATION PATTERNS FOLLOWING COVID-19 INFECTION

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ABSTRACT

The Coronavirus Disease 2019 (COVID-19) has been demonstrated to disrupt the body's immune response, adversely affecting the reproductive system. Consequently, this study has focused on the changes in the menstruation patterns of survivors of the disease in women of reproductive age with asymptomatic, mild, and severe cases. This study employed an observational cross-sectional approach. The sample comprised 207 women who had recovered from COVID-19 within the past six months and met the inclusion and exclusion criteria. The sampling technique utilized consecutive sampling, and menstrual characteristics were assessed using a questionnaire. Several respondents in the severe group experienced changes in their menstrual patterns. Their duration of menstruation was shortened by 11.11%, and 13.58% had a more extended menstrual period. Some respondents' cycles were elongated by 20.98%, some decreased their initial menstrual volume by 32.09%, and some increased by 27.16%. Meanwhile, their menstrual volume decreased by 17.28% at the end of menstruation, and their duration lengthened by 24.69%. 12.1% of respondents also reported changes in menstrual regularity. Additionally, 19.75% of respondents stated that their menstrual pain decreased, and 13.58% had increased menstrual pain. The multivariate analysis revealed that the severity of the COVID-19 infection was the primary factor influencing menstrual patterns.

Keywords: *Menstrual patterns; menstrual cycle; severity of infection; survivor of COVID-19.*

INTRODUCTION

In 2019, a new Severe Acute Respiratory Syndrome coronavirus (SARS-CoV-2) was discovered and was first identified in Wuhan, China. Named Coronavirus Disease 2019 (COVID-19), this virus spread very quickly through respiratory droplets of infected people. COVID-19 can cause symptoms ranging from mild to severe, such as coughing, fever, and shortness of breath. Its initial symptoms are similar to common cold systems caused by the influenza virus (UNICEF, 2020).

On January 30, 2020, the World Health Organization (WHO) declared a public health emergency of international concern (PHEIC), and on March 11, 2020, COVID-19 was determined as a pandemic situation (WHO, 2023). The pandemic continued for three years, and COVID-19 cases rapidly

increased in waves of variants worldwide. A survey result on September 2023 reported over 771 million confirmed cases of COVID-19 worldwide, with almost 7 million deaths. Within the first two years, the highest increase in infections occurred in the Americas, which was reported to have increased by 7%. Meanwhile, the number of cases decreased by around 12% in the South and East Asia regions. Conversely, some regions experienced an increased mortality rate, especially in Africa, at 72% (WHO, 2021).

COVID-19 has significantly contributed to global morbidity and mortality rates and dramatically affected the health service system. Special planning and handling were needed to maintain the continuity of health services worldwide (Khan et al., 2020). Meanwhile, the clinical manifestations of COVID-19 infection range widely. A total of 81% of patients had mild clinical symptoms, 14% had severe symptoms, and the remaining 5% required critical treatment for organ failure, sepsis, shock, and multiple organ dysfunction. However, initial epidemiological findings identified that most confirmed cases were asymptomatic based on a study of more than 44,000 infected patients in China (The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team, 2020).

According to Wiersinga et al. (2020), COVID-19 infection causes inflammation in the tissues and endothelial cells of the lungs. This pathogenesis then results in micro-thrombi formation and contributes to the occurrence of thrombotic complications, such as limb ischemia, ischemia stroke, and myocardial infarction and can eventually lead to multiple organ failures. Jing et al. (2020) also explained that COVID-19 infection can interfere with the body's immune system and affect the reproductive system.

Previous research on the effect of COVID-19 infection on the reproductive system was also conducted by Li et al. (2021). Their study observed menstrual changes in severe-level COVID-19 patients. They found that the menstrual cycle was lengthened, and the volume decreased in severe patients' menstrual cycles. Hoffmann et al. (2020) explained that in COVID-19 infection, the COVID-19 pathogen enters cells via the angiotensin-converting enzyme-2 (ACE2) receptor. Zhang et al. (2020) further described how COVID-19 attacks organs that produce ACE2. One of these sources is the cell ovarian granulosa that makes ACE2 (Honorato-Sampaio et al., 2012). These findings suggest that the COVID-19 virus can target the ovaries.

However, little to no clinical data have been published regarding the impact of the COVID-19 virus on ovarian function (Li et al., 2021). Meanwhile, some changes in ovarian function can be seen by observing changes in menstruation.

This study compared changes in women's menstruation patterns following COVID-19 infection. Based on the Living Guidance for Clinical Management of COVID-19 (2021) issued by the WHO, COVID-19 severity can be divided into three groups: asymptomatic (no symptoms), mild (mild-moderate symptoms), and severe (severe symptoms) (WHO, 2021). Monin et al. (2020) explained the immune system's response to a viral infection would trigger an adaptive protective response. Additionally, this cascade response will induce hormonal changes in the uterus, which is thought to cause menstrual changes.

These changes in the uterus are also produced because when an infection occurs, a person will experience disturbances in their sleep duration, time, and quality (Baker & Lee, 2022) and changes in their thermoregulation system (Baker et al., 2020). These changes make their menstrual cycle abnormal (shorter or longer). Sundström-Poromaa (2018) reported that significant changes in sleep patterns in women, for example, sleeping less than 6 hours, typical sleep disturbances, and changes in emotional adaptation and mental health, can cause changes in a woman's premenstrual syndrome.

Research on women's menstruation pattern changes after COVID-19 infection needs to be conducted. Wang et al. (2021) stated that most researchers have focused on damages to the respiratory system rather than the reproductive system as a post-infection effect of SARS-CoV-2. Meanwhile, the research at Tongji Hospital on 177 patients showed that most respondents experienced decreased and increased menstrual volume, lengthening and shortening of the menstrual cycle, and changes in menstrual pain (Li et al., 2021). Additionally, Davis et al. (2022) researched 1,752 women from 56 countries and found that 36% had menstrual problems and 26% had irregular menstrual periods after COVID-19 infection.

However, few studies have focused on changes in women's menstrual cycles after COVID-19 infection in Indonesia. According to COVID-19 Survivor Indonesia (CSI) data, around 70% of female survivors of COVID-19 experience long-term COVID-19 symptoms, one of which is a change in their menstrual cycle (CNN Indonesia, 2021). Therefore, this study is important, given the scarcity of research on this topic in Indonesia.

Furthermore, changes in the menstrual cycle following SARS-CoV-2 infection can induce anxiety and concern about reproductive health, which impacts sexual well-being with partners. Therefore, this study has the following three objectives: to examine women's menstrual changes post-COVID-19 infection in women of reproductive age with asymptomatic, mild, and severe symptoms; to determine the relationship between the respondents' characteristics and the severity of infection with changes in menstrual patterns; and to identify the most dominant factor associated with changes in menstrual patterns.

METHOD
Study design
This observational study used a cross-sectional approach and primary data to investigate the changes in the menstrual cycle of asymptomatic, mild, and severe COVID-19 survivors.

Sample
Data on asymptomatic patients or those who experienced mild COVID-19 symptoms were collected from one of the shelters treating COVID-19 patients in Daerah Istimewa Yogyakarta (DIY). Meanwhile, data for COVID-19 survivors with severe symptoms were collected from patients treated at RSUP Dr. Sardjito General Hospital.

The study's population was patients who had recovered from asymptomatic, mild, and severe COVID-19 in DIY and met the inclusion criteria. The following inclusion criteria were used in this study: women of reproductive age (16-45 years) who experience menstruation; have experienced asymptomatic, mild, or severe COVID-19 in the last six months, confirmed through medical records, and have fully recovered; and willing to become research subjects by signing an informed consent form.

Meanwhile, the following exclusion criteria were used in this study: patients who have had reproductive organ surgery that affects their menstrual cycle; patients who experienced menstrual disorders before being infected with COVID-19 (based on patient information); and patients who cannot use the Google Form application.

The consecutive sampling technique was employed. Therefore, all research subjects who were found and met the inclusion criteria were included in the study until the minimum number of samples was met. The Slovin formula was used to determine the minimum number of samples, which was 58 people in each group. The researchers compiled the questionnaire with several alternative answers describing the respondents' menstrual characteristics before and after being infected with COVID-19, up to a maximum of 6 months after COVID-19 infection.

Instrument
The researcher compiled the women's menstruation pattern instrument based on previous research references about menstruation pattern. The changes in menstrual patterns studied included menstrual duration, frequency, volume at the beginning of menstruation, volume at the end of menstruation, and menstrual pain. These were defined as follows: 1) The duration of menstruation starts from the first day of bleeding until the bleeding finishes; the answer choices are 1-3 days, 4-8 days, and > 8 days; 2) The menstrual cycle is the duration from the start of menstruation in this period until the start of the next period; the answer choices are < 28 days, 28-35 days, and > 35 days; 3) Menstrual regularity is the regularity of menstruation. The answer choices are if the period is the same every month, it is called regular, whereas if the time range is different every month, it is called irregular; 4) Volume at the beginning of menstruation is the average amount of blood secreted during the initial menstrual period per day. The answer choices are 0.5 ml, > 05-2 ml, > 2-3.5 ml, > 3.5-6 .5 ml and >6.5-12.5 ml; 5) Volume at the end of menstruation is the average amount of blood secreted during the final menstrual period per day, the answer choices are 0.5 ml, > 05-2 ml, > 2-3.5 ml, > 3.5-6 .5 ml and >6.5-12.5 ml.; and 6) Menstrual pain is an unpleasant sensation that arises when a woman is menstruating, with the answer choices of no menstrual pain and menstrual pain.

The instrument used in this study went under subject matter expert review, involving 3 experts whose expertise are related to the instrument being assessed. This study's relevance aspect has an I-CVI of 0.98, and its accuracy aspect has an I-CVI value of 0.97. Additionally, its essence aspect has an I-CVI of 0.98, clarity aspect has an I-CVI of 1.00, and ease of understanding aspect has an I-CVI value of 0.96. Therefore, it the I-CVI of each aspect of the Menstrual Change Instrument questionnaire is valid. The researchers did not conduct a reliability test. In addition, the instrument was piloted with a comprehension test on 10 respondents who indicated that they understood the questions and answered according to the questions.

Data collection
The data collection process was conducted online using WhatsApp and Google Forms. The researchers worked with the UGM Covid-19 Task Force to collect active WhatsApp numbers of patients who had been treated. The researchers contacted the WhatsApp of each potential respondent who met the inclusion criteria and then explained the research. In addition, the researcher asked about their willingness to become a research respondent by sharing a link to a Google form containing an informed consent form and the research questionnaire. The respondents then completed the research questionnaire within the time limit agreed with the researcher.

Data analysis
To observe changes in menstrual patterns, the respondents were asked to answer the questionnaire based on their experience before and after they were infected with COVID-19. The menstrual pattern component is declared to have changed if the measurement results before COVID-19 are different after being infected with COVID-19. They then illustrated their responses with a diagram of menstrual characteristics before and after being infected with COVID-19. Next, a comparative test was conducted using Chi-square analysis with significance set as $p<0.05$ to determine whether there were differences in the menstrual pattern changes in each type of case. A multivariate analysis was also conducted using logistic regression.

Ethical consideration
The research was conducted after obtaining approval from the Medical and Health Research Ethics Committee of the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada in Yogyakarta, Indonesia with the approval number: KE/FK/0187/EC/2022.

RESULT
A total of 207 respondents were involved in this study, consisting of 58 asymptomatic COVID-19 survivors, 68 mild COVID-19 survivors, and 81 severe COVID survivors. Table 1 shows the respondents' characteristics. Most of the respondents were late adolescents aged 17-25 years (64.3%), and the most common body mass index (BMI) status was a normal BMI status of 18.5-25 (61.8%). Most respondents experienced menarche at the age of 12-16 years (80.2%), most do not smoke (96.6%), and all respondents do not use contraception (100%). A homogeneity test was conducted between the asymptomatic, mild, and severe respondent groups. The tests revealed that the respondent's age and menarche's age were not homogeneous between the three groups. In comparison, BMI and smoking status showed homogeneity between the three groups.

Table 1. Respondents' Characteristics n = 207

Characteristics of respondents	Asymptomatic		Mild		Severe		Total		p
	n	%	n	%	n	%	n	%	
Age									
Late teens 17-25 years old	41	19.8	54	26.1	38	18.4	133	64.3	0.000*
Early adulthood 26-35 years old	16	7.7	9	4.3	18	8.7	43	20.8	
Late adulthood 36-45 years	1	0.5	5	2.4	25	12.1	31	15.0	
Body Mass Index									
Underweight < 18.5	12	5.8	9	4.3	12	5.8	33	15.9	0.820
Normally 18.5-25	33	15.9	44	21.3	51	24.6	128	61.8	
Fat >25	13	6.3	15	7.2	18	8.7	46	22.2	
Menarche									
Children aged 5-11 years	9	4.3	15	7.2	8	3.9	32	15.5	0.010*
Early adolescence aged 12-16 years	49	23.7	52	25.1	65	31.4	166	80.2	
Late adolescence 17-25 years	0	0	1	0.5	8	3.9	9	4.3	
Smoking behavior									
Do not smoke	55	26.6	64	30.9	81	39.1	200	96.6	0.074
Smoke	3	1.4	4	1.9	0	0	7	3.4	
History of contraceptive use									
Not using contraception	58	28	68	32.9	81	39.1	207	100	-
Using contraception	0	0	0	0	0	0	0	0	

Table 2 presents the findings of an analysis that examined the number of respondents who experienced alterations in their menstrual patterns. Comparative tests of the respondents' menstrual durations were conducted on those with asymptomatic, mild, and severe cases, and they revealed significant differences in the changes in menstrual duration across the three groups, with a p-value of 0.004.

Conversely, no statistically significant differences were observed in the menstrual cycles of the three groups (p = 0.363). A p-value of 0.000 was obtained for the three groups, indicating a statistically significant correlation between changes in menstrual regularity. Significant differences were observed in the initial volume of menstrual bleeding between the three groups (p = 0.000). Similarly, significant differences were observed in the changes in menstrual volume at the end of menstruation between the three groups, with a p-value of 0.000. Additionally, significant differences were observed in the changes in menstrual pain across the three groups, with a p-value of 0.000.

Table 2. Changes in women's menstrual patterns before and after asymptomatic, mild, and severe COVID-19 infection (n = 207)

Pattern of Menstruation	Asymptomatic		Mild		Severe		Total		*P*
	n	%	n	%	n	%	n	%	
Duration of Menstruation									
There is no change in duration	53	25.6	63	30.4	62	29.5	177	85.5	0.004*
There has been a change in duration	5	2.4	5	2.4	20	9.7	30	14.5	
Total	58	28	68	32.9	81	39.1	207	100	
Menstrual Cycle									
There is no cycle change	43	20.8	54	26.1	56	27.1	153	73.9	0.363
There is a cyclical change	15	7.2	14	6.8	25	12.1	54	26.1	
Total	58	28	68	32.9	81	39.1	207	100	
Menstrual Regularity									
There is no change in regularity	47	22.7	67	32.4	56	27.1	170	82.1	0.000*
There is a change in regularity	11	5.3	1	0.5	25	12.1	37	17.9	
Total	58	28	68	32.9	81	39.1	207	100	
Volume at the beginning of menstruation									0.000*
There is no change in volume	40	19.3	55	26.6	33	15.9	128	61.8	
There is a volume change	18	8.7	13	6.3	48	23.2	79	38.2	
Total	58	28	68	32.9	81	39.1	207	100	
Volume at the end of menstruation									0.000*
There is no change in volume	48	23.2	66	31,9	47	22.7	161	77.8	
There is a volume change	10	4.8	2	1	34	16.4	46	22.2	
Total	58	28	68	32,9	81	39.1	207	100	
Menstrual Pain									0.000*
There was no change in menstrual pain	40	19.3	64	30,9	79	38.2	183	88.4	
There are changes in menstrual pain changes	18	8.7	4	1,9	2	1	24	11.6	
Total	58	28	68	32,9	81	39.1	207	100	

*Note * p < 0,005*

Figure 1 exhibits that most respondents' menstruation duration did not change. However, in the severe group, the number of respondents whose menstrual duration was shortened was nine people (11.11%), and 11 people (13.58%) had prolonged menstrual duration.
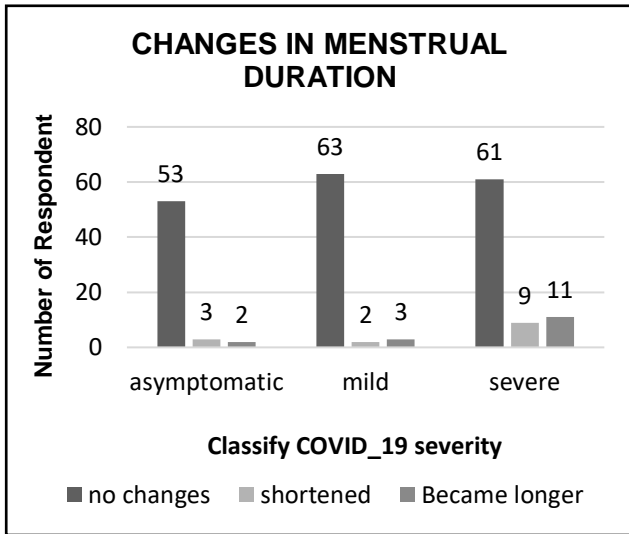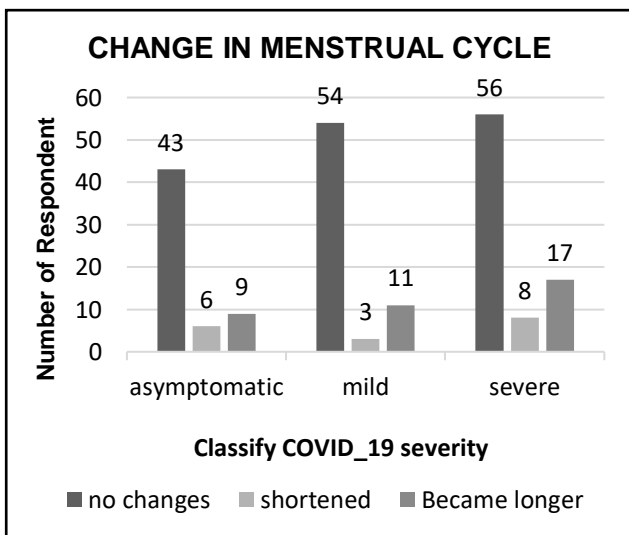

Figure 1. Changes in menstrual duration

Figure 2. Changes in menstrual cycle

Figure 2 exhibits that most respondents' menstrual cycles remained unchanged. However, there has been a slight change in the respondents' menstrual cycles for each type of COVID-19 severity. The respondents' cycle length changes are almost the same for all COVID-19 severities. The respondents who experienced the most changes through an elongated cycle were the those who had severe COVID-19, with 17 people or 20.98% of the total number of respondents in the severe group.

Figure 3 shows that most respondents did not experience changes in menstrual regularity. Nevertheless, there were slight changes in the respondents' menstrual regularity in each type of COVID-19 severity. The respondents who experienced severe COVID-19 symptoms had the most significant change in menstrual regularity, with 25 people or 30.86% of the total number of respondents in the severe group.
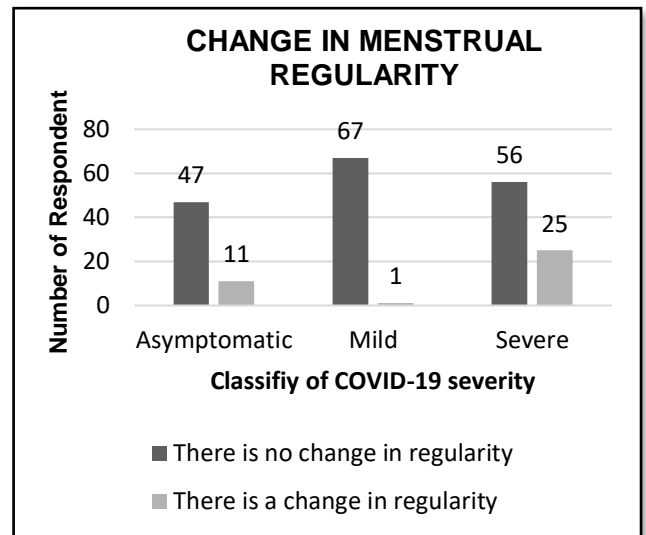

Figure 3. Changes in menstrual regularity

Based on Figures 4 and 5, the respondents' volume of menstruation at the beginning and end of their menstruation period was the same as the volume before and after being infected with COVID-19. However, respondents who experienced severe COVID-19 symptoms experienced more changes in menstrual volume than those of other severity types. Menstrual volume at the beginning of menstruation, for the respondents in the severe group, 26 (32.09%) respondents' volume of menstruation decreased, and 22 (27.16%) increased. Meanwhile, 14 (17.28%) respondents' menstruation volume at the end of menstruation in the severe group decreased, while 20 (24.69%) people had prolonged volume changes.

Figure 6 shows that most respondents' menstrual pain did not change between before and after being infected with COVID-19 for each type of COVID-19 severity. However, of the respondents with severe COVID-19 symptoms, 16 (19.75%) stated that their menstrual pain decreased, and 11 (13.58%) had increased menstrual pain.
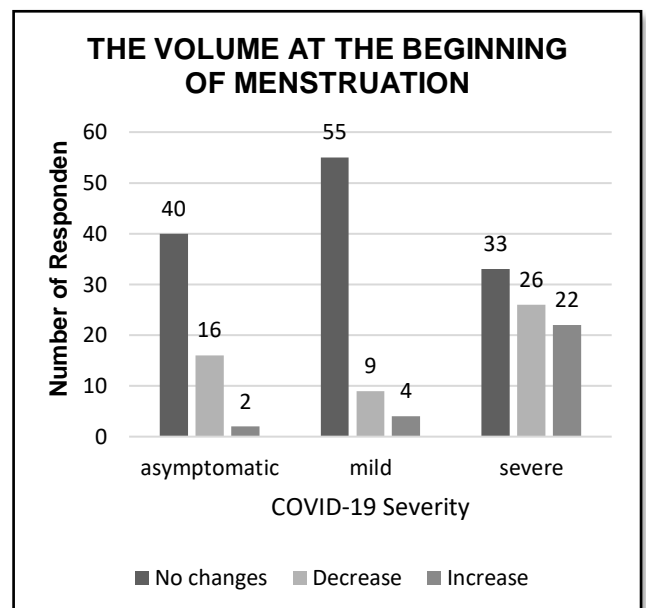

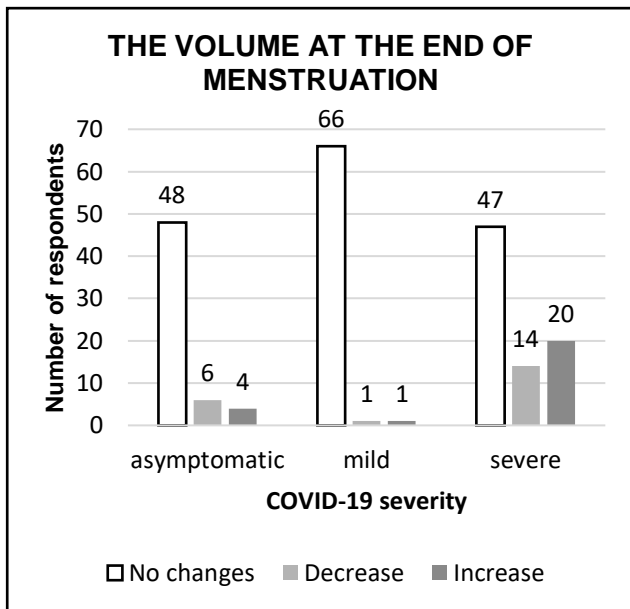**Figure 4. The volume at the beginning of menstruation**

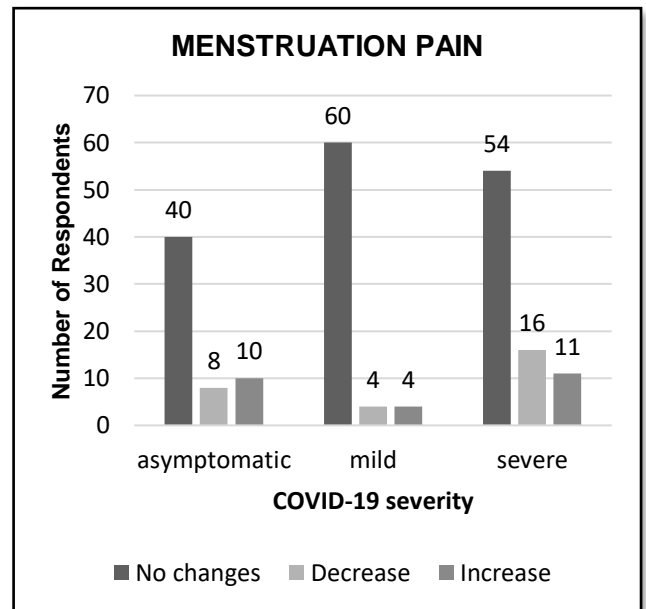**Figure 5. The volume at the end of menstruation**

Figure 6. Menstruation pain

Table 4. Multivariate analysis of the respondents' characteristics and the severity of infection with menstrual pattern changes

Variabel	Koefisien	S.E	Wald	df	Nilai p	OR	CI (95%)		R-square
							Min	Max	
Duration of menstruation									
Severity of infection	-1,679	0,571	8,656	1	0,003	0,187	0,061	0,571	0,102
Age	1,570	0,840	3,495	1	0,062	4,807	0,927	24,626	
Body mass index	1,263	0,777	2,845	1	0,104	3,536	0,772	16,198	
Menarche	-0,415	1,320	0,099	1	0,753	0,661	0,050	8,783	
Menstrual cycle									
Severity of infection	-0,561	0,423	1,760	1	0,125	0,570	0,249	1,307	0,045
Age	1,187	0,595	3,948	1	0,047	3,264	1,016	10,484	
Body mass index	-0,698	0,527	1,753	1	0,186	0,498	0,177	1,398	
Menarche	-0.271	0,906	0,090	1	0,764	0,762	0,129	4,497	
Menstrual regularity									
Severity of infection	-0,771	0,449	2,967	1	0,085	0,461	0,191	0,113	0,154
Age	0,072	0,574	0,016	1	0,901	1,074	0,349	3,309	
Body mass index	-0,206	0,643	0,102	1	0,749	0,814	0,231	2,872	
Menarche	1,941	1,253	2,399	1	0,121	6,967	0,597	81,253	
The volume of the beginning of menstruation									
Severity of infection	-1,661	0,416	15,909	1	0,000	0,190	0,084	0,430	0,188
Age	0,845	0,525	2,585	1	0,108	2,327	0,831	6,516	
Body mass index	-0,852	0,544	2,406	1	0,121	0,427	0,145	1,252	
Menarche	0,847	0,894	0,897	1	0,343	2,333	0,404	13,465	
The volume of the end of menstruation									
Severity of infection	-1,108	0,455	5,916	1	0,015	0,330	0,135	0,806	0,196
Age	-0,355	0,717	0,422	1	0,516	0,701	0,240	2,047	
Body mass index	-0,269	0,652	0,170	1	0,680	0,764	0,213	2,745	
Menarche	-0,586	0,960	0,373	1	0,542	0,557	0,085	3,651	
Menstrual Pain									
Severity of infection	3,470	1,046	11,014	1	0,001	32,132	4,140	249,401	0,299
Age	-0,798	1,057	0,570	1	0,450	0,450	0,057	3,576	
Body mass index	-0,086	0,724	0,014	1	0,906	0,918	0,222	3,794	
Menarche	-0,575	1,441	0,159	1	0,690	0,563	0,033	9,491	

The relationship between the respondents' characteristics and the severity of infection with changes in menstrual patterns was analyzed. The factors that play a role vary greatly and can be explained as follows: 1) The dominant factor associated with the duration of menstruation is the severity of infection. The four variables tested have an influence of 10.2% on the duration of menstruation, while the rest are influenced by other factors not examined in this study. 2) The dominant factor associated with the menstrual cycle is the respondent's age. The four variables tested have an influence of 4.5% on the menstrual cycle, while the rest are influenced by factors not examined in this study. 3) For menstrual regularity, none of the four variables examined in this study are dominantly associated with the incidence of menstrual regularity. These variables have an influence of 15.4% on the menstrual cycle, while the rest are influenced

by factors not examined in this study. 4) The dominant factor associated with menstrual volume at the beginning of menstruation is the severity of infection. The four variables tested have an influence of 18.8% on the volume of the beginning of menstruation, while the rest are influenced by factors examined in this study. 5) The dominant factor associated with menstrual volume at the end of menstruation is the severity of the infection. The four variables tested have an influence of 19.6% on the volume of the end of menstruation, while the rest are influenced by factors not examined in this study. 6) The dominant factor associated with menstrual pain is the severity of infection. The four variables tested have an influence of 29.9% on menstrual pain, while the rest is influenced by factors not examined in this study.

The multivariate analysis revealed that of the four variables suspected of being related to changes in menstrual pattern, the severity of COVID-19 infection is the dominant factor affecting the duration of menstruation, the menstrual volume at the beginning and the end of menstruation, and menstrual pain.

DISCUSSION

Based on epidemiological studies about COVID-19 infection, the frequency of men infected with COVID-19 is higher than women in several countries, including China, South Korea, Italy, and worldwide (Mo et al., 2020; Chen et al., 2020; Remuzzi and Remuzzi, 2020). The rate and fatality of COVID-19 infection in women is lower than in men because women can produce higher levels of circulating antibodies, especially IgG and IgM immunoglobulins, than men (Butterworth et al., 1967). In addition, compared with men, women can also develop higher levels of immune cells, such as CD4+ T helper cells (Amadori et al., 1995). Nevertheless, for epidemiological research purposes, the influence of COVID-19 infection on female patients is worthy of further study.

Based on this study's results, the changes in the respondents' menstrual patterns varied based on the severity of COVID-19 infection. As illustrated in the preceding figures, most respondents reported alterations in their menstrual patterns, such as duration, regularity, volume at the beginning and end of menstruation, and intensity of menstrual discomfort. These observed variations were statistically significant across the three groups.

In contrast, menstrual cycle characteristics exhibited minimal variation across the three groups. The group with a history of severe COVID-19 infection demonstrated the most pronounced alterations in menstrual patterns. The three groups had only one similar pattern, namely the menstrual cycle (Mardliyah et al., 2023; Rahmawati et al., 2023; Ramadhani et al., 2023).

The symptomatic changes experienced by women infected by COVID-19 result in physiological changes in their bodies, especially in their reproductive organs. This statement aligns with Huang et al.'s (2020) findings in their mini-review. Infection with the COVID-19 virus can affect host cells through the cellular receptor, angiotensin-converting enzyme 2 (ACE2). Theoretically, human cells with ACE2 expression are believed to affect the targets of SARS-CoV-2 infection, including the lungs, digestive tract, kidneys, and heart, as well as the ovaries and testes, which have a dominant role in fertility. ACE2 is also related to oocyte maturation, ovulation, and spermatogenesis. ACE2 can also be found in endometrial epithelial cells. Huang et al. (2020) also found

some uncertainty about whether COVID-19 infection can damage the reproductive system.

Moreover, previous viral infections are widely known to affect the female reproductive system and cause menstrual disorders, such as hepatitis B and C virus infections and human immunodeficiency virus (HIV). Anovulation has also been reported in acute illness and may be transient. The disease causes suppression of ovarian function, thereby affecting its regular function (Li et al., 2021).

Furthermore, endometrial tissue expresses receptors and proteins involved in SARS-CoV-2 infectivity, but it is unknown whether this can alter endometrial receptivity and embryo implantation (Delamuta et al., 2021). Therefore, the effects of SARS-CoV-2 on the male/female reproductive system must be studied in the long term. Most researchers currently focus on studying respiratory system damage rather than the reproductive system after COVID-19 infection. However, some results imply that SARS-CoV-2 infection can be detrimental. Meanwhile, the male reproductive system also functions through ACE2 receptor mediation. Several studies have shown that SARS-CoV-2 may impact male/female reproduction, so the best efforts are to control and prevent SARSCoV-2 infection with vaccinations and strategies to avoid transmission (Wang et al., 2021).

This study's multivariate analysis revealed that the severity of infection is the dominant factor affecting menstrual duration, the menstrual volume at the beginning and end of menstruation, and menstrual pain. To date, there is limited existing literature on the impact of the SARS-CoV-2 infection on menstrual patterns. However, the available research provides insight into the infection's effect on each of these patterns. The prevailing view is that the SARS-CoV-2 infection affects the female reproductive system (Li et al.,2021). SARS-CoV-2 can invade target cells by binding to ACE2, thus affecting female fertility. ACE2, widely expressed in the ovaries, uterus, vagina, and placenta, regulates the levels of angiotensin II (Ang II) and Ang-(1-7) to perform its physiological functions. ACE2, Ang II, and Ang-(1–7) can regulate follicle development and ovulation, regulate angiogenesis and corpus luteum degeneration, and influence endometrial tissue growth. ACE2 expression in the ovaries may affect ovarian reserve; reduced ovarian reserve can affect fecundity by reducing egg quality (Steiner et al., 2017). The ovarian hormone levels in question are basal concentrations of stimulating hormone (FSH), basal luteinizing hormone (LH), estradiol (E(2)), AMH anti-Müllerian hormone (AMH) (Tal et al., 2017; Jhonson et al., 2006). Therefore, ACE2 expression in the ovaries may affect the changes in women's menstrual cycle and menstrual volume. Kolanska et al. (2021) stated that the ovarian reserve of patients with a history of asymptomatic and mild COVID-19 did not change, as proven by comparing the results of an examination of AMH levels in COVID-19 rapid diagnostic test-positive patients and COVID-19 quick diagnostic test negative patients. This finding may also be related to the reports of fewer menstrual pattern changes in patients with asymptomatic infection and more menstrual cycle changes in the group with severe infection. However, further studies with a larger sample size are needed.

This study's results also demonstrate that menstrual pain was experienced by patients with a history of asymptomatic, mild, and severe types of COVID-19. Although all respondents experienced changes to their menstrual pain, the most changes occurred in the severe group, as 16 (19.75%) respondents stated that their menstrual pain had decreased

and 11 (13.58%) had increased menstrual pain. This study also included menstrual pain as one of the menstrual pattern variables because it is commonly experienced by women who are menstruating.

According to a study by Negriff et al. (2009), one of the most common physical and emotional symptoms of menstruation is menstrual pain, also known as dysmenorrhea (Negriff et al, 2009). The menstrual pain studied in this study was specifically classified as primary dysmenorrhea, defined as pain during menstruation without any pathological problems found in the reproductive organs (Davis et al., 2005).

These changes in menstrual patterns add further evidence that COVID-19 infection influences women's reproductive organs and may also affect fertility. This research was conducted by asking 207 patients with a history of COVID-19 infection with a six-month time limit. Most changes in menstrual patterns occurred in patients with severe symptoms, while very few changes occurred in mild and asymptomatic types. Several respondents stated that the changes in menstrual patterns were felt early after infected with COVID-19; as their body's condition improved, their menstrual patterns tended to return to how they were before being COVID-19 infection.

According to Li et al. (2021), COVID-19 infection causes suppression of ovarian function, causing changes in sexual hormone levels and raising the possibility of a woman experiencing menstrual disorders, which tend to be reversible. Hormonal imbalances can also affect changes in the menstrual cycle, and some causes include exposure to environmental stressors such as excessive physical activity, low energy intake, cigarette smoke, and psychosocial stress (Attarchi et al., 2013). Patients with COVID-19 experience very high levels of psychological distress because they feel that COVID-19 is a new disease with no known cure and a high risk of death. This psychological stress can also affect changes in the menstrual cycle. The findings of this study may serve as an educational resource for healthcare professionals seeking to reduce patient anxiety following a diagnosis of COVID-19. It is important to note that COVID-19 infection, particularly in severe cases, can lead to alterations in the menstrual cycle, including changes in duration, volume, and pain levels of menstruation.

Nevertheless, this study's sample is still limited, and menstrual data taken before and after being infected with COVID-19 were taken up to a maximum of 6 months after being infected with COVID-19, making it possible for respondents to forget their menstrual history. This study also did not examine psychological stress factors that are often experienced by COVID-19 patients, which can also affect changes in women's menstrual patterns. Finally, the questionnaire used also does not meet the reliability test criteria.

CONCLUSION AND RECOMMENDATION

There were significant differences in the changes in women's menstrual patterns based on the severity group (asymptomatic, mild, and severe) of COVID-19. The menstrual pattern changes examined were duration, regularity, beginning and end menstrual volume, and menstrual pain. The respondents in the severe COVID-19 group experienced the most frequent changes in menstrual patterns. Age of menarche and infection severity also correlate with changes in menstrual patterns.

The multivariate analysis revealed that the severity of COVID-19 infection is the dominant factor affecting menstrual duration, the menstrual volume at the beginning and end of menstruation, and menstrual pain. Knowledge about the potential for changes in menstrual patterns after COVID-19 infection is essential for patient education to reduce their anxiety about the impacts that arise after COVID-19 infection. Future research should employ a larger sample size and a longitudinal observational design when examining changes in the menstrual cycle in other infectious diseases. Doing so will enable a more comprehensive understanding of the impact of such diseases on reproductive organs. In addition, researchers need to examine other factors that can affect changes in menstrual patterns that have not been examined in this study, such as psychological stress factors.

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<u>**ORIGINAL ARTICLE**</u>

FAMILY NEEDS OF PATIENTS ADMITTED IN THE INTENSIVE CARE UNIT: A META-SYNTHESIS

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ABSTRACT

The life threats for patients admitted in the Intensive Care Unit (ICU) is higher compared to other care units. The magnitude of the life threats in the ICU not only causes anxiety for patients but also for other families. The family has crucial roles in supporting the patient's recovery, so the holistic needs of the patient's family also require to be considered. This meta-synthesis aimed to synthesize findings from qualitative studies that explored and described the needs of families while accompanying patients in the ICU. A systematic literature search from online databases was used to conduct a qualitative meta-synthesis, which was then evaluated using Critical Appraisal Skill Programme (CASP) checklist for Qualitative Study. Literature that fit the requirements was further analyzed. Three main themes that were fundamental for families were revealed including the need for information, the need for family involvement in patient care, and the need for visiting time for the family. Understanding the family as a unit brings benefits to the patient. It is essential to adapt professional practice strategies that involve families in the daily care of critical patients. Further research is required on how to carry out interventions that translate this knowledge into nursing care practices and actions.

Keywords: *Critical illness; family caregiver; needs; ICU; qualitative*

INTRODUCTION

Family members of Patients admitted in the intensive care unit (ICU) encounter psychological crisis, stress, and depression due to a relative's admission s to this unit, which is frequently an unanticipated event and aimed for individuals in a critical condition and possibility of high mortality (op 't Hoog et al., 2020). A longitudinal study found that about 43% of the relatives of patients who had been in an ICU had high levels of depressive symptoms in a year after discharge (Cameron et al., 2019).

The clinical condition of the ICU patients and inability to communicate directly with health workers and family members create anxiety and stress, not only about the patients' acute clinical condition but also regarding to about care transitions status and the long-term prognosis after discharge (Alsharari, 2020). Furthermore, stress due to a relative's illness can affect how family members cope with the condition and thus may hinder the extraordinary support that the patient needs (Suhartini et al., 2023).

The inability of critical patients to interact with health providers or participate in treatment decisions means that the responsibilities typically falls on patient's families as substitutes in decision-making. The presence of family members in the ICU was known to influence the patient experience positively. A study conducted in Canada explained that the family support have a positive impact on improved patient's condition (Dale et al., 2020). The American College of Critical Care Medicine published recommendations for healthcare providers to support families and meet their needs (Davidson et al., 2007).

By considering the importance of family involvement in caring process for critical patients, many researchers have conducted previous studies related to the family needs of

critical patients holistically, so through literature studies, this study have tried to formulate previous findings regarding the family needs of ICU patients. An apparent reference is a demand for health workers, especially nurses, so that nurses are able to identify and to understand every basic need of the families of critical patients in improving the service quality provided to critical patients through good collaboration with the family, merely making the family a complement to providing information on the patient's health history and as informed consent without discussion to consider the best decision for the patient.

METHOD

Meta-synthesis is a systematic approach used to search, filter, extract, and encode qualitative data (Lachal et al., 2017). This approach involves combining findings across a variety of qualitative studies to ascertain common patterns and themes within a given topic and to increase understanding of evidence-based interventions (Mungall-Baldwin, 2022). Qualitative synthesis is recognized as a valuable tool for analyzing participant meanings, experiences, and perspectives, both in depth (thanks to a qualitative approach) and broad range (thanks to a combination of articles from various backgrounds and participants) (Lachal et al., 2017). The study applied a meta-synthesis approach with six steps: 1) defining the research questions and selection criteria, 2) driving study selection, 3) conducting study quality assessments, 4) extracting and presenting formal data, 5) directing data analysis and 6) writing a synthesis (Lachal et al., 2017).

Determining the research questions and selection criteria

The articles used in the preparation of a qualitative meta-synthesis study related to the needs of families in the ICU. The research question that guides this meta-synthesis analysis is "What are the needs of the family while accompanying patients in ICU care?".

The inclusion criteria were: (a) primary qualitative research exploring the needs of patient families during ICU care, (b) regarding the families of critically ill adult patients admitted in the ICU, (c) written in English, and (e) open access.

Promoting study selection

Initial search terms were based on academic literature following PRISMA's guidelines for conducting reviews (Lachal et al., 2017). Five electronic databases were used in this study (Scopus, ScienceDirect, PubMed, and ProQuest) and then relevant topics were included in meta-synthesis analysis. In searching the literature, the Boolean operators "OR/AND" were applied. Keywords used in the search included Needs AND Families OR Relatives AND Hospitalized AND ICU. All peer-reviewed literature searches were carried out using all available sections, including title, abstract, and keywords. The articles that have been obtained are analyzed, as well as differences and duplications. Figure 1 explained the process of searching for and selecting articles as literature using Preferred Reporting Items for Meta-synthesis (Matthew et al., 2021).

Quality assessment

This CASP (Critical Appraisal Skill Program) checklist for Qualitative Research assesses ten areas: clarity of research objectives, qualitative characteristics, research design, recruitment strategy, data collection, researcher reflexivity, ethical considerations of issues, the equivalence of data analysis, clarity of stated findings and research value (CASP, 2015). Ratings ranged from 1 to 10 (1=low quality and 10=high quality) on each article reviewed (Lachal et al., 2017).
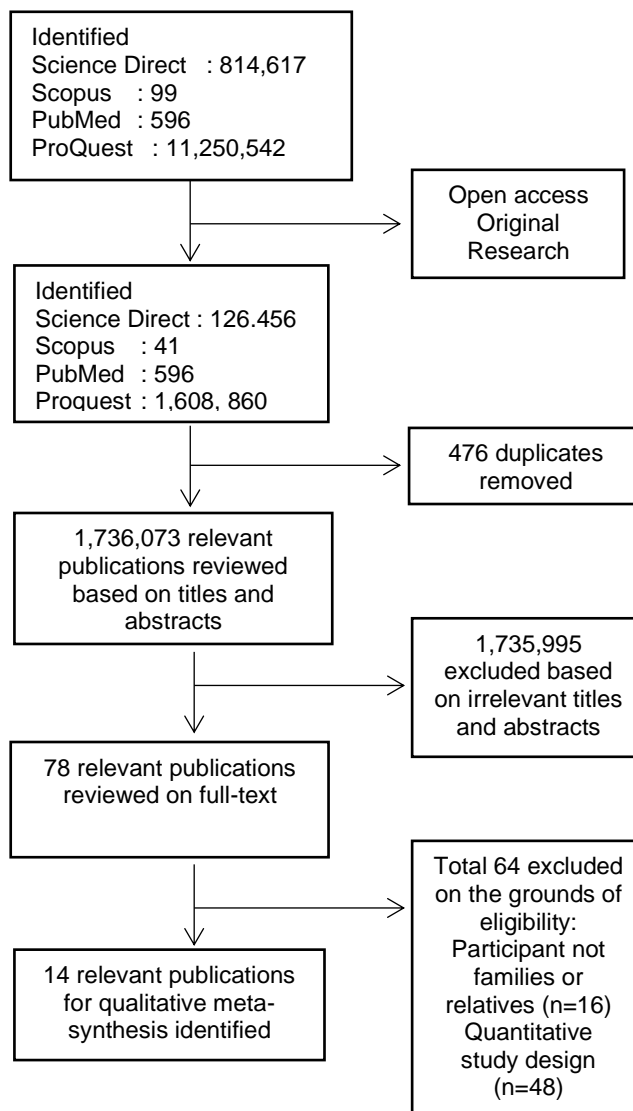

Figure 1. PRISMA Flow Chart

Data extraction and data synthesis

Articles that meet the criteria are extracted in the form of a matrix to facilitate data processing and determine the research theme, and the matrix can be seen in Table 1 as the results of the study.

RESULT
Table 1. Data Extraction extracts, presents the formal data, and results of the study

Author Year Country	Aim	Method	Findings	Recommendation	Quality assessment CASP (Appraisal Result: "Y" Yes, "N" No, "U" Unclear. "N/A" Not Applicable)
Söderström 2009 Sweden	Describe and interpret family adaptation during ICU stay and up to 18 months after discharge	Qualitative design, hermeneutic analysis	• The struggle for resilience; • The struggle for consolation; • The struggle to rebuild a life.	Research is needed on families facing critical illness and on factors such as beliefs and anticipation that help families adapt well	9/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results N— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—The participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Dale 2020 Canada	Explore potentially modified support needs	Longitudinal qualitative study	• Information support; • Emotional; • Training.	Researchers recommend family-centered care which includes communication and support interventions to facilitate family capacities and moderate long-term negative health outcomes.	9/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—The Participant adequately represented U—Ethical considerations addressed Y—Conclusions draw from the analysis, interpretation data
Santana 2007 Spanyol	compare the level of satisfaction of families who are treated in (ICU) with the perceptions of health workers about the environment of care and information received.	Qualitative descriptive interview study	• Improve the waiting room; • Personalize care; • Assess individual flexibility in visiting hours.	Researchers recommend using all of these satisfaction data should be used in initiatives to improve the quality of critical care.	7/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis data Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research U—Participant adequately represented N—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Ventura et al 2020 Spanish	Know the feelings and needs of the relatives of patients	Qualitative study	• Psychological assistance; • Information; • Cooperate in caring for family	Although research exists into the needs of family members of patients admitted to the ICU, better	10/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data

Author Year Country	Aim	Method	Findings	Recommendation	Quality assessment CASP (Appraisal Result: "Y" Yes, "N" No, "U" Unclear. "N/A" Not Applicable)
	treated in the ICU of a third-level hospital in Catalonia and II) studying the participation strategies put forward by relatives.		members.	knowledge of this is still needed to guide strategy and care for families.	Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—the Participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Czerwonka et al 2015 Canada	Explore the needs of survivors and caregivers during critical illness episodes until they return to independent living	Qualitative study	Information needs of survivors' transition from dependence to independence.	Further research can be enhanced by including a diverse and representative sample population.	8/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results N— A statement locating the researcher culturally or theoretically U—Influence of the researcher on the research Y—the Participant adequately represented U—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Op 't Hoog et al 2020 Dutch	Understand what relatives are experiencing and what is needed to provide input in improving family-centered care and reducing PICS symptoms.	Qualitative study	• Relief; • Uncertainty; • Need to be recognized as a caregiver; • Sharing hope; • The need for continuity in care.	Recommendations for further research should provide more insight into factors such as culture and family situation.	9/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results N— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—The Participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Ågård et al 2007 Denmark	Contribute to understanding the needs of the family as well as to developing communication, and better	A qualitative study with a Grounded Theory approach	• Withstand uncertainty; • Put yourself aside; • Form personal cues.	More research is needed with an emphasis on communication and cooperation seen from the perspective of relatives and caregivers. It is also recommended that ICU nurses develop	9/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research

Author Year Country	Aim	Method	Findings	Recommendation	Quality assessment CASP (Appraisal Result: "Y" Yes, "N" No, "U" Unclear. "N/A" Not Applicable)
	cooperation between nurses and families			educational programs that recognize the complexities of family situations.	Y—The Participant adequately represented U—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Keenan & Joseph 2010 Canada	Identify needs expressed by family members as patients with severe brain injury progress through their recovery	Qualitative study	• Manage life; • Involvement in care; • Need for information.	a larger sample can provide a more complete picture of family needs.	10/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—the participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Iverson et al 2014 USA	Identify the needs expressed by family members in making decisions	A focus group qualitative study	• Flying; • Information search; • Tracking; • Gather resources.	Stress is exacerbated when family needs are not identified or adequately met and recommend that family needs assessment be incorporated into patient care plans.	10/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—The participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Naef et al 2020 Swiss	Investigate the experiences of families and healthcare workers with nurse-led family support interventions in intensive care	Qualitative evaluation study	• Family is the most critical part of ICU care; • Facilitate staff-family interaction and communication; • Promote quality of family care; • Family support interventions.	More studies are needed that address the impact of nurse-led family support interventions on ICU care processes and outcomes.	8/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results N— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research N—The participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Bohart et al	Explore	exploratory	• Ongoing	Researchers did	10/10

Author Year Country	Aim	Method	Findings	Recommendation	Quality assessment CASP (Appraisal Result: "Y" Yes, "N" No, "U" Unclear. "N/A" Not Applicable)
2022 Denmark	perspectives and wishes for patient and family-centered care among adult patients and family members with experience of admission to adult intensive care units	descriptive using inductive thematic analysis	dialogue; • Humanize quality care; • Equip the family to navigate.	not apply validated instruments test of participants for delirium before formal interviews. This could be a relevant consideration in future studies	Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—The Participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Wong et al 2020 Australia	Describe the perspective of family participation in patient care in the ICU	Qualitative study	• Families are part of the health team; • Motivators; • The role of the family during recovery.	Further studies are needed to validate the association between long-term critically ill patients and family participation rates	8/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results N— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research N—The participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Blom et al 2013 Sweden	Explore the phenomenon of participation and support experienced by close relatives of patients in the ICU.	Qualitative Studies, phenomenological approach	• Participate in care and be close to the patient; • Confidence in care; • Support engagement in care.	Further research is needed on how to conduct interventions that translate this knowledge into practice and action	10/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results Y— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—The participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data
Ågård et al 2019 Denmark	Provide a richer context for a family's quantitative assessment of the	Qualitative study	• Information; • Clinical skills; • ICU environment; • Discharge of ICU.	combining qualitative and quantitative data sources to allow a more complete picture of patient and family experiences in the	9/10 Y— Appropriate qualitative methodology Y— Clear Aims Y—Appropriate data collection Y—Appropriate Analysis of data Y—Appropriate of the interpretation results

Author Year Country	Aim	Method	Findings	Recommendation	Quality assessment CASP (Appraisal Result: "Y" Yes, "N" No, "U" Unclear. "N/A" Not Applicable)
	quality of ICU care, and delineate further areas of quality that are important to family members			ICU.	N— A statement locating the researcher culturally or theoretically Y—Influence of the researcher on the research Y—Participant adequately represented Y—Ethical considerations addressed Y—Conclusions drawn from the analysis, interpretation data

Thematic synthesis of the results

Following a qualitative meta-synthesis process from the 14 included articles, three main themes were identified. The synthesis took three stages including coding the themes and sub-themes on the findings of the primary study; organization of 'free codes' into related fields to develop 'descriptive' themes and developing an analytic themes by discussion with the review team (Schmidt et al., 2021). Articles are provided to illustrate each theme, and citations given in italics are from participants in the original study, and citations that are not italicized represent the interpretations of the study authors.

Theme 1: Information Needs for Families

The need for 'information' was identified in all research articles collected as an essential need (Ågård et al., 2019; Ågård & Harder, 2007; Blom et al., 2013; Bohart et al., 2022; Czerwonka et al., 2015; Dale et al., 2020; Harrison et al., 2019; Iverson et al., 2014; Keenan & Joseph, 2010; Naef et al., 2020b; op 't Hoog et al., 2020; Santana Cabrera et al., 2007; Söderström et al., 2009; Ventura Expósito & Arreciado Marañón, 2021). Family experiences related to information needs that are included in the very significant category include being able to talk and discuss with doctors every day, knowing the reasons why an intervention is performed on a patient, knowing how the patient is treated medically and knowing clearly what is being done to the patient. Knowing is a means that can provide certainty or clarity for the family. This need to know seems important to them, the family will understand each patient's condition even when facing the possibility of losing their loved one and help the family understand their role so that they are able to be actively involved in the care process in the ICU (op 't Hoog et al., 2020).

"I need to know. I want to know and be told about everything they are going through" N14 (Ventura Expósito & Arreciado Marañón, 2021).
"We need answers, we need to know the terminology, 'what does this mean', and yes, it's very important that we want to be part of the decision making" [Caregiver 16] (Dale et al., 2020).
"During visiting hours we mostly have to ask for information, it's an unpleasant situation. We are only informed about our inquiries and nothing more. This is a burden for us." (Dutch respondents)(Ågård et al., 2019)*.*

Theme 2: The need for families to be involved in patient care

Apart from social support, the family expressed a need for nurses and staff to recognize them as caregivers more. Families were disappointed with their involvement level in medical care. Families explained that sometimes, information was only shared with patients. Of course, this created more confusion for family members than clarity because the patient was delirious, and the family felt neglected in some ways (op 't Hoog et al., 2020).

"I need to take care of him, help him and make sure he gets well" N14.
"I will do everything I can. I'm doing everything I can make him better" O15.
"I will do whatever my mother needs, I will do it. I will comb her hair or help her with cleaning, dress her. . . I'll look after it, and I think we'll both enjoy it."

Families explained the importance of feeling close to their loved ones. Many of them also wanted to be able to provide support and care for family members who are currently undergoing treatment in the ICU. In other words, it helped patients emotionally and psychologically and raise their spirits to fight against illness (Ventura Expósito & Arreciado Marañón, 2021).

Theme 3: The need for family visiting time

The percentage of relatives who requested more time to stay with their loved ones showed that visiting time was important.

"We spent a lot of time waiting outside, the time we wanted to have with Dad. Being allowed to sit quietly by the bed means a lot to us, so more time with Dad would be even better." (Danish respondent) (Ågård et al., 2019).

Being beside the patient makes it easier for family members to carry out affective and health care functions (Ahlberg et al., 2023). The affective function is the internal function of the family to fulfill psychosocial needs, such as caring for each other, providing love, and accepting and supporting each other (op 't Hoog et al., 2020). Meanwhile, the function of health care is the family's ability to care for family members who experience health problems related to the patient's condition and ensure that the patient receives the best care (Naef et al., 2020a).

DISCUSSION

Taking into account the present family context as an extension of the patient is becoming more widely accepted in ICU practice and is a concept underlying patient-centered care (Mitchell et al., 2016). Family needs have been identified using a variety of approaches, including understanding more deeply what the family is experiencing and what is needed in an effort to improve family-centered care.

Information is the most essential need for families and one of the most valued needs of the patient's family. Difficulties in facilitating the understanding of information among patient families have been identified during the early stages of critical

patient admission. Families do not retain information or have the ability to interpret information easily (Ventura Expósito & Arreciado Marañón, 2021).

Other researchers suggest to escalate family's understanding, information should be presented in simple terms, using pictures and written materials that families can keep or refer to on their own time as they try and understand the injury conditions of their family member being treated to the likely outcomes (Ågård & Harder, 2007). Attention should be paid to the content and form of information, and high-quality information is described in terms such as "honest", "clear", "understandable", "empathetic", "not too little, not too much", "not rushed and vice versa for low-quality information. Finding the right balance between realism and optimism is a highly valued characteristic of high-quality information (Ågård et al., 2019).

Optimizing the provision of information and knowledge about the patient's condition brings relief to family members and helps them understand the situation (Bohart et al., 2022). Effective communication affects the role of the family in participation. Families feel confident in advocating and making decisions to provide treatment to patients and to guide their participation in physical care (Iverson et al., 2014). Family participation in nursing care activities can be beneficial for patients and families. Wong illustrates how family participation provides comfort and support to patients and facilitates adherence to treatment, while, at the same time, meeting the need for families to feel that they are contributing to their relative's recovery.

The role of the family in minimizing the psychological impact and supporting the patient's emotional well-being can be attributed to the close and intimate relationship between them. This condition also allows the family to maintain patient orientation. They are able to communicate information that reduces uncertainty and anxiety and provide social support that fulfills the patient's sense of isolation and loneliness (Wong et al., 2020). These findings illustrate the reasons why the treatment method is currently not only patient-centered but also important in taking into account the presence of the family in the process of providing care in the ICU. Suppose families are to be involved in care. In that case, they must be accepted and invited to participate, and a professional approach and attitude are essential for both the family and the patient. If not supported and allowed to participate, they may suffer, endure silence, and retreat to wait for change(Blom et al., 2013). This empirical evidence approach can be considered to allow adjustments and new insights in policy making both visits and family involvement in providing care to patients (Ventura Expósito & Arreciado Marañón, 2021). An unrestricted visit policy for patients and their families will provide benefits and influence the provision of nursing care and the function of care in the ICU. Nurses should develop clear policies and procedures for ICU visits that will be supported and reinforced by all nurses in the unit (Santana Cabrera et al., 2007)

CONCLUSIONS AND RECOMMENDATIONS

A clear concept on family needs while receiving care in the ICU has yet to be standardised. Thus, the results of the study still describe gaps in the field. The family will use all source of information to support the assessment of the patient's medical history. Understanding family needs will gain the communication with nurses and health care providers, and create professional practice to improve tailored nursing care.

CONFLICT OF INTEREST
None

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ORIGINAL ARTICLE

HEALTH LITERACY AND MEDICATION ADHERENCE AMONG PATIENTS WITH HYPERTENSION

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ABSTRACT

Hypertension requires patients to adhere to a medication regimen that needs to be adhered to for life to control blood pressure and prevent complications. A related factor to medication adherence is patients' health literacy, which influences their ability to maintain hypertension prescription regimens. This factor is critical in managing chronic diseases, such as hypertension, to achieve optimal health. This study aims to investigate the relationship between health literacy and medication adherence in patients with hypertension. The study was conducted at public health care centers in West Sumatra. This study used a quantitative approach with a cross-sectional design. The researchers used a non-probability sampling technique, namely purposive sampling, for a total sample of 175 respondents. Data were collected using the Morisky Medication Adherence (MMAS-8) and Health Literacy Survey Europe-16 (HLS-EU-Q16) questionnaires. Data were processed using computerization with *chi-square* test. The results showed that 41.7% of patients with hypertension have sufficient health literacy, and 46.9% have low levels of medication adherence. In addition, 52.3% with inadequate health literacy had low levels of medication adherence. The statistical test results obtained a p-value = 0.001 (p < 0.005), indicating a relationship between health literacy and medication adherence. It is essential to improve hypertension treatment adherence by improving the health literacy of patients with hypertension.

Keywords: *Health literacy; HLS-EU-Q16; hypertension; medication adherence; MMAS-8*

INTRODUCTION

The prevalence of hypertension worldwide has significantly increased, posing a major global public health challenge. Between 2010 and 2016, it is estimated that 31.1% of adults worldwide had hypertension, with a higher prevalence observed in low- and middle-income countries (LMICs) than in high-income countries (Mills et al., 2016). The number is projected to increase by 60% to 1.56 billion in 2025 (Angeli et al., 2013). Meanwhile, Indonesia is one of the countries with the highest cases of hypertension in Southeast Asia, with 34.1% of the population living with this chronic condition (Pulungan et al., 2022).

Self-management is essential for people with hypertension to maintain their well-being and prevent complications. Management of the condition includes self-care management, lifestyle modifications, and medication adherence (Barus et al., 2023). Medication is crucial role in maintaining blood pressure control (Ernawati et al., 2022). Medications have been shown to control blood pressure and significantly reduce the risk of developing cardiovascular complications. Nevertheless, patients with hypertension need to continuously use antihypertensive drugs for a long time to achieve this outcome (Shi et al., 2019).

Adherence is the patient's ability to accurately follow the prescribed treatment regimen (Sawkin et al., 2015). A patient's level of compliance with prescribed medications, including timing, dosage, and intervals, is referred to as medication adherence (Schönfeld et al., 2021). It is influenced by many factors, including sociodemographic characteristics, e.g., age, gender, education level, insurance, anxiety level, depression, sleep disturbances, and health literacy (Lor et al., 2019).

Health literacy is the degree to which individuals are motivated and able to access, understand, and use information that promotes and maintains good health (Rowlands, 2014). It is a mediator that can explain the relationship between the individual and a health context (Wannasirikul et al., 2016). It is also essential in empowering, engaging, and motivating an individual in a person-centered care model (Parnell et al., 2019). Health literacy is vital since it indicates an individual's knowledge and potential to achieve and participate in goals. Moreover, it has been proven effective in improving health practices (Wannasirikul et al., 2016).

Individuals with good health literacy tend to comply better and adhere to medication and non-medication regimens for chronic and acute diseases (Miller, 2016). Previous studies have found that health literacy improves individuals' self-management skills (MacKey et al., 2016) and guarantees positive behavioral changes (Duong et al., 2018; Guntzviller et al., 2017; Yokokawa et al., 2016). Patients' knowledge about hypertension and literacy is also the predictor of medication adherence (Boima et al., 2015; Pan et al., 2017; Shirindi et al., 2016). Moreover, a recent study found that health literacy directly increases medication adherence, specifically in older adults with hypertension (Satriana et al., 2021).

Furthermore, increased health literacy improves patient adherence to hypertension medication. Hypertensive patients with good health literacy levels can manage their disease or have good self-care (Kilic & Dag, 2020). Conversely, individuals with reduced levels of health literacy are more likely to be hospitalized due to low adherence to their medication regimen and inability to manage chronic conditions. Therefore, it is vital for healthcare providers to evaluate and understand people's health literacy to facilitate effective interventions (Duong et al., 2019). Currently, health workers do not consider measuring the patient's understanding of the information provided. Therefore, this study aims to determine hypertensive patients' health literacy and medication adherence.

METHOD
Study Design
This cross-sectional study was conducted at a public health center in West Sumatra.

Participants
The researchers used a non-probability sampling technique, specifically purposive sampling, with a total sample of 175 respondents. The inclusion criteria for this study were individuals aged 18-45 years who provided informed consent, individuals with hypertension without comorbidities, and those with good communication skills.

Instrument
This study used the Morisky Medication Adherence (MMAS-8) and Health Literacy Survey Europe-16 (HLS-EU-Q16) questionnaires to assess the respondents' adherence to medication and health literacy. The MMAS-8 questionnaire consists of eight questions, and the respondents were asked to answer questions 1-7 with a choice of yes or no. In question 8, they had the following answer options: never, occasionally, sometimes, often, and always. The final assessment is calculated based on the total score and categorized as low adherence for a score <6, moderate adherence for a score of 6-7, and high adherence for a score

of 8. This questionnaire is a standardized instrument whose validity and reliability have been confirmed, with item selection values ranging from 0.305 to 0.463 and a Cronbach's alpha of 0.675, indicating good reliability (Prabowo & Huwae, 2022).

The HLS-EU-Q16 questionnaire was used for the assessment of health literacy. It consists of 16 questions with a Likert scale of 1-4, where 1 = very difficult, 2 = moderately difficult, 3 = fairly easy, and 4 = very easy. In addition, it measures health literacy dimensions from health services, disease prevention, and health promotion. The level of health literacy is calculated from the total score categorized as follows: inadequate (0-8), problematic (9-12), and sufficient health literacy (13-16) (Pelikan et al., 2014). This questionnaire has been tested for validity and reliability with a Cronbach Alpha of 0.947 (Nurjanah & Rachmani, 2014).

Data Analysis
The data underwent univariate and bivariate analyses. The univariate analysis analyzed the proportions of demographic data. Meanwhile, the bivariate analysis was conducted using the Chi-Square test to measure the relationship between health literacy and medication adherence.

Ethical Consideration
This study was approved by the Ethics Commission of the Faculty of Nursing of Universitas Andalas with number 215a/KEPK/2021 and has fulfilled the human requirements based on the Helsinki study protocol.

RESULT
The results show that 66.9% of the respondents are between 36 and 45 years old, 57.1% are female, and 37.1% are senior high school graduates.

Table 1. Respondents' Characteristics (n = 175)

Respondents' Characteristics	f	%
Age		
18-25	6	3.4
26-35	52	29.7
36-45	117	66.9
Gender		
Female	100	57.1
Male	75	42.9
Highest Education Level		
Primary school	37	21.1
Junior high school	43	24.6
Senior high school	65	37.1
Graduates	30	17.1
Total	175	100

This study found a significant relationship between health literacy and medication adherence (p-value = 0.001). A total of 44 respondents had inadequate health literacy, of which 23 (52.3%) had low medication adherence. Next, 58 respondents had problematic health literacy, of which 34 (58.6%) had a low level of medication adherence, and 18 (31%) had a moderate level of medication adherence. Moreover, this study found that 73 respondents had sufficient health literacy, of which 31 (42.5%) had a high level of medication adherence, 25 (34.2%) had a low level of medication adherence, and 17 (23.3%) had a moderate level of medication adherence (Table 2).

Table 2. The relationship between health literacy and medication adherence in patients with hypertension

Variable	Level of medication adherence						n	%	p-value
	Low		Moderate		High				
	n	%	n	%	n	%			
Health literacy									
Inadequate	23	52.3	11	25	10	22.7	44	100	0.001
Problematic	34	58.6	18	31	6	10.3	58	100	
Sufficient	25	34.2	17	23.3	31	42.5	73	100	

DISCUSSION

Health literacy is generally defined as an individual's ability to access, understand, and use health information to maintain and improve their own health and make appropriate decisions regarding health-related services. Studies have found that younger individuals tend to understand and analyze health information more effectively. In this study, most respondents were in their productive age range (36–45 years old) and demonstrated sufficient health literacy.

Gender is also a contributing factor to medication adherence. This study showed that women had higher health literacy than men, and most female respondents had a high level of medication adherence. The gap may be associated with women's increased familiarity with navigating the healthcare system and dealing with health issues. A previous study explained that women report more health issues and have higher medical service utilization and charges than men (Lee et al., 2015).

Moreover, attitudes, beliefs, and motivation toward health issues might influence adherence to recommendations, particularly how drug therapies are distributed based on gender. Notwithstanding the wide range of published literature on this issue, conflicting findings have been reported about medication adherence and gender. Women have higher levels of hypertension awareness than men. Therefore, they may be more motivated to adhere because they understand the risk of non-adherence and are more motivated to seek healthcare services (Biffi et al., 2020).

Furthermore, education is related to health literacy and medication adherence. Respondents with higher education levels had better health literacy (Kostenius et al., 2017). This finding aligns with Darvishpour et al. (2016), who showed that respondents with a high education level have sufficient literacy. Education is also related to a patient's knowledge and capacity to receive information (Altin et al., 2014). Higher education may help respondents obtain more knowledge, improving their ability to access, read, analyze, and use information to increase their health literacy and experience. Therefore, the higher the patient's education level, the greater their health literacy and management of hypertension. Next, this study's data analysis revealed a significant relationship between health literacy and medication adherence. This finding aligns with Shi et al. (2019), who studied the relationship between health literacy and adherence to hypertension treatment (p-value = 0.01). This result is similar to Lor et al. (2019), who found a relationship between health literacy and medication adherence with a p-value of 0.043. In their study, the respondents with a high literacy level were highly compliant with hypertension treatment. Another study also showed a significant positive relationship between health literacy and medication adherence. Thus, patients with sufficient health literacy have higher compliance with their medication regimen (Schönfeld et al., 2021).

Poor medication adherence in patients with hypertension may cause uncontrolled blood pressure. There is a relationship between medication adherence, blood pressure control, and a patient's health literacy. The ability to find, understand, assess, and use information positively correlates with medication adherence (Shi et al., 2019). Wahyuningsih (2019) explained that health literacy influences adherence to hypertension. A high level of health literacy will be directly proportional to knowledge, the ability to take a pill regularly, and treatment adherence. Therefore, health literacy is essential for building knowledge and encouraging positive actions. Based on this study, it can be shown that one of the factors affecting hypertension treatment adherence is the health literacy of hypertension patients. Counseling and health education can help increase medication adherence by strengthening patients' health literacy. Therefore, it is essential to improve hypertension treatment adherence by improving the health literacy of patients with hypertension.

This study used a cross-sectional design, which limits the ability to establish causality between health literacy and medication adherence. Also, it did not account for sociocultural factors or roles that may influence these differences, potentially leading to an oversimplification of gender-based findings.

CONCLUSION

This study found a relationship between health literacy level This study found a relationship between health literacy levels and medication adherence in patients with hypertension, with higher health literacy being associated with greater adherence to medication regimens. However, the study also revealed that some patients still exhibit sufficient or problematic health literacy levels. Therefore, it is recommended to investigate the effectiveness of targeted interventions, such as health education programs and counseling, to enhance health literacy and, consequently, improve medication adherence among patients with hypertension. Additionally, future studies should consider incorporating factors such as psychological well-being, healthcare access, and cultural influences to gain a deeper understanding of the complexities affecting health literacy and adherence.

DECLARATION OF CONFLICT OF INTEREST
None

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