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Reshaping the future of nursing education through leadership

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The experiences in the covid 19 pandemic have raised the concern of reshaping the future of nursing education to prepare nurses who are more resilient in facing the challenges of vulnerable infection. Good leadership in nursing will be the navigator in reshaping the future direction of nursing education.

The future of nursing education will need to be focused on the emergence of nursing practice which is likely to involve a continued emphasis on primary health care and holistic care. The increasing rate of the aging population and non-communicable rapid advancement in information communication technology will need to call for more nurses to be more ICT savvy and, to become more technology-driven, with the use of electronic health records, telehealth, and other digital tools becoming more prevalent. This will enable nurses to access patient information more easily and provide care remotely, which can improve access to healthcare for patients in remote or underserved areas (Marzilli, 2022) Evidence-based practice and interprofessional collaboration will be crucial to help ensure that nurses have the knowledge and skills to provide safe and effective care in an ever-changing healthcare environment.

Nursing leaders must develop and test new learning and assessment methods, especially for the delivery of remote learning, open distance learning, and care delivery. Nursing leaders in academia and practice can advocate for increased nursing involvement in the planning, design, and evaluation of care delivery services. Strong, ongoing academic practice partnerships are needed to support planning for future scenarios and the preparation of new nurses who are resilient. Nurse scientists to be more assertive in generating the knowledge critical to addressing future emergencies (Cynthia, 2022).

Effective leaders in nursing education need to be nurtured and supported by the organizations in which they are educated, trained, and work (Swanwick,2011).

Aspiring and current leaders can be identified, trained, and assessed through formal leadership development programs, and through supportive organizational cultures. This requires embedding leadership training programs, opportunities for leadership practice, and promotion of professional networks within and beyond the organization. Mentorship within healthcare education is important to further enhance nursing leadership and engagement within the workforce and interprofessional collaboration (Burgess et al., 2018). Leadership consists of a learnable set of practices and skills that can be developed by reading literature and attending leadership courses (Burgess et al, 2016). Additionally, investment in the social capital of organizations, fostering interprofessional learning and communication in the work setting, and collaboration across organizations assist in leadership development. Developing leadership skills is a life-long process.

In conclusion, the provision of opportunities for leadership development is crucial in improving nursing education and leading to effecting change. The leaders in nursing education who demonstrate excellence in teamwork, clinical skills, patient-centered care, and embracing ICT and responsibly balance accountability with autonomy will definitely lead the future of nursing education way forward to prepare a competent task force to face any challenges in the future (Van Diggele, et al., 2020).



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Coping strategies and family support to the adjustment of adolescents who have parents working as migrant workers

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ABSTRACT

Introduction: Adolescents often have difficulty adjusting to their surroundings. Coping and family support are also associated with this adjustment. However, the relationship between the aforementioned factors and adjustment among adolescents with parents who work as migrant workers remains unclear. This study aimed to analyze the relationship between coping and family support with the adjustment of adolescents who have parents who work as migrant workers.

Methods: This is a cross-sectional study. A total of 70 early adolescents with parents working as migrant workers were recruited from the total sample. In this study, coping strategies and family social support were assigned as independent variables, while the dependent variable was the adjustment of adolescents who had parents as migrant workers. The questionnaire was used to measure the outcome of interest and tested for validity and reliability. The data analysis in this study used Spearman Rho. Spearman's Rho correlation with alpha, α set ≤ 0.05 , was used to analyze the data.

Results: The results indicate that Coping strategies ($p = 0.018$; $r = 0.283$) and family support ($p = 0.001$; $r = 0.380$) were associated with adolescent adjustment.

Conclusions: Both coping strategies and family support contribute to the adjustment of adolescents whose parents work as migrant workers. There is a need to increase the priority of psychosocial counseling for adolescents who have parents working as migrant workers and educate their families to increase attention and support appropriate adolescent development.

Keywords: coping strategies, family support, adolescent, migrant workers, mental health

Introduction

Indonesia is one of several countries with a high population of migrant workers (Umami and Turnip, 2019). In 2017, the National Authority for the Placement and Protection of Indonesian Overseas Workers (BPNP2TKI) reported that the population of migrant workers increased exponentially to 261, 820 in all sectors. Consequently, many people have to leave their

families and children in their hometowns and work as migrant workers (Lam and Yeoh, 2019a). These children are usually called "left-behind children" (Umami and Turnip, 2019), and, as they grow and reach adolescence, they are cared for by other parents, relatives, or caregivers.

The separation of parents and children for a long period of time (Hoang and Yeoh, 2012; Moyce and



Schenker, [2018](#)) leaves a deep scar, especially to children, adjusting to enter their adolescence phase. A previous study on adolescents' adjustment factors reported that social-emotional problems are common among adolescent children (Hirvonen *et al.*, [2018](#)). Adolescents who experience problems in emotional development are those who do not live with their parents working as migrant workers, which causes them to live separately from their parents for a long time (Garver, [2017](#)). Adolescents are in a transition period from children to adults; they need a process of adjustment that is good for both the teenager and his family, such as dealing with stress, frustration, and conflict (Santrock, [2011](#)).

In Indonesia, the phenomenon in one of the sub-districts where the research was conducted was that many middle-aged adolescents did not live with their parents because their parents had to work as Indonesian migrant workers. A previous study reported that adolescents whose parents work as migrant workers have a poorer quality of life than their children (Wong, Chang and He, [2009](#)). Children perceive this phenomenon through the manifestation of psycho-emotional problems such as anger, anxiety, and poor performance at school (Garver, [2017](#)). However, adolescents perceive and react differently to this phenomenon. According to the 2017 Kendal District Teaching and Learning Center (PKBM) survey, this district was second-ranked in Central Java, with a high dropout rate of 4,024 teenagers. Juvenile delinquency is one of the factors that cause school dropout. Juvenile delinquency occurs because of the failure of adolescents to adapt to their environment and daily relationships. Adolescent social-emotional adjustment is related to attention, parental support, and adolescent coping characteristics (Bullock *et al.*, [2018](#)).

Working as a migrant worker demands high responsibility and sacrifices to live separately from their family for a long period of time (Hoang and Yeoh, [2012](#); Moyce and Schenker, [2018](#)). Consequently, parents may face more complex problems (Hoang and Yeoh, [2012](#); Lam and Yeoh, [2019a](#)), which is a transition period from child to adult. Therefore, more research is required. Inappropriate parent-child interactions will affect adolescent self-adjustment, which impacts emotional stability and the adolescent's adaptation process in preparing for adulthood (Martínez *et al.*, [2021](#)). Early adolescents who experience failure in adjustment behave poorly in education, have an aggressive attitude, are very unconfident in themselves, feel insecure, and have feelings of giving up easily (Hurlock, [2006](#)). Adjustment problems that occur in adolescents with

Table 1 Respondent characteristics (n=70)

Respondent characteristics	N	%
Sex		
Male	33	47.1
Female	37	52.9
Age		
13 years old	6	8.6
14 years old	34	48.6
15 years old	30	42.9
Parent education		
Primary school	21	30
Junior High	42	60
High school	7	10
Living with		
Aunt and uncle	15	21.4
Brother	11	15.7
Grandmother	44	62.9

parents who work as migrant workers are very urgent and important to be addressed and it is necessary to understand the relationship between family support and adolescent coping strategies with adolescent adjustment to parents as migrant workers, so that it can be used as a basis for developing relevant interventions to prevent negative impacts on adolescent development. The purpose of this study was to analyze the relationship between family support and adolescent coping strategies and adolescent adjustment to parents who work as migrant workers.

Materials and Methods

The research design used in this study was cross-sectional. Adolescents who attend junior high schools and whose parents worked as migrant workers for at least three years at one of the junior high schools in Patebon District, Kendal Regency, Central Java, Indonesia, were included in this study. This research took place in an area where many adolescents were discovered abandoned by their parents who work as migrant workers abroad. Seventy samples were obtained using the total sampling technique.

The study examined two types of variables: independent variables, which included coping strategy and family social support, while the dependent variable was self-adjustment in adolescents who had parents as migrant workers.

Instruments

The instrument used in this study was a questionnaire consisting of a coping strategy questionnaire, a Family Support Questionnaire, and a Self-Adjustment Questionnaire. The coping strategy questionnaire was adapted from Lazarus' theory and developed by (Carver, C.S; Weintroub, J.,K; Sceiner. M., [1989](#)). This questionnaire, which consisted of 15 questions, was modified by the researcher according to

the research objectives. The family support questionnaire was adapted based on the parameters of Langford et al. (1997) and Wittenberg-Lyles et al. (2014), consisting of 15 questions about emotional, instrumental, informational, and appraisal, and modified by the researcher. The researcher modified the self-adjustment questionnaire based on Schneider's (1964) parameters, which consisted of 20 questions.

All questionnaires were tested for validity and reliability and deemed valid and reliable. The results of the reliability test of Cronbach's alpha value on coping strategies were 0.761, and Cronbach's alpha value on parental family support was 0.754, Cronbach's alpha value on self-adjustment was 0.752.

Procedure

Researchers obtained data from teachers on the respondents of adolescents who have parents who are migrant workers. Before the respondent took part in this study, the respondent's guardian signed a letter of consent after being explained the purpose of the study by the researcher. Then, when collecting data, the researcher, assisted by a counselling guidance teacher (BP), collected adolescents in second- and third-level classes to complete the questionnaire. The researcher explained the procedures for filling out the questionnaire in advance and asked if it was not clear. The time taken to complete the questionnaire was approximately 15-20 minutes.

Data Analysis

The statistical test used in this study was the Spearman Rho correlation.

Ethical Clearance

This study was approved by the Health Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga, with the code of ethics number 1531-KEPK.

Results

The characteristics of the respondents in this study indicated that the male respondents were 33 (47.1%) and 37 (52.9%) were female. Almost half of the respondents were 14 years of age (48.6%). Most of the respondents' parents had completed junior high school education, with 42 students (60%). More than half of the total number of respondents lived with their grandmothers, with as many as 44 (62.9%) respondents ([Table 1](#)).

The results of this study indicate that the highest average adolescent coping strategy is one that focuses on emotions (1.87 ± 0.63), while the aspect with the highest average score on adolescent family support with parents who work as migrant workers is instrumental support (2.11 ± 0.73). This study shows that the highest self-adjustment of adolescents is the aspect of being able to be realistic and objective (2.03 ± 0.74). The results of the correlation test between coping strategies and self-adjustment showed that the significance value of the Spearman's rho correlation test was $p = 0.018$ ($p < 0.005$), indicating that there is a relationship between coping strategies and self-adjustment in adolescents whose parents work as migrant workers. The value of the correlation coefficient (r) is 0.283, which means that coping strategies and adolescent adjustment are related. A positive correlation coefficient indicates that

Table 2 The relationship between coping strategies and family support with adolescents' adjustment to their parents working as migrant workers ($n=70$)

Indicator	Mean	SD	p-value	r
Coping Strategy			0.018	0.283
Coping strategies focus on problems	1.79	0.65		
Coping strategies focus on emotions	1.87	0.63		
Family support			0.001	0.380
Informational support	1.94	0.75921		
Instrumental support	2.11	0.73313		
Appraisal or award support	1.90	0.72532		
Emotional support	1.96	0.87536		
Adjustment				
Able to control emotions and have patience	1.94	0.63442		
Have a good self-defense structure	1.73	0.50852		
Able to learn from experience	1.86	0.74767		
Able to be realistic and objective	2.03	0.74155		

the better the coping strategy, the better the adjustment. The relationship between family support and self-adjustment showed that the significance value on the Spearman's rho correlation test was $p = 0.001$ ($p < 0.05$). It can be concluded that there is a relationship between family support and self-adjustment among adolescents whose parents are migrant workers. The correlation coefficient value was 0.380, indicating that the relationship between family support and adjustment was sufficient. The correlation coefficient was positive, which means that increasing family support increases the level of adolescent adjustment (Table 2).

Discussions

The coping strategies of adolescents who live separately from their parents because their parents have to work as migrant workers abroad affect their adjustment. In this study, there was a significant positive correlation between the coping strategies chosen by teenagers and their adolescent adjustment. Adolescent adjustment may increase if coping strategies increase. Similar to the results of previous research, adolescents with good coping strategies also have good emotional maturity (Lee et al., 2017). The conditions that occur in adolescents with parents who work as migrant workers abroad in this study, even though adolescents do not live at home with their parents, show they can still manage stress well so that they can adapt well to themselves and the surrounding environment.

Coping strategy is a way to cope with and manage the stress that is being experienced (Stephenson and DeLongis, 2020); the coping strategies that adolescents of parents who work as migrant workers those that focus on problems and those that focus on emotions. This situation is in line with the results of previous research, which states that adolescent coping strategies to overcome their conflicts focus on overcoming problems and emotional control (Sang Ayu Ketut Tri Semaraputri, 2018). Both coping strategies are capable of dealing with stress experienced by adolescents. Problem-focused coping strategies mean that adolescents deal with stress by directly focusing on solving problems. In contrast, emotion-focused coping strategies mean that adolescents choose to control their emotions without forcing them to change their existing conditions (Fabick, 2011).

This study indicates that the majority of adolescents have coping strategies that focus on emotions rather than being problem-focused coping strategies. This is in line with previous research, which states that coping strategies for emotional control are related to self-

adjustment (Ghofiniyah and Setiowati, 2017). Adolescents who have to live separately from their parents because their parents work as migrant workers experience loneliness, longing for their parents, sadness, and feelings of being neglected (Hoang et al., 2014), they do not have the power to change the existing situation; they said that their parents worked abroad for their education and they would live with them in the future (Lam and Yeoh, 2019b), so that adolescents tend to control their emotions more than having to solve problems or change circumstances. Emotion-focused strategies are such as rejection, venting emotions, anger, confusion, apathy, or seeking social support if this condition is uncontrolled and receives inappropriate support it can lead to maladaptive responses (Baker and Berenbaum, 2007; Garver, 2017). Emotional-focused coping is usually more at risk for maladaptive outcomes (Schneider, King and Delfabbro, 2018). This maladaptive response leads to unsuccessful adjustments that can trigger juvenile delinquency or risky adolescent behaviour (Bullock et al., 2018; Schneider, King and Delfabbro, 2018) Not all adolescents in this study used emotion-focused coping strategies, it was also found adolescents with problem-focused coping strategies. When using problem-focused coping strategies, adolescents tended to express feelings directly about an event that caused stress, adolescents were realistic and objective and could adjust well. Previous research has shown that adolescents with problem-focused coping strategies are more adaptable than those with emotion-focused coping strategies (Lee et al., 2017). Problem-focused coping strategies result in good mental health (Mullis and Chapman, 2010).

This study also found that adolescents with parents who work as migrant workers will have good adjustment if they have good family support. The results of this study are in line with previous research that stated that proper family interaction and support affected emotional stability, which also had an impact on adolescent adjustment (Martínez et al., 2021), as well as the lack of support from the family, which has the potential to cause symptoms of depression in adolescents who also suffer from depression. This will affect the subsequent development of adolescents (Roche, Bingenheimer and Ghazarian, 2016). Adolescents who have to live separately from their parents need more attention from families who care at home; these teenagers lose attention and closeness to their parents; they need support in undergoing a difficult developmental and transitional period in adolescence (Krisnana et al., 2019). If they do not

receive appropriate support, they risk getting support from a negative social environment, which has the potential to lead to maladaptive behaviour (Baker and Berenbaum, 2007; Ani *et al.*, 2020).

Adolescents in this study received support from their families in the form of information, instrument, appraisal, and emotional support. The results of this study are in line with the research of Panewaty and Indrawati (2018), which states that adolescent self-adjustment family support includes emotional, information, instrumental, and appraisal support that affect adolescents' social adjustment (Panewaty and Indrawati, 2020). The higher the perceived social support, the higher the adolescents' social adjustment. Conversely, the more negative the parents' social support, the lower the adolescents' social adjustment. Social support from close family members influences adolescents' adaptation. Adolescents need parental social support, such as emotional support, information support, instrumental support, and appraisal support, to adapt to their environment (Marhamah and Hamzah, 2017). In this study, adolescents who did not live with their parents were more likely to receive instrumental support from their families than those who did not. Instrumental support is more evidently provided to children or adolescents to meet their daily needs compared to the need for appreciation or emotion; instrumental support tends to be more visible than other support, such as parents of an adolescent who work far away from abroad to improve the family economy (Lam and Yeoh, 2019b); parents provide money and the closest family tries to meet the physical or instrumental needs of adolescents, such as daily school needs, housing, clothing, health, and others (Moskal and Tyrrell, 2015; Fellmeth *et al.*, 2018). The limitation of this study is that it has not separated and analyzed further who the parents working as migrant workers are, whether father, mother, or both, thus requiring further research to identify it.

Conclusions

Coping strategies and appropriate family support can affect adolescents' adjustment. It requires education-based intervention and special counselling for families and adolescents who have parents with migrant workers, so that they have good parenting styles according to the development of adolescents. In addition, the components related to adolescents who live separately from their parents who work abroad, such as teachers or the nearest health facility, must focus on paying attention to the mental health problems

of adolescents with this condition. It is also necessary to pay attention to the physical and mental health of their immediate family. Those caring for children whose parents have left and are working far abroad, are such as elderly grandmothers, grandfathers, or other families, so that it is hoped that they can optimize care and good quality of life for adolescents and the families who care for them.

Conflict of Interest

There is no conflict of interest.

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The correlation between parents interaction conflict with online game addiction in adolescents

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ABSTRACT

Introduction: The prevalence of online game addiction has increased among adolescents in Indonesia. This study aimed to analyze the correlation between parent conflict and online game addiction among adolescents.

Methods: This study used a cross-sectional, correlational design. The inclusion criteria in this study were as follows: (1) adolescents between the ages of 13-19 and who were male, and (2) adolescents who were willing to become respondents. Eighty adolescents were approached according to the inclusion criteria, and 73 respondents were eligible for this study. The data collection method used was a questionnaire filled out by adolescents. The questionnaire was adapted to adolescents and to determine adolescents' perceptions of interaction conflict. Statistical analysis was performed using Spearman's rank test with $\alpha=0.05$.

Results: Parental interaction conflict was positively related to online game addiction among adolescents ($p = 0.004$). The majority of respondents who experienced online game addiction in the fair category had low interaction conflicts with their parents.

Conclusions: Conflict of interaction with parents can cause adolescents to become addicted to online games. Parents are expected to engage in good interactions in accordance with the stages of adolescent development. Parents should be able to complete their problem interactions well.

Keywords: conflict interaction, mental health, addiction, game online, adolescent

Introduction

The rapid development of technology, such as information, communication, and entertainment, is currently being used by teenagers. One of its uses is to play online games (Karaca et al., 2020). Online game addiction is a compulsive psychological state, or uncontrollable dependence on online games played over computer networks, usually via the Internet, that occurs among adolescents (Lee and Kim, 2017), and causes serious problems. For example, addiction to online games has a wide range of negative effects on daily life and can interfere with psychological balance,

sleep quality, and academic achievement (Montag, Schivinski, and Pontes, 2021). Online game addiction can be seen from the use of time for (on average) 20-25 hours a week, and the average time spent playing online games is more than four hours per day (Fitri, Emria, and Lira Erwinda, 2018).

Previous research shows that online game addiction has a negative impact on the psychological state of compulsive or uncontrollable dependence (Mun and Lee 2022; Rosendo-Rios, Trott, and Shukla, 2022). Gaming is just another recreational activity, but it can be a problem when people lose control of it (Young, 2016)



and it becomes a mental disorder (Brink, [2017](#)). In previous studies, attention deficit, depression, low self-esteem, and negative interpersonal relationships have been found to be predictors of addictive and problematic online game use in children and adolescents (Mun and Lee [2022](#)). In addition, parental factors, including parent-child relationships and parental attachment, are also significantly associated with online game addiction in adolescents (Kim, K., and Kim, [2015](#)). However, research that further discusses the conflict between parent and child interaction and online game addiction is still lacking.

The results of previous studies in China mentioned that parental factors, including parent-child relationship and parental attachment, are also significantly associated with adolescent online game addiction, and that parental psychological problems are critical risk factors for the development of internalizing and externalizing problems in children and adolescents (Xu, Cui, and Lawrence, [2020](#)). Based on the results of a study conducted in Tangerang, it was shown that a lack of interaction in the family can cause online games in adolescents to become a daily necessity (Yudha, [2015](#)). Shearman and Dumlao in Japan show that the relationship between family communication and adolescents deteriorates (Ozmete and Bayoglu, [2009](#)). Conflict between parents and adolescents can have a negative impact on adolescent behavior (Doorn et al., [2008](#)). Previous research has shown that depression and low family monitoring are discriminative factors for Internet addiction (Zhang et al., [2022a](#))

The global population of internet users has increased (Qiu et al., [2022](#)). Collaborative research between the Association of Internet Services Indonesia (APJII, [2014](#)) shows Indonesia ranks fourth after China, India, and Japan in terms of the number of Internet users, with 88 million Internet users per day, which is 34.1% of the total population in Indonesia. This represents a 4,300% growth over the last 16 years. Looking at children between the ages of 8 and 18, it was found that 88% played games electronically and 68% indicated that they played at least weekly, and 23 % daily (Zhang et al., [2022a](#)). Previous research concluded that adolescents who have negative parent-child relationships and conflict interactions tend to divert their attention to online games to obtain emotional needs that cannot be obtained from the family (Qiu et al., [2022](#)).

Research by Fuadi (2016) in Surabaya, showed there to be three 3 levels of addiction: 41.7% for medium addiction, 25% for low addiction, and 25% for high addiction. Assistance and the application of parenting efforts influence the level of problems that arise from

online gaming addiction (Joung, [2014](#)). Online gaming is a psychosocial problem commonly found in children and adolescents (Rahmawati, Bahar, B, and Salam, [2013](#)) and players will play continuously (addiction) regardless of how long they spend (Choi et al., [2018](#)). Internet addiction is a common disorder (Ahmed et al., [2022](#)), and consists of at least three subtypes: excessive gaming, sexual preoccupation, and e-mail/text messaging (Block, [2008](#)).

Previous research shows that the impact of online game addiction includes a loss of interpersonal relationships, failure to cope with responsibilities, impaired aspects of life, and poor health (Lin, [2015](#)). The attitude of parents toward their child, closeness of the family, and their exposure to domestic violence will cause online game addiction (Wu et al., [2022](#)). The behavior that appears due to the game's excessive online nature needs the interventions of the family to prevent online game addiction, and for parents to intensively communicate with their children (Kim et al., [2003](#); Piotrowski et al., [2015](#)). However, studies that explain the relationship between parent-interaction conflict and online gaming among adolescents have not yet been conducted. The purpose of this study was to explain the relationship between parent-conflict interactions with online game addiction in adolescents. The results of this study will provide a better perspective on the concept of interaction between parents and children, and will increase perspectives to minimize conflict interactions that occur between children and parents, as well as serve educators who mediate between parents and children in solving problems related to interaction conflict.

Materials and Methods

The design of this study was correlational, using a cross-sectional approach intended to determine the relationship between independent variables and the dependent variable. The sampling method used was purposive. The independent variable in this study was parent-conflict interaction. The questions in the questionnaire were adjusted to be completed by the adolescents to examine adolescents' perceptions of perceived interaction conflict. The dependent variable in this study was online game addiction.

The study population consisted of adolescents who were online game users at GamerCamp (GC) in Surabaya. The sample size of this study was 62 adolescents in Surabaya. The reason we use the GamerCamp site is because, based on the results of a preliminary study in several GamerCamps, the site in

Klampus is the most visited by adolescents and is the largest in Surabaya with strategic internet café location supported by cheap rates of Rp. 4,000.00 per hour. This is also due to the large number of PCs, reaching 64 PCs with an average connection speed of 65.00 Mbps.

The inclusion criteria in this study were as follows: (1) adolescents between the ages of 13 – 19 and who were male, and (2) adolescents who were willing to become respondents. The exclusion criterion was adolescents who played online games for the first time. The subject recruitment process in the GC Klampus Surabaya was conducted from 10:00 am to 9 pm within 1 month, according to the inclusion criteria. Researchers assume that gamers who have visited for the second time have an interest and desire to continue playing online games, which in turn can lead to addiction because the reference source that researchers use is said to be addicted to online games as seen from the use of time (on average) between 20-25 hours a week. Eighty adolescents were approached according to the inclusion criteria and there were 73 respondents included. After receiving an explanation of the study, parents who agreed to their children as research respondents and adolescents who were willing resulted to 62 respondents. The researcher gave an explanation to the adolescents about the goals, benefits and risks, the principles of confidentiality, the fact that it was voluntary, compensation and the involvement of the adolescents in the study itself. After that, the researchers distributed approval sheets to the adolescents for them to give to their parents. An explanation of the study was also given to their parents along with the informed consent sheet, and informed consent was signed by the parents.

The independent variable in this study was the conflict of parents' interactions, while the dependent variable in this study was online game addiction. The Internet addiction test (IAT) was used to assess online game addiction. The questionnaire was translated into Indonesian and tested for its validity and reliability. All items of the questionnaire had good validity scores, and the reliability test had a Cronbach's α score of 0.756. The questionnaire detail had six parameters: Saliency, excessive use, neglect work, anticipation, lack of control and neglect social life. The questionnaire consisted of 20 statements with the following interpretation of the scores: 0-30 = Not addicted; 31-49 = Mild addiction; 50-79 = Moderate addiction; 80-100 = Severe addiction.

The instrument used to assess conflict interactions between parents and adolescents is the Parents Conflict Interaction & Adolescent Questionnaire, which is filled

by adolescents to see adolescents' perceptions of perceived interaction conflict. Adolescents who are able to feel the interaction conflict that occurs are not seen from the perspective of parents because of their higher level of subjectivity. The questionnaire was completed independently by the adolescents. Adolescent answers are feelings experienced in relation to the conflict interaction that has been applied by parents. Parent conflict interaction was measured using the Parents Conflict Interaction and Adolescents Questionnaire developed by Lestari (2009). The questionnaire has three main indicators: habits and social life, which also include relationships with family and social conventions. The second indicator is responsibility and the last is the achievement of the school. The Parents Conflict Interaction and Adolescent Questionnaire was tested for its validity and reliability. All questionnaire items had good validity scores, and reliability testing showed a Cronbach's α of 0.450. The questionnaire consisted of 13 questions based on three parameters: Social Habits and Life, Responsibilities and School Achievements. The interpretation of scores is high interaction conflict = average mark value and low interaction conflict = average mark value.

Before carrying out the data research, the researcher explained the purpose of the study, benefits, confidentiality of data, compensation, and voluntary elements for adolescents to accept or refuse to become respondents. Adolescents were of an age where they already have the cognitive ability to understand the explanation and so can give an informed consent. The researcher asked for permission from the GamerCamp site owner to carry out the research and went to the GamerCamp every day from 10 am to 9 pm after obtaining approval from internet cafe owners. The researcher gave an explanation to the adolescents about the goals, the benefits and risks, the principles of confidentiality, the fact that it was voluntary, compensation and the involvement of the adolescents in the study itself. Subsequently, the researchers distributed approval sheets to the adolescents to give them to their parents. On the parental consent sheet, the researcher asked for the parents' telephone numbers to crosscheck and ensure that the parents had agreed to their child as a research respondent. An explanation of the study was also given to their parents along with an informed consent sheet which they. The next step was to distribute the questionnaires to the adolescents, and both the parent-adolescent interaction conflict questionnaire and IAT were carried out for 30 minutes. After the respondent completed the

questionnaire, it was returned to the researcher and the completeness of the answers was checked. In this way, if there were incomplete data (demographic data), it could be resolved immediately. After all respondents filled out the questionnaire, the researchers gave them souvenirs in the form of stationery and education about the wider use of online games.

The results of the data obtained were then used to conduct descriptive and inferential analyses. The descriptive data analysis was about the percentage or frequency distribution, mean, and standard deviation, and the inferential analysis used Spearman's Rho Test correlation with $\alpha=0.05$.

This research was assessed using ethical standards and it was certified with Ethical Approval No. 294 - KEPK on January 12, 2017, issued by the Faculty of Nursing of Universitas Airlangga.

Results

Table 1 shows that most respondents were adolescents aged 17 - 19 years old (53 people; 85.5%).

Table 1 Demographic characteristic

Characteristic	N	%
Age of Respondents		
13 - 16 years	9	14.5
17 - 19 years	53	85.5
Total	62	100
Education		
Junior High School	17	27.4
Senior High School	40	64.5
No school (Never gone to school)	5	8.1
Total	62	100
Number of Siblings		
Do not have	10	16.1
1	27	43.5
2	17	27.4
More than 2	8	12.9
Total	62	100
Child Order:		
1	27	43.5
2	22	35.5
More than 2	13	21
Total	62	100
Nearest Person with Respondents		
Friends, both at home and at school	12	19.4
Brother and /or sister	24	38.7
Parents		
Total	62	100
Frequent Type Of Online Game Played		
War game	46	74.2
Game strategy	16	22.6
Game on social media	2	3.2
Total	62	100
Duration of Playing Online game		
Less than 3 hours	29	46.8
2- 6 hours	30	48.4
6 - 12 hours	3	4.8
Total	62	100

Table 2 Cross-tabulation of parents

Parents' Interaction Conflict	Addiction to Online Game Total									
	High		Moderate		Fair		No Addiction			
	N	%	N	%	N	%	N	%		
High	0	0	13	21	13	21	3	4.8	29	46.8
Low	0	0	7	11.3	18	29	8	12.9	33	53.2
Total	0	0	20	32.3	31	50	11	17.7	62	100

Significance (p): 0,004

Spearman's Rho correlation coefficient (r): 0.360

The majority consisted of senior high school students (40 people, 64.5%). The adolescents playing at GC Internet Corner had one sibling (27 people; 43.5%). Most of the respondents were the first children (27 people; 43.5%). The respondents were closer to their friends, both at home and at school (26 people; 41.9%), and most of the respondents who played online games did so for 3 - 6 hours per day (30 people; 48.4%).

Table 2 illustrates that most respondents had a conflict with their parents in the low category (33 people; 53.2%). Table 2 shows that most respondents were in the categories of low addiction (31 people; 50%) and medium addiction (20 people; 32.3%).

Table 2 shows that most respondents who experienced online game addiction had a level of conflict interaction with their parents that was in the high category (13 people; 21%). The cross-tabulation data also show that there were three people (4.8%) who did not experience online game addiction who had a high level of interaction conflict with their parents.

The relationship between the parents' interaction conflict and online game addiction in adolescents, based on the non-parametric Spearman rho test, had a significance level of $\alpha \leq 0.05$. The analysis showed a p value of 0.004. This means that there is a relationship between parents' interaction conflict and online game addiction in adolescents at the GC Internet Corner in Klampis, Surabaya. In addition, the alternative hypothesis shows that there is a relationship based on a correlation coefficient (r) of 0.360. This means that there is a weak and positive correlation coefficient, indicating that the relationship between the two variables is in the same direction, with the same high value.

The findings from this study found that respondents who had high interaction conflicts with their parents had addiction to online games with high categories. Conflicts occur due to demands from parents who want their children to be better. The respondent's parents will be angry and punished if the respondent is caught skipping school and gets bad grades in school. In addition, the parents of the respondents always demanded that their children study. A small percentage of the respondents thought that their parents were old-fashioned. This is because their parents still apply the education system

from their days, as well as respondents think that their parents in educating them do not follow the developments of the times. Respondents said that their parents always regulated their personality without giving them the opportunity to develop it. With this finding, it is hoped that parents can better understand the characteristics of their children according to their growth and development age, so that a harmonious relationship can be established.

Discussions

In this study, it was hypothesized that high levels of parental interaction conflict can cause adolescents to become addicted to online games at high levels. The findings of this study revealed that most respondents who experienced a fair category of online game addiction had low interaction conflicts with their parents. The results of this study are in accordance with several previous research results that the parents' interaction conflict is the reinforcing factor that influences and shapes the behavior of adolescents when playing online games, leading to addiction. The higher the stress level and the less support from the family, the greater the risk of depression in adolescents will be increased (Nursalam, 2009). Early adolescence is a time when conflict between adolescents and parents increases. This increase can occur because of several factors that have been discussed, which involve adolescent maturation and maturation of parents (Wu et al., 2022). The results of this study show that there is a relationship between parental interaction with online game addiction in adolescents (Zhang et al., 2022b). This is consistent with previous research showing that negative parent-child relationships will lead to reduced communication between parents and children, resulting in alienation, interaction conflict, and compensation behavior of adolescents seeking emotional warmth and support through online games (Qiu et al., 2022).

The results showed that almost half of the respondents experienced high interaction conflict with their parents. Conflict with their parents increases in early adolescence and involves daily activities such as tidying the bedroom, dressing neatly, going home before a certain hour, not talking too long on the phone and so on (Liu et al., 2020). Adolescents experience social transition changes in their individual relationships with others, especially in terms of their emotions, personality, and social role context in development (Qiu et al., 2022). During this period of change and transition, adolescents face new conditions and are under social pressure, whereas during childhood they are less

prepared (Griffiths, 2022). Good family interactions can reduce conflicts that may occur between children and their parents (Nursalam, Alit and Fauziningtyas, 2009). Parent-child conflict interaction is one of the predictors of game online addiction, improving parent-child interaction can contribute to weaken online game addiction (Gonzalez-Buesoet et al., 2018)

Another factor that also affects parental interaction conflict is the age of the respondents, who in this study were mostly aged 17–19 years (late teenagers). Stanley Hall cited in Santrock (2003), states that being a teenager is a time when storms and stress come out; it is a time of problem. Adolescents experience a period of identity crisis that includes identity diffusion/confusion, moratorium, foreclosure, and identity achievement (Griffiths, 2022). Self-actualization is achieved when players are able to achieve the highest level of the game. In fact, in the process of achieving this, teenagers can put aside their daily activities, as well as their patterns of interaction with their parents (Santrock, 2003). The characteristics of young people who experience problems are adolescents who experience resistance and challenge with their parents, as well as conflicts within themselves, which are often the root cause of contradictions and interaction conflicts with their parents (Yilmaz et al., 2023).

Most respondents were close to their friends, both at home and at school. This can cause conflicts when respondents interact with their parents. They like gathering or playing online games with friends (Durak et al., 2022). They also revealed that the person nearest to the respondent was their friend, both at home and at school. According to previous research, adolescents will be closer to their friends during this developmental period (Wang et al., 2022). Adolescents prefer to hang out with their friends, and when they experience interaction conflict with their parents, they prefer to get together with their friends (Wang et al., 2021).

The tabulation data showed that a major cause of conflict was the demands of parents who wanted their children to be better. The parents would be angry and punish their child if the respondent was caught skipping class or if they were getting bad grades in school. In addition, parents demanded that their children study at any time. A small percentage of the respondents thought that their parents were old-fashioned because they were still applying the system of education that was used in their own era. The respondents mentioned that their parents always regulated their personality without giving them the opportunity to develop it. Previous research has shown that children grow and thrive in

beneficial environments with supportive relationships. A good relationship will positively affect their development, including adjustment, prosperity, prosocial behavior, and value transmission. Fostering interaction with the child's parent requires good communication to be in place (Bittman, Rutherford, and Brown, 2015).

According to Imanuel (2009), gender is one of the factors that can influence online game addiction. Gender significantly influences the personal factors involved in playing online games. Several studies have shown that men play games more than women do because men are more inclined to fantasize and want to feel the adrenaline rush. Adolescents, have the greatest influence in terms of online game addiction, because youth is a stage where they are between the phases of childhood and adulthood through physical and psychological changes. As a result, when adolescents experience various conflicts related to themselves, they begin to question their self-concept, think about their ideal characteristics, and compare themselves with others' ideal standards (Efendi, 2009). The data obtained by the researchers at Surabaya consisted of a sample of all males.

The respondents also believed that online gaming was fun during the conflict. Furthermore, it relates to another indicator (Young, 2011), namely, mood modification. Mood modification refers to the happiness and peacefulness experienced when addictive behaviors arise. The game was used to cope with or escape from problems. A small proportion of the respondents said that their friends complained when they played online games. However, the respondents who were depressed or anxious offline did not feel so after returning to playing online games.

The results indicate that there is a relationship between parenting and addiction to online gaming. Protective parents can cause adolescents to seek refuge while playing online games. In addition, research conducted by (Nursalam, Armini and Fauziningtyas, 2009) mentioned that the pattern of bad interactions between parents and their children can lead to delinquency in adolescents.

Conclusions

Parental interaction conflict is related with online game addiction. Parental interaction conflicts can influence and shape respondents' behavior in playing online games as an escape mechanism for dealing with conflicts with parents, which, if not controlled, can lead to addiction. Parents are expected to engage in good

interactions in accordance with the stages of adolescent development. Parents should be able to complete their problem interactions well. Nurses can provide training and counseling to parents to improve communication, interaction, and relationships with children to increase the fulfillment of children's emotional needs, so that the use of online games can be reduced.

Conflict of Interest

There is no conflict of interest.

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Perceived competence of Filipino nursing students graduating during pandemic

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ABSTRACT

Introduction: Given the importance of maintaining competence, limited published research is conducted in the local setting touching on the competence of nursing students graduating during the pandemic. This study determined graduating nursing students' perceived fundamental nursing skills and core competence.

Methods: The research design is quantitative descriptive cross-sectional. The study participants were the 102 graduating nursing students of a public university in Iloilo City, Philippines. The Perceived Competence of Filipino Nurses Questionnaire was used to gather data in May 2022 and these were analyzed using SPSS software version 23.

Results: The results revealed that, while the majority of nursing students reported that their nursing competencies were greatly affected by the shift to the online learning platform, most still had a high perception of their fundamental nursing skills competence (M=6.97) and core competence (M=8.03). The areas of elimination (M=5.41) and research (M=7.63) were the lowest-ranked fundamental skill and core competencies, respectively. There was a significant difference ($p < .05$) in nursing students' perceived competence based on self-reported academic performance.

Conclusions: Despite the reduced exposure in the clinical setting due to the pandemic, graduating nursing students perceive themselves to be highly confident in their capabilities as future professional nurses. Nonetheless, areas for improvement were identified that warrant further assessment, validation, and enhancement.

Keywords: competence, nursing skills, nursing students, pandemic, Philippines

Introduction

The high transmissibility of coronavirus disease (COVID-19) makes healthcare systems worldwide drastically overwhelmed. This catastrophic event highlighted the need for skilled healthcare workers, particularly nurses (Lynch & Pusey-Murray, 2021). To be a skilled professional nurse, one must have the fundamental skills and core competencies (Fukada, 2018; Xie, 2019). Skills and competence are closely related since competence is generally defined as the ability to act accordingly and be recognized by others (Nascimento et al., 2021). Competence in nursing is defined in various ways, and each focus on a particular educational topic. Clinical competence, one of the most tackled definitions, is the knowledge reinforced by a mix

of cognitive, psychomotor, and affective or attitudinal abilities appropriately implemented in a given scenario (Weeks et al., 2019). Being a discipline that is based on hands-on practice, the critical challenge in nursing education is teaching students core competencies and providing various opportunities to sharpen and improve their fundamental skills, especially when performing on actual patients (Gregersen et al., 2021; Oducado et al., 2019). Fukada (2018) defined nursing core competence as the ability to use rational reasoning and accurate nursing skills to provide quality nursing services that satisfy the needs of the clients being cared for. Sumagaysay and Oducado (2019) identified the core competencies based on the 11 Key Areas of Responsibilities (KAR). The KAR was incorporated in

2012 in the National Nursing Core Competencies Standards, serving as a framework for the practice and education of nursing in the Philippines and defining what nursing graduates are expected to perform in professional nursing practice (Belo-Delariarte et al., 2018; Nabizadeh-Gharghozar et al., 2021). On the other hand, the term "fundamental nursing skills" is not thoroughly defined in any existing literature. However, it's usually referred to as basic clinical skills or essential prerequisites for novice nurses when they start working as professionals (Missen et al., 2016). In the same study by Ubas-Sumagaysay and Oducado (2019) fundamental clinical nursing skills encompass technical nursing skills.

Worldwide, nursing practice is generally founded on professional nursing skills and core competence (Fukada, 2018; Staykova et al., 2017). Practical nursing skills involve technical, theoretical, and practical aspects, caring perspectives, as well as ethical and moral considerations (Gregersen et al., 2021). In nursing education, the classroom and clinical environment are interconnected and complementary because students must apply in clinical practice what they have learned in the classroom, online, and through other modalities (Oducado et al., 2019). When approaching the end of their nursing education, students are expected to have gained adequate skills and competence to fulfill their duties safely and effectively without the need for direct supervision, fully allowing them to build trusting relationships with their patients (Cowen et al., 2018; Leonardsen et al., 2021). Hence, the competence of graduating nursing students is important as it is associated with upholding the culture of high-quality nursing care, professional standards, and patient safety (Kajander-Unkuri, 2014).

With the increasing need for skilled nurses in both local and global healthcare settings, it is vital to determine the fundamental nursing skills and core competence of graduating nursing students, especially as they are nearing graduation and about to enter professional nursing practice. However, previous studies conducted in the pre-pandemic have shown contrasting and inconsistent findings on the level of competence and fundamental skills of graduating nursing students. For instance, the Orkaizagirre-Gómara et al. (2020) study conducted in Spain and Mohamadirizi et al.'s (2015) in Iran before the COVID-19 pandemic, revealed that final-year or senior nursing students were found to have competent clinical skills. In contrast, single institute-based studies conducted in multiple developed countries, including the USA, Australia, and Iran, reported deficits in graduating nursing students' clinical

skills, and very few of them possessed entry-level competencies and practice readiness (Jamshidi et al., 2016; Kavanagh, 2017; Missen et al., 2016). According to Park and Han (2013), in clinical settings, freshly graduated nurses fall short of the clinical performance required to fulfill a variety of health-related demands. In addition, research indicates that many graduating or newly graduated nurses desire to be more competent and knowledgeable about the procedures they are expected to become skilled at (Sheahan, 2015).

To safeguard students from the virus, face-to-face education was replaced by virtual remote learning, and clinical experiences were halted (Agu et al., 2021). Despite a study claiming that online learning bears the potential to enhance clinical reasoning and knowledge retention (Padilha et al., 2019), some nursing students assert that online learning does not consistently deliver prompt feedback and responses when compared to traditional in-person classes (Li et al., 2019). Additionally, Nkenke et al. (2012) claimed that the online setup lacks supervision, which may affect learning performance. Due to infection concerns and a lack of personal protective equipment, the COVID-19 pandemic has prompted a sudden transition from in-person to remote learning, reducing clinical experience (Powers et al., 2021). As there exist contrasting results of different studies on the impact of online learning on the development of the competencies of nursing students, few to no studies, have been conducted yet touching on the graduating nursing students' level of perceived fundamental nursing skills and core competence in the online modality at the time of the pandemic, particularly at the Philippine setting. Whereas the study of Ubas-Sumagaysay and Oducado (2020) conducted before the pandemic reported a relatively high level of competency among new graduate Filipino nurses, it is unknown whether or not the level of competence of graduating nursing students has worsened with the emergency shifting to online modalities at the time of the pandemic.

With the pandemic still prevailing, most, if not all, graduating nursing students in the Philippines are still stuck inside their home's sans clinical experience. As the time of graduation approaches, wherein a new set of fresh graduates will be produced, the importance of assessing how graduating nursing students perceive their competencies should be acknowledged as a crucial need to improve professional nursing practice. Therefore, this study focuses on determining the fundamental nursing skills and core competencies reported by the graduating nursing students in a public University in the Philippines.

Materials and Methods

A quantitative research design, specifically descriptive-cross sectional research design, was utilized in this study. The study participants included all (135) undergraduate students from the fourth year or graduating class of Bachelor of Science in Nursing in a public University in Iloilo City, Philippines. There were 102 responses obtained from the electronic survey getting a response rate of 75.56%. Based on the Cochran (1977) formula, the sample size required given the population of 135 given a 5% level of precision, and a 95% confidence level is only 101.

The data for this study were collected using an online questionnaire with four (4) parts. Part One, Respondents' Profile, covers the personal information. In addition, the questionnaire included the students' self-reported academic performance as reported by Terry and Peck (2020), with responses ranging from "Very Poor" to "Very Good." Part Two and Three included the Perceived Competence for Filipino Nurses Questionnaire (PCFNQ) of Ubas-Sumagaysay and Oducado (2020). Part Two covers the graduating students' fundamental nursing skills, measured using the Fundamental Nursing Skills Competency Scale (FNCS) of the PCFNQ. The FNCS consisted of 99 items with 14 domains. Part Three covers the graduating students' nursing core competencies, measured using the Nursing Core Competency Scale (NCCS) of the PCFNQ. The original NCCS consists of 151 performance indicators. However, we excluded ten (10) items in this study since these performance indicators do not apply to graduating nursing students. Hence, the version in this study included a total of 141 items. This part measured the students' degree of self-reported competence based on the 11 Key Areas of Responsibility (KAR). Responses in the PCFNQ were graded on a 10-point scale, wherein one (1) corresponds to "Not Competent" and ten (10) indicates "Very Highly Competent." High scores indicate a high level of competency. The PCFNQ has very high internal consistency with Cronbach's alpha based on the actual data being 0.987 and 0.996 for FNCS and NCCS, respectively. Part Four covers the extent to which graduating nursing students think the current online learning platform has affected the development of their fundamental nursing skills and core competencies. Two questions were asked, "To what extent do you think the current online learning platform has affected the development of your fundamental nursing skills competencies?" and "To what extent do you think the current online learning platform has affected the

development of your nursing core competencies?" with five (5) choices ranging from "Very Low" to "Very High."

Following the approval of the University Ethics Committee (Protocol Number WVSU.URERC-2022.CON_002), the researchers obtained permission to conduct the study from the Office of the Dean and the Division Chairperson of the College of Nursing. Assistance was sought from the Level IV division chairperson and curriculum officer in contacting each class chairperson to serve as a link between the researchers and participants through school email or Facebook Messenger. Since the researchers have no access to the respective group chats and the Facebook group of the Level IV nursing students, the chairpersons were requested to share the link in their group chats and Facebook groups. Electronic informed consent was included in the first part. As the minimum sample size was met, the responses of the participants were compiled, organized, and consolidated in the spreadsheet.

All statistical computations were done via the Statistical Package for the Social Sciences (SPSS) software version 23.0. The Kolmogorov-Smirnov test was utilized to determine the normality of the data, and descriptives, t-Test, and ANOVA set at 0.05 level of significance were used to analyze the data.

Results

In total, 102 responses were included in this analysis. [Table 1](#) shows the average age of the participants, which is 22.20 years (SD=0.51), and the majority were female (60.8%) and reported an acceptable level of academic performance (80.4%).

[Table 2](#) shows that graduating nursing students had a high level (M = 6.97, SD=1.17) of perceived fundamental nursing skills. The graduating nursing students reported a very high level of perceived

Table 1 Profile of the participants

Categories	f	%
Age [M = 22.20; SD = 0.51]		
Sex		
Male	40	39.2%
Female	62	60.8%
Academic Performance		
Very Poor	0	0
Low	6	5.9%
Acceptable	82	80.4%
High	14	13.7%
Very Good	0	0
Total	102	100%

Table 2 Level of perceived fundamental nursing skills competencies

Fundamental Skills	Min.	Max	M	SD	Interpretation
Asepsis	5.17	10.00	8.57	1.02	Very High
Activity and Exercise	2.27	10.00	7.86	1.43	High
Health Assessment	4.58	9.58	7.84	0.98	High
Medications	2.69	9.46	7.24	1.38	High
Fluid, Electrolyte, and Acid-Base Balance	1.56	10.00	6.91	1.50	High
Safety	3.00	9.33	6.80	1.34	High
Hygiene	2.78	9.33	6.64	6.64	High
Pain Management	1.50	10.00	6.64	1.75	High
Perioperative Nursing	2.00	9.25	6.47	1.61	High
Oxygenation	1.38	9.50	6.45	1.69	High
Nutrition	1.20	9.60	6.36	1.82	Moderate
Wound Care	1.86	9.14	5.93	1.65	Moderate
Diagnostic Testing	2.17	8.50	5.91	1.54	Moderate
Elimination	1.00	9.40	5.41	1.93	Moderate
Composite Score	3.26	9.26	6.97	1.17	High

NOTE: 1.00-2.79 (Very Low), 2.80-4.59 (Low), 4.60-6.39 (Moderate), 6.40-8.19 (High), and 8.20-10.00 (Very High)

fundamental nursing skills in asepsis (M= 8.57, SD=1.02) and lowest in elimination (M= 5.41, SD=1.93) with only a moderate level of competence.

Table 3 shows that the graduating nursing students had a high level of perceived nursing core competence (M= 8.03, SD=.14). Among the 11 KAR, the graduating student nurses reported being most competent in personal and professional development (M= 8.37, SD=1.05) and collaboration and teamwork (M= 8.24, SD=1.18) and although high, research (M= 7.63, SD=1.32) ranked lowest among the 11 domains of core nursing competencies.

Table 4 shows that, when the participants were classified according to sex, there was no significant difference in their perceived fundamental nursing skills competence (t=-.034, p=.973) and their perceived core competencies (t=-.636, p=.526). Based on self-reported academic performance, there was a significant difference in their perceived fundamental nursing skills competence (F=4.225, p=.017) and core competencies (F=3.681, p=.029).

Table 5 shows that the majority reported that the online learning platform has a very high effect on their perceived fundamental skills (48%) and core competence (46.1%).

Discussions

This study assessed the competence of graduating nursing students, with participants posting the highest competency in asepsis, activity and exercise, health assessment, and medications. Similar to the result of this study, asepsis, activity and exercise, and medications were among the three essential clinical skills with the highest level of competence identified by new graduate nurses in the Philippines in the pre-pandemic study of Ubas-Sumagaysay and Oducado (2020). With the advent of the pandemic, the importance of hand hygiene and aseptic techniques are continuously reinforced in all settings as protective and preventive measures. Given the numerous interventions and campaigns promoting this action, high compliance levels are expected. This finding may also be attributed to the recent clinical exposure in perioperative nursing for completing their scrubs requirements, which coincided during data gathering. Nonetheless, these skills are frequently done even in the pre-pandemic setting. Moreover, while this study found a high perceived level of competency in medication management, the two studies conducted by Cleary-Holdfort and Leufer (2020) in Ireland found that medication management was among the areas of concern identified by senior nursing students.

Table 3 Level of perceived core competencies

Core Skills	Min.	Max	M	SD	Interpretation
Personal and Professional Development	5.86	10.00	8.37	1.05	Very High
Collaboration and Teamwork	3.75	10.00	8.24	1.18	Very High
Ethico-moral Responsibility	2.57	10.00	8.17	1.43	High
Records Management	2.36	10.00	8.16	1.33	High
Communication	5.00	10.00	8.14	1.17	High
Legal Responsibility	5.13	10.00	8.12	1.18	High
Quality Improvement	3.55	10.00	8.05	1.20	High
Health Education	3.42	10.00	7.97	1.25	High
Safe and Quality Nursing Care	3.33	10.00	7.93	1.16	High
Management of Resources and Environment	2.36	10.00	7.88	1.25	High
Research	3.55	10.00	7.63	1.32	High
Composite Score	4.51	10.00	8.03	1.14	High

NOTE: 1.00-2.79 (Very Low), 2.80-4.59 (Low), 4.60-6.39 (Moderate), 6.40-8.19 (High), and 8.20-10.00 (Very High)

Table 4 Differences in perceived competence

Independent Variables	Fundamental Skills				Core Skills			
	M	SD	Test Statistics	p-value	M	SD	Test Statistics	p-value
Sex			-.034	.973			-.636	.526
Male	6.97	1.14			7.94	1.00		
Female	6.97	1.20			8.09	1.22		
Academic Performance			4.225	.017			3.681	.029
High	7.37	0.95			8.59	0.89		
Acceptable	6.99	1.15			8.00	1.13		
Low	5.77	1.39			7.16	1.32		

NOTE: M (Mean), SD (Standard Deviation)

By contrast, complex wound care, diagnostic testing, and elimination areas revealed lower means of competence. Ubas-Sumagaysay and Oducado (2020) explained that these skill sets highlight the areas uncommonly practiced by nursing students in a resource-limited setting like the Philippines. For instance, ECG recording and interpreting, administering cleansing enemas, changing a stoma appliance, and blood withdrawal may not be part of some nursing schools' routine return demonstration practice (Ubas-Sumagaysay & Oducado, 2020). In addition, opportunities to perform these skills are rare, especially in a resource-limited setting like the Philippines, where most concerns are rooted in the lack of financial resources, equipment, and technological advances (Dela Cruz & Ortega-Dela Cruz, 2019). Given the pandemic with which face-to-face classes were halted, opportunities and chances for the graduating nursing students to have much exposure in the clinical area were also affected, putting the focus more on prioritizing the requirements for graduation. Kirwa and Gakere (2016) noted that nursing students value the repetitive practice of nursing skills as the continuous hands-on practice of skills demonstrates boosted performance and competence. Inadequacy in clinical skills development may also be significantly attributed to the pandemic, where face-to-face classes and clinical exposure were suspended. Despite the shift to online learning to address the educational barrier (Oducado, 2021), the lack of actual exposure, resources, and supervision may have hampered the practice and enhancement of the nursing students' skills in the complex areas of diagnostic testing and elimination. Activities like ostomy

care and venipuncture rely heavily on a resource-based learning approach, and virtual experience may not be sufficient to develop these skills. Ramos-Morcillo et al. (2020) disclosed that nursing students from two Spanish public universities perceived clinical training as indispensable and could not be substituted. Oducado and Estoque (2021) further elaborated that not all areas of nursing education can be performed digitally, such as those entailing more practical aspects. Moreover, final-year nursing students in India were also reported to be least competent in elimination among the nursing skills domains (Upashe et al., 2022). It was noted in the same study that only a portion of the nursing students were able to independently perform nursing skills like venipuncture and ostomy care, which was attributed to inadequate clinical experience. Furthermore, clinical placements in Delivery Room and Operating Room were given priority for this particular sample in the study to comply with academic requirements needed for the nearing graduation and licensure examination, thus resulting in limited clinical experience in other areas. Despite the barriers above, graduating nursing students showed favorable results regarding their perceived fundamental nursing skills.

Furthermore, this study's respondents displayed a high regard for personal and professional development. Professional development begins with academic achievement and practice (Pullen, 2021). Professional practice experience and good role models are important for students' professional identity development (Vabo et al. (2021). Felstead and Springett (2016) also noted that having nursing educators who can role model professional attributes appears crucial to developing professionalism in nursing students. Moreover, graduating student nurses reported being highly competent in collaboration and teamwork. Effective collaboration and teamwork among nursing students exist with the understanding that conflict is inevitable, and productive conflict resolution is encouraged with open communication (Regis College, 2023). Nursing students believe that good communication and collaborative decision-making are strengths that can

Table 5 Self-reported extent of effect of online learning platform on perceived competence

Categories	Fundamental Skills		Core Skills	
	f	%	f	%
Very High	49	48.0	47	46.1
High	20	19.6	20	19.6
Moderate	19	18.6	18	17.6
Low	12	11.8	13	12.7
Very Low	2	2.0	4	3.9

help prevent time delays and improve overall management (Morphet, [2014](#)).

Although high levels of competence were reported in resource and environmental management and research, these two areas ranked lowest among the 11 Key Areas of Responsibility. Studies show that nursing staff cannot do all the essential nursing tasks due to the scarcity of resources in patient care (Primc, [2020](#)). Nurses from five teaching hospitals in Iran similarly identified inadequate resources as one of the most noteworthy barriers in care environments leading to disrupted, missed, or delayed care nursing delivery (Rivaz et al., [2017](#)). Moreover, according to the findings of Bahadori et al. ([2016](#)), the most significant barrier to using research findings from the perspective of nursing students was the need for more time. Studies on the factors that impede nurses' research participation included lack of time, knowledge, funding, and support services and poor attitude of nurses toward research (Nkrumah et al., [2018](#)). Similarly, the results of earlier studies in the Philippines conformed to the low self-reported competence in research (Oducado & Penuela, [2014](#); Ubas-Sumagaysay & Oducado, [2020](#)).

This study showed that sex does not affect graduating nursing students' perceived fundamental nursing skills and core competence. The finding is similar to previous studies, such as a systematic review by Chan et al. ([2014](#)), which said that male and female nursing students perform similarly in most aspects with minimal differences in some areas. This result is also consistent with prior research concluding that sex had not been shown to influence the skills and competence of nursing students (Harrison, [2019](#); Kajander-Unkuri et al., [2014](#); Park & Choi, [2020](#); Ubas-Sumagaysay & Oducado, [2020](#)).

Not surprisingly, this study also demonstrated that the level of self-assessed academic performance affected the level of fundamental nursing skills and core competence. The finding suggests that those with high academic performance, compared to those with low academic performance, are more likely to have higher self-reported nursing skills and core competence. This finding is congruent with a study by Kim and Kim ([2021](#)) conducted in South Korea, wherein graduating nursing students with high academic achievement in their classes were also found to have high clinical performance and competence. Evidence from the Philippines has also demonstrated a correlation between performance in the classroom and clinical setting (Oducado et al., [2019](#)). The Self-Efficacy Theory of Albert Bandura ([1977](#)) hypothesized that the level at

which individuals perform is directly related to how well they perceive their capabilities.

However, it should be noted that this study's academic performance was measured according to self-assessment. Kajander-Unkuri et al. ([2016](#)) disclosed that the self-assessment of graduating nursing students of their competence tends to be incongruent with the assessment of their mentors. Specifically, graduating nursing students rate their competence higher than their mentors could observe (Kajander-Unkuri et al., [2016](#)). Another point to consider is that this study was conducted during the COVID-19 pandemic when the participants could not have face-to-face classes, skills laboratory practices, and clinical exposure. Students may need more learning experiences to solidify their competence. Students' relatively high competence evaluation could be attributed to the Dunning-Kruger effect. According to Dunning ([2011](#)), those who do not have sufficient knowledge are subject to ignorance. This ignorance may lead to them to being unaware of any mistakes they might commit, leading to an inflated perception of their capabilities. The participants of this study have only been given very little time to practice their skills in the actual care setting. Likely, they may need more encounters to test the extent of their nursing skills in real-life clinical environments. Given that role transition remains difficult for new graduate nurses and continues to be an unresolved issue for decade (Oducado & Ubas-Sumagaysay, [2019](#)), it may be necessary to provide students who graduated at the time of the pandemic with adequate support, constant feedback, and mentoring in their transition into the nursing workforce.

Finally, this study showed that the majority of graduating nursing students acknowledged that the online learning environment had a significant impact on their fundamental nursing skills and core competence. However, the current study failed to explore further whether this effect is negative or positive. Nonetheless, a systematic review of online learning during the COVID-19 pandemic found that, on average, students in the health sciences expressed more negative than positive perceptions (Abdull Mutalib et al., [2022](#)). Findings are congruent with numerous studies conducted in the Philippines (Oducado & Soriano, [2021](#)), Jordan (Maqableh & Alia, [2021](#)), and Indonesia (Pramana et al., [2022](#); Simanullang et al., [2021](#)) that tackle the experiences of students in the virtual setup. Most medical students in Jeddah and India said online learning affected their clinical skills (Ibrahim et al., [2021](#); Khan et al. ([2021](#))). Oducado and Estoque ([2021](#)) also

noted that most undergraduate nursing students in the Philippines were unsatisfied with the online learning platform, and the pandemic has significantly affected their academic performance. Likewise, Li et al. (2021) found a low satisfaction rate among international medical and nursing students as influenced by numerous factors, including but not limited to the absence of practical classes.

This study has limitations as it only involved graduating nursing students enrolled in one public university in the Philippines in the second semester of the school year 2021-2022. Thus, the results of this study will only be generalizable among study participants and not to all nursing students in the Philippines and other countries. This study focused on the perceived 13 fundamental nursing skills competence and 11 core competencies and whether it is influenced by sex and academic performance. This study did not cover other factors and circumstances that could affect nursing students' competence. As this is a cross-sectional study, it cannot establish causal linkages between variables and cannot follow changes over time. Also, given the use of online survey questionnaires, another drawback of this study is the biases and limitations related to self-report data. Self-reports are subject to the constraints associated with honesty, social desirability, and introspective ability. Lastly, the instrument used in this study appears to have a very high Cronbach's alpha, which may be attributed to the relatively lengthy scale. A more robust test of the psychometric properties of the instrument and a shorter version scale is recommended.

Conclusions

The virtual or remote teaching and learning mode has significantly affected nursing students' skills and competence. However, despite limited exposure in the clinical field brought about by the pandemic, the graduating nursing students perceive themselves to be proficient in performing basic nursing skills and in their capabilities in what they are expected to perform in professional nursing practice. Nonetheless, areas for improvement warrant further assessment, validation, and enhancement. Assessing graduating nursing students' competence is critical for determining their ability and readiness to provide quality healthcare services. Despite viewing themselves as proficient, it is still suggested that academic and healthcare institutions give due attention to the clinical practice of graduating nursing students to address areas of concern regarding skills and competence development. New nurses who

had limited hands-on clinical experience and graduated during the pandemic may need more appropriate guidance and supervision during their transition to professional practice to supplement the limited hands-on clinical exposure and facilitate a smooth role transition experience.

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Effect of isometric handgrip exercise on blood pressure and comfort among hypertensive patients

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ABSTRACT

Introduction: Hypertension patients with uncontrolled blood pressure will experience some physical complaints. Controlled blood pressure will reduce physical complaints and improve comfort. Physical activity can help in making blood pressure controlled. However, due to limited time and access, many hypertensive patients rarely do some exercise. This study aimed to investigate the Isometric Handgrip Exercise's effect on blood pressure and comfort of hypertension patients.

Methods: The research design is a quasi-experimental pre and post-test with the control group. The population was hypertension patients who were members of the chronic program disease, had hypertension pre and grade 1, and no further complication or physical impairment. The sample used unpaired numerical analytical formulas, obtained by 25 patients for each group. The intervention of an Isometric Handgrip was conducted for ten days. In one day, there is one session with 4x3 minutes.

Results: The results showed a significant relationship between isometric handgrip exercise with a decrease in blood pressure and increased patient comfort.

Conclusions: Isometric handgrip exercise can be an alternative activity for patients that influences helping to maintain stable blood pressure and reduce the physical discomfort.

Keywords: physical activity, hypertension, blood pressure, comfort

Introduction

Hypertension has a significant effect on public health (Manimala, [2015](#)). It is already a significant healthcare burden worldwide (Jørgensen et al., [2018](#)). Hypertension is the third primary cause of death globally (WHO, [2021](#)). World Health Organization (WHO) data showed that around 972 million (26.4%) worldwide suffer from hypertension, which is expected to reach 29.2% by 2025 (WHO, [2021](#)). The prevalence of hypertension in Indonesia has increased by 34.1% compared to the prevalence in 2013 by 25.8%. North Sumatra is ranked third in hypertension cases in Indonesia, with 32,944 cases (Ministry of Health RI, [2018](#)).

Uncontrolled high blood pressure can result in long-term and potentially fatal complications such as coronary artery disease, heart failure, stroke, and kidney failure. In addition, patients will experience cognitive decline and overall poor quality of life (WHO, [2021](#)). Patients with uncontrolled hypertension have symptoms such as dizziness, headache, anxiety, difficulty sleeping, shortness of breath, buzzing ears, fatigue, nosebleeds, and sunken eyes (Makruf, [2019](#)). Symptoms of hypertension cause discomfort; research shows that most hypertension sufferers, 75.2%, experience discomfort (Insana, [2018](#)).

Discomfort among people with hypertension requires a proper management. Management in



overcoming hypertension can use pharmacological and non-pharmacological therapies. Physical activity is one of the alternatives to non-pharmacological therapies developed to lower blood pressure (Carlson et al., 2014). Physical activity increases the blood flow which promotes comfort (Naldi et al., 2022). In Indonesian Public Health centers, there was an existing chronic disease program called Prolanis. Hypertensive patients received medication and an educational program with physical activity included. However, many patients still lack physical activity because they are busy with work or have no time. Physical activity is challenging due to limited time and access to sports activities provided. European and United States of America (USA) treatment guidelines recommend physical activity through Isometric Handgrip Exercise therapy (Okamoto et al., 2020).

Isometric handgrips exercises are simple physical exercises that do not require many facilities or rooms. Moreover, it does not take much time and is not affected by the weather because it can be done indoors (Owen et al., 2010). Isometric handgrip exercises reduce blood pressure in hypertension by about seven mmHg for systolic and five mmHg for diastolic (Farah et al., 2017), prevent muscle atrophy, build muscle volume, improve joint stability, and reduce edema (Rahmawati et al., 2018). Physical activities such as ergonomic stretching reduce the pain score in musculoskeletal disorders so that it will achieve a state of comfort (Andari, 2019). Increased physical activity will help increase the secretion of endorphin hormones to create comfort (Naldi et al., 2022). Therefore, researchers are interested in researching physical activity using isometric handgrip exercises to reduce pressure and improve comfort. The purpose of this study was to investigate the effect of isometric handgrip exercises on blood pressure and comfort in hypertension patients in healthcare centers.

Materials and Methods.

Design

The research design used was quasi-experimental quantitative research with control group. A repeated measure design for blood pressure variables and a pre-test and post-test design for comfort variables were used.

Population and sample

The population in this study was 523 hypertensive patients who underwent treatment at the local public Health Center. Determining samples by randomized sampling is a method of selecting samples. There were 25 subjects in the intervention group and 25 in the control group. The inclusion criteria in this study were: stage one and two uncontrolled hypertension patients who consume antihypertensive drugs with a single dose (Amlodipine or Captopril); experienced symptoms of discomfort; attended the chronic disease program (Prolanis) for at least the last three months. The exclusion criteria were hypertension patients who experience disorders in the upper extremities, such as arthritis; patients who experience further complications.

Intervention

The intervention in this study used a handgrip device with the brand "Speeds." The isometric handgrip exercise (IHE) was conducted in one session for ten days routine without stopping with a frequency of 4 x 3 minutes on both hands alternately (McGowan et al., 2017) Before the subject performed the IHE, the researcher did some simple training to the patients to obtain each subject's grip ability. The day before the intervention began, researchers measured blood pressure using a digital sphygmomanometer and comfort with the General Comfort Questionnaire (GCQ).

Furthermore, the researchers asked the subjects to do IHE at 09.00 am every day until the tenth day. Researchers visited the subject's home on the sixth, eighth and tenth days to measure the subject's blood pressure at 9:00 am. On the tenth day, the researchers also re-measured the subjects' comfort (post-test) with the GCQ questionnaire again. During the research process, from the first to the tenth day, researchers communicated via telephone to ensure that the subjects took antihypertensive drugs and conducted isometric handgrip exercises.

Instruments

Comfort measurement was measured by the General Comfort Questionnaire (GCQ). This research is adapted from the GCQ, which is adapted to the concept of comfort consisting of relief, ease, and transcendence. There were 48 questions with a response format of a four-point Likert scale. There were three questions

about relief; five about ease, questions, and four about transcendentals. The 12 questions consist of seven positive questions and five negative questions. Likert scores range from 1 (strongly disagree) to 4 (strongly agree) (Kolcaba, 2003).

Meanwhile, researchers also documented the discomfort complaints reported by the patients at the first day and which are symptoms of the presence of discomfort the subject feels. These complaints of discomfort were obtained using an observation sheet containing complaints of discomfort: headaches, stiffness, difficulty sleeping, sunken eyes, and fatigue.

Data analysis

Univariate analysis in the study used frequency distribution for characteristics using computer SPSS version 2.3 software. Bivariate analysis of this study related to the mean blood pressure of systole and diastole using the Repeated Measure Anova test, comfort measurements using Wilcoxon analysis tests, and comfort differences between the two groups using the Mann-Whitney test.

Ethical clearance

This research has received recommendations and ethical clearance from the Ethics Commission of Hangtuah University Pekanbaru. It has obtained permission from the Sihepeng Health Center. This research has gone through an ethical review procedure and was declared feasible to be carried out and is valid from July-September 2022 with Number: 515/KEPK/STIKes-HTP/VII/2022.

Results

The intervention group conducted IHE with one session per day on both hands alternately with a total duration of three minutes for ten days and continued to take antihypertensive drugs. The number of samples was 50, with 25 in the intervention group and 25 in the control group using randomized sampling techniques. The control group was not given IHE treatment and continued to take anti-hypertension drugs.

Characteristics of respondents

Table 1 shows the characteristics of respondents in both the intervention and control groups. Most respondents were the early elderly (46-55 years), female, taking the anti-hypertension drug amlodipine, have grade 1 hypertension, and have different levels of education and different types of work.

Table 1 Frequency distribution of subject characteristics (n=50)

No	Subject Characteristics	Group Intervention		Control Group	
		f	%	f	%
1.	Age				
	Age 36 – 45 years	14	56	7	28
	Age 46 – 55 years	11	44	18	72
2.	Gender				
	Man	8	32	8	32
	Woman	17	68	17	68
3.	Occupation				
	Farmer	3	12	4	16
	Self-employed	2	8	1	4
	Private	5	20	5	20
	Civil servants	6	24	3	12
	Housewives	9	36	12	48
4.	Education Level				
	Junior	6	24	6	24
	High School	11	44	14	56
	Diploma	2	8	2	8
	Bachelor	6	24	3	12
5.	Types of Drugs				
	Amlodipine	21	84	23	92
	Captopril	4	16	2	8
6.	Grade				
	Hypertension	24	96	25	100
	Grade 1	1	4	0	0
	Grade 2				

Average value of blood pressure pretest and day 6, 8, 10 intervention group and control group

Systole Blood Pressure

Based on Figure 1, it was found that there was a decrease in the average blood pressure of systole in both groups. The intervention group averaged systole blood pressure at the pre-period was 154 mmHg, on the sixth day 145 mmHg, day to day 142 mmHg, and on day ten 140 mmHg. The control group averaged systole blood pressure at pre-time of 152 mmHg on day six, 149 mmHg, day to day 148 mmHg, and day ten 148 mmHg. The mean results show that the intervention group's average systole blood pressure is significant.

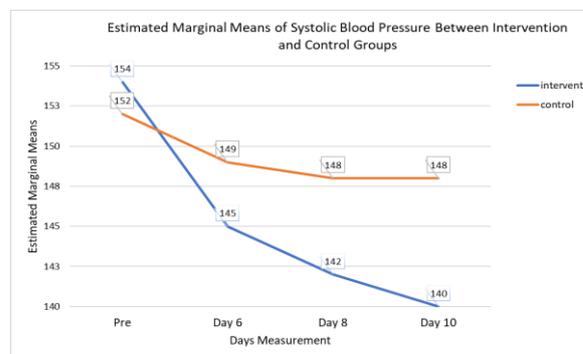


Figure 1 Average blood pressure of systole pretest and day 6, 8, 10 intervention group and control group

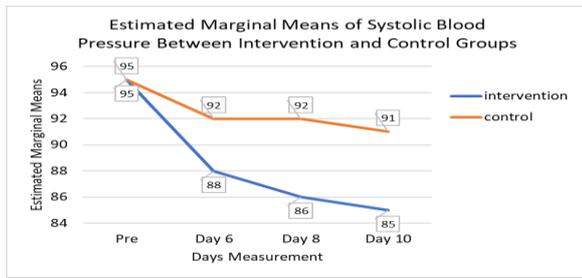


Figure 2 Average diastole pretest blood pressure and days 6, 8, and 10 intervention groups and control groups

Diastole Blood Pressure

Based on [Figure 2](#), there was an average decrease in diastole blood pressure in both groups. The intervention group averaged diastole blood pressure at pre was 95 mmHg, 88 mmHg on the sixth day, 86 mmHg on the eighth day, and 85 mmHg on the tenth day. The control group averaged systole blood pressure at 95 mmHg pre, 92 mmHg on the sixth day, 92 mmHg on day eight, and 91 mmHg on the tenth day. Based on the mean results, it shows that the average blood pressure of diastole is significant in the intervention group.

Differences in pre- and post-comfort in intervention groups and control groups

Based on [Table 2](#), it was found that for pre, in both groups there was no difference in comfort, as indicated by the value of $p = 0.159$. However, ten days after monitoring, the difference in comfort between the two groups was shown with a $p\text{-value} = 0.000$. There was an increase in comfort in the intervention group after conducting IHE for ten days.

Effect of isometric handgrip exercise on the comfort of hypertensive patients

[Table 3](#) shows the effect of isometric handgrip exercise on the comfort of hypertensive patients with a $p\text{-value} = 0.000$. The increase in comfort in the intervention group was experienced in 20 subjects, three subjects did not experience a change in comfort in the intervention group and in two subjects there was a decrease in comfort.

Table 3 Effect of isometric handgrip exercise on hypertension patient comfort

		n	Mean Rank	Number of positive ratings	Z	p-value
Pre-test and Post-test Group Interventions	Decreased comfort	2	1.50	3.00	-4.031	0.000
	Increased comfort	20	12.50	250.00		
	No change	3				
	Total	25				

Discussions

This study aims to mitigate the effect of isometric handgrip exercise (IHE) on blood pressure and comfort in patients with hypertension at the public health center. The results showed a change in the average blood pressure value in the intervention group given IHE for ten days. A significant decrease in blood pressure was seen in the intervention group compared to the control group. IHE lowers blood pressure through physiological pathways such as changes in the autonomic nervous system, vascular function, and heart rate. In the IHE procedure, the handgrip mechanism shows that a grip works in three ways: balancing the autonomic nervous system, including blood pressure, repairing damage, and encouraging blood vessels to dilate, which allows more accessible blood flow. This exercise can lower blood pressure if the individual can perform training regularly (Pratiwi, [2020](#)).

Furthermore, the shear stress mechanism happened when IHE is carried out. The shear stress mechanism is the friction of blood with the endothelium, which will trigger a longitudinal force. The shear stress mechanism causes the release of nitrite oxide (NO)-endothelium as derivatives produced by endothelial cells that are vasodilators of blood vessels. Nitrite oxide is a crucial mediator of endothelial cells, which are the inside of the lumen of blood vessels throughout the body and have an essential role as a link between blood circulation and smooth muscle cells in blood vessels (McGowan et al., [2017](#)).

Table 2 Differences in pre and post-comfort in intervention groups and control groups

Comforts	Group	n	Mean Rank	Sum of Rank	Z	p-value
Pre	Intervention	25	28.34	708.50	-1.409	0.159
	Control	25	22.66	566.50		
	Total	50				
Post	Intervention	25	34.26	856.50	-4.292	0.000
	Control	25	16.74	418.50		
	Total	50				

This study showed a decrease in the average systolic and diastolic blood pressure in the intervention group, where a decrease in blood pressure values led to a decrease in hypertension grade (from hypertension grade 1 to pre-hypertension) (Joint National Committee 8, 2014). Meanwhile, in the control group, there was also a decrease in blood pressure, but it did not significantly show a change in hypertension grades. This is in line with study from Susiladewi (2017) which showed the same results, that there was a significant difference also occurred in the average post-test results of the control group who only consumed hypertension drugs and the treatment group that carried out IHE.

Hormonally, isometric exercise will increase the secretion of the hormone b-endorphin in the body as an effect of exercise or physical activity as a natural analgesic that can provide a sense of relaxation to the body. Physical activity is one way to meet the needs of a sense of comfort. Increased physical activity will help increase the secretion of endorphine hormones. Physical activity will stimulate the pituitary gland to release endorphin hormones so that there is an increase in endorphin levels in the blood. This hormone can function as a natural sedative produced by the brain that channels a sense of comfort (Naldi et al., 2022).

Providing physical activity in the form of IHE meets the needs of comfort for people with hypertension. Kolcaba's comfort theory is used to explain the discomfort felt due to the symptoms of hypertension (relief) and then help solve it so that the client feels free from problems and is at peace, namely a decrease in blood pressure and the presence of comfort felt (Kolcaba., 2003). The GCQ questionnaire is a comfort questionnaire with the Kolcaba Comfort theory approach, where three aspects of comfort, namely relief, ease, and transcendence, are measured. The results showed significant changes in all aspects of comfort. In this study, on day 10 researchers asked the subjects about the benefits after doing IHE, and they said that they would continue to do IHE because of the benefits that had been felt. The comfort felt by the subject is due to the absence of complaints of discomfort due to the symptoms of hypertension. According to research based on Kolcaba's theory, the type of comfort that the subject feels IHE gives has entered into the transcendence type of comfort. This study also found a change in respondents' complaints before and after getting the IHE. Before getting IHE, the most common complaints felt were fatigue, headaches and stiffness, but after being given an IHE then the complaints felt were just headaches. This is because

there are still patients who experience sleep deprivation, which affects complaints during the measurement day.

Research conducted by Andari (2019) on the effect of physical activity in the form of ergonomic gymnastics stretching on the pain score of musculoskeletal disorders (MSDs), shows the results of decreasing MSDs pain scores so that the benefits that can be felt directly are the achievement of a condition of comfort. In this study, the IHE which was carried out for ten days was part of the physical activity of the results of this study and obtained a value of $p = 0.000$, which means that there is an influence of IHE administration on the comfort of hypertensive patients.

Even though this study has proven that IHE has an impact on blood pressure and comfort of hypertension patients, there is some limitation. The limitations in this study are dietary arrangements and stress levels in hypertensive patients that can affect blood pressure and discomfort have not been fully noticed by researchers.

Conclusions

This study has proven that isometric handgrip exercise (IHE) conducted regularly once a day significantly influences hypertensive patients' blood pressure and physical comfort. In addition, IHE also influences reducing physical complaints felt by patients. Isometric handgrip exercise influences controlling blood pressure in patients with hypertension. The implication of this study is that IHE can become an independent modality therapy for hypertensive patients in lowering blood pressure and increasing comfort. This exercise also can be considered an integrative therapy modality for hypertensive patients in the public health centers.

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Conflict of Interest

There is no conflict of interest to declare from this study.

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A systematic review of illness representations in patients with mild traumatic brain injury

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ABSTRACT

Introduction: Little is known about the cognitive and emotional perceptions of patients with mild traumatic brain injury, although studies showed patients experiencing difficulties in cognitive functioning and psychological impacts following their injury. This systematic review aims to identify the current literature regarding illness representation dimensions in mild traumatic brain injury and their related factors.

Methods: A search of electronic databases was completed using PubMed, CINAHL, Embase, and Web of Science, which were published from 2002 to April 2020. Studies were assessed for quality and bias, and data were analyzed using narrative synthesis.

Results: The initial search yielded 155 studies, and ten were included. The results showed that patients had negative perceptions toward their mild traumatic brain injury. Some dimensions of illness representation were found to have relationships to their post-concussion symptoms, post-traumatic stress disorder, and quality of life of mild traumatic brain injury patients.

Conclusions: The illness representations can be applied to such patients because it is able to explain symptoms and related factors that indicate their recovery process. The findings help trauma nurses to build interventions based on the dimensions of illness representations to generate appropriate perceptions after injury, and may to enhance the recovery process and outcomes.

Keywords: illness representations, mild traumatic brain injury, nursing, systematic review

Introduction

Mild traumatic brain injury (mTBI) constitutes one of the most challenging public health issues, with an estimated incidence of 100-350/100,000 people worldwide (Cassidy et al., 2004; Nguyen et al., 2016; Skandsen et al., 2019). Patients with mTBI frequently experience headaches, dizziness, fatigue (van der Naalt et al., 2017), poor quality of life (Fikriyanti et al., 2014; Voormolen et al., 2019), cognitive function impairments (Theadom et al., 2016), and psychological distress after receiving mTBI (Cassidy et al., 2014; Vikane et al., 2019).

Although an mTBI is not a life-threatening event, studies have emerged indicating that mTBI patients experience difficulties in cognitive functioning and psychological distress. The cognitive problems of such patients vary in terms of the associated recovery rates, with one study reporting that the majority of mTBI patients fully recovered within 90 days after the injury (Karr et al., 2014). In contrast, another study found that about 39% of patients with mTBI still reported cognitive complaints as of six months after being injured (Stulemeijer et al., 2007). In addition, various

psychological problems, such as anxiety and depression, have also been reported as of two months after receiving an mTBI (Vikane et al., 2019). Furthermore, one recent study found that not all patients with mTBI reported experiencing a full recovery after the injury (Nelson et al., 2019).

The recovery process after an mTBI might not always be observed by a medical professional (Theadom et al., 2016), as one three-month follow-up study of patients with mTBI reported that only 52% had even visited a medical practitioner regarding their injury (Seabury et al., 2018). Furthermore, it has been reported that most non-hospitalized mTBI patients do not experience a full recovery, with visits to outpatient clinics being common among such patients (de Koning et al., 2017). Evidence has showed that the recovery process after an mTBI influenced by patients' perceptions and behavioral responses to their condition (Var & Rajeswaran, 2012). Therefore, an innovation for posthospital follow-up with respect to patient perception is definitely important, because a study showed patients with negative perceptions of injury-related symptoms, self-control, and treatment controls on discharge from the hospital were at increased risk of impaired quality of life 3

months after discharged from the hospital (Tonapa et al., 2021).

One of the increasingly popular models that describe patients' views and responses toward illness is Leventhal's Common-Sense Model of Illness Representations (CSMIR) (Petrie et al., 2007). The CSMIR model has received increasing attention because it can explain how individuals view and adapt to changing consequences and health threats (Rice, 2012). Illness representations (IRs) are a central part of the CSMIR, and can be assessed along different dimensions of IR. IRs were originally conceived of as being comprised of five dimensions of cognitive representations, including identity, timeline, consequences, control, and causes. Each dimension reflects different perceptions or internal beliefs regarding an illness (Leventhal et al., 2001). Moss-Morris et al. (2002) used different patient populations to rebuild the dimensions of IR. Two dimensions, illness coherence and emotional representations, were added as a result. The timeline dimension was divided into two subscales, timeline-acute/chronic and timeline cyclical, and the control dimension was divided into personal control and treatment control (Moss-Morris et al., 2002). The

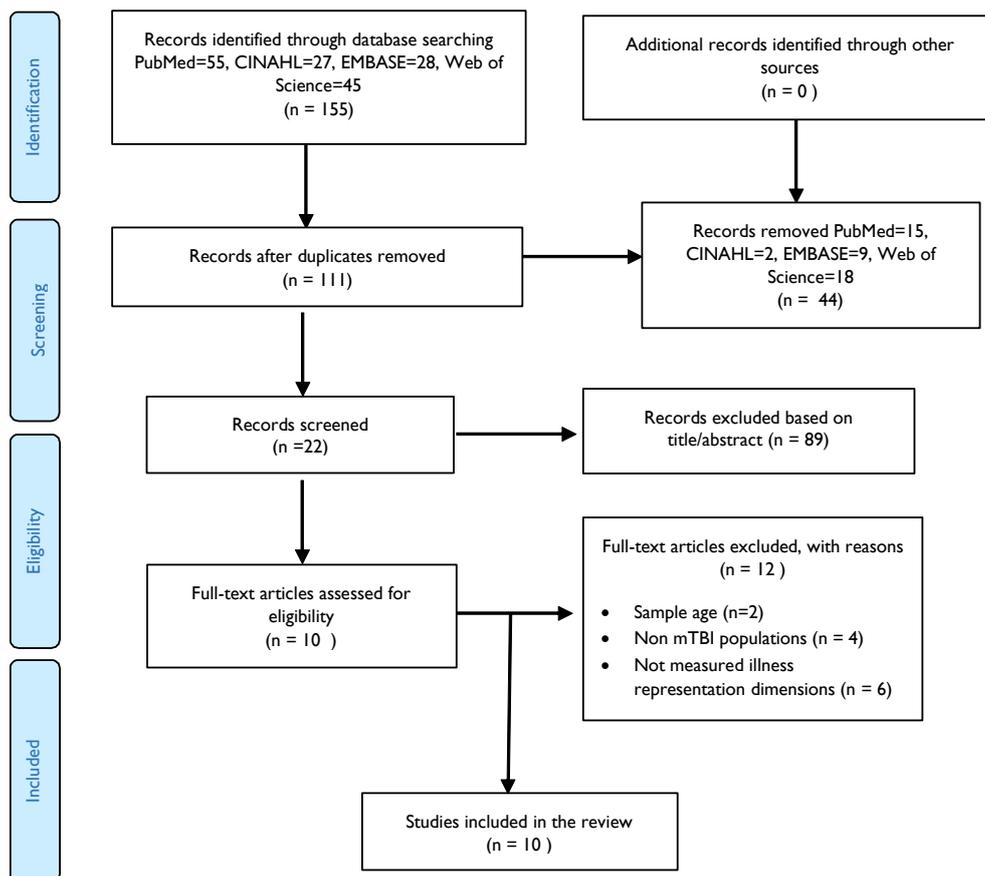


Figure 1 PRISMA Flowchart

Table 1 Search terms used computerized databases

Group	PubMed (indexed terms)	CINAHL (CINAHL headings)	Embase (Embase Emtree)	Web of Science
Search keywords group 1	(((((mild traumatic brain injury) OR (mild brain injury)) OR (mTBI)) OR (Concussion)) OR (mild traumatic brain))	mild traumatic brain injury OR mild brain injury OR concussion OR mTBI	'traumatic brain injury' OR 'head injury' OR concussion	(((((mild traumatic brain injury OR mild brain injury OR concussion OR mtbi))))
Search keywords group 2	(((((illness perceptions) OR (illness representations)) OR (common sense model illness representations)) OR (leventhal))	illness representation OR illness perception OR leventhal & johnson self-regulation theory OR self-regulation	'illness perception' OR 'illness perception questionnaire' OR 'self regulation model' OR 'common sense/exp OR 'common sense model'	(((((illness perceptions OR illness representations OR common sense model illness representations OR leventhal))))
Search keywords group 3	Group 1 AND group 2	Group 1 AND group 2	Group 1 AND group 2	Group 1 AND group 2

concept of IRs has been helpful in understanding conditions such as cardiovascular disease (French et al., 2006; Nur, 2018), kidney disease (Lin et al., 2013; Velez-Velez & Bosch, 2016), and traumatic injury (Lee et al., 2010). Early screening and prevention innovations using interventions based on reframing illness representations in trauma patients before they transition back into society would be beneficial (Lee et al., 2015; Tonapa et al., 2022). Relatedly, a study regarding IRs in mTBI reported that a patient's increasing understanding of his or her condition was reflected in various IR dimensions (such as the timeline acute/chronic, timeline cyclic, consequences, and illness coherence dimensions) (Snell et al., 2013).

There have been few studies reviewing the role of IRs and the various IR dimensions in mTBI patients. It is essential, however, to better understand the present evidence regarding IRs in mTBI, as such evidence could potentially be useful in terms of informing future clinical interventions based on the IR dimensions.

Therefore, this review aims to review the current literature regarding illness representation dimensions in mild traumatic brain injury and their related factors. The research questions were: (a) What have been the IR dimensions of mTBI patient groups studied? (b) What are the IRs related factors in patients with mTBI?

Materials and Methods

Research design

This study was a systematic review using the the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement process of identification, screening, and assessment of eligibility (Moher et al., 2009).

Search methods

A systematic review (SR) was completed using electronic searches across four databases: PubMed,

CINAHL, Embase, and Web of Science databases. The keywords or key terms used in these searches matched the Population, Intervention, Comparison intervention, and Outcome measures (PICO) inclusion criteria, and were then combined with the Boolean operator (Aromataris & Riitano, 2014). The search terms used in searching each database were slightly different based on the preferences of each database. Relatedly, the search terms were organized into three groups of keywords that were determined based on the respective databases that the terms were used to search (Table 1). The inclusion and exclusion criteria were the study: (1) concerned patients with mTBI, (2) included IR dimensions measurements, (3) included adult participants, and (4) was presented in a full-texts paper in English.

Search outcomes

A total of 155 potentially relevant articles were initially identified in the four databases. A total of 111 of those remained after duplications were removed using Endnote software. Next, the titles and abstracts of those articles were read one by one for further screening, after which 22 remaining full-text articles were further assessed for eligibility. Subsequently, 12 of those articles were excluded for various reasons (i.e., the age of the study subjects, the inclusion of non-mTBI populations, and no measurements conducted using a questionnaire that contained the dimensions IR). Finally, ten studies were deemed eligible for inclusion in this review (Figure 1).

The study selection process was carried out by two of this study's authors (MM and TSI) independently, after which they reached agreement. There was no disagreement between the two authors during the selection process.

Quality appraisal

The Joanna Briggs Institute (JBI) Critical Appraisal Checklist has been used for analytical cross-sectional

Table 2 Critical appraisal of cohort studies

Authors	Checklist criteria for cohort studies											Results (%)
	1	2	3	4	5	6	7	8	9	10	11	
Whittaker et al. 2007	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	16/22 (73%)
Snell et al. 2011	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	22/22 (100%)
Snell et al. 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	22/22 (100%)
Jones et al. 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	Y	21/22 (95%)
Jones et al. 2019	Y	Y	Y	Y	Y	Y	Y	Y	U	U	Y	20/22 (91%)
Anderson & Fitzgerald. 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	Y	21/22 (95%)

Y = yes; N = no; U = unclear. 1.Were the two groups similar and recruited from the same population? 2.Were the exposures measured similarly to assign people to both exposed and unexposed groups? 3.Was the exposure measured in a valid and reliable way? 4.Were confounding factors identified? 5.Were strategies to deal with confounding factors stated? 6.Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)? 7.Were the outcomes measured in a valid and reliable way? 8.Was the follow up time reported and sufficient to be long enough for outcomes to occur? 9.Was follow up complete, and if not, were the reasons for loss to follow up described and explored? 10.Were strategies to address incomplete follow up utilized? 11.Was appropriate statistical analysis used?

Table 3 Critical appraisal of cross-sectional studies

Authors	Checklist criteria for cross-sectional studies								Results (%)
	1	2	3	4	5	6	7	8	
Var & Rajeswaran. 2012	Y	Y	Y	Y	N	N	Y	Y	12/16 (75%)
War & Rajeswaren. 2013	Y	Y	Y	Y	N	N	Y	Y	12/16 (75%)
Sullivan et al. 2014	Y	Y	Y	Y	Y	U	Y	Y	15/16 (94%)
Bahraini et al. 2018	Y	Y	Y	Y	Y	Y	Y	Y	16/16 (100%)

Y = yes; N = no; U = unclear. 1.Were the criteria for inclusion in the sample clearly defined? 2.Were the study subjects and the setting described in detail? 3.Was the exposure measured in a valid and reliable way? 4.Were objective, standard criteria used for measurement of the condition? 5.Were confounding factors identified? 6.Were strategies to deal with confounding factors stated? 7.Were the outcomes measured in a valid and reliable way? 8.Was appropriate statistical analysis used?

and cohort studies (The Joanna Briggs Institute, 2017). More specifically, for a cohort study, a JBI checklist assessment regarding 11 qualities is used, while for cross-sectional research, a JBI checklist assessment regarding eight qualities is used. That approach was therefore taken initially in this study. Two authors independently assessed the collected studies for methodological quality, after which they came to agreement. For each study assessed with JBI checklist, each criterion was given a score (Yes = 2, No = 0, Unclear =1), and these scores were then converted to a percentage. In order to ensure methodological quality among the studies ultimately reviewed, a minimum score of 70% was required for an included study (Fernandez et al., 2020). This study followed these criteria, and no study was excluded based on its methodological quality (Table 2 and Table 3).

Data extraction and synthesis

Two authors independently extracted data from all of the included studies into Excel spreadsheets. Any disagreements during the data extraction process were resolved through un-blinded discussion. The authors extracted data into five main categories: (a) study information including the author(s), year of publication, and study country; (b) populations; (c) research design; (d) measurements; and (e) findings. Narrative synthesis was applied to analyze and explain the findings in this study (Popay et al., 2006). The process included listing data for the included studies, identifying IR dimensions, and exploring IR-related factors in patients with mTBI.

Results

Characteristics of included studies

The number of participants in those studies ranged from 30 to 245. Four of the studies were conducted in New Zealand (Jones et al., 2016; Jones et al., 2019; Snell et al., 2013; Snell et al., 2011), two in Australia (Anderson & Fitzgerald, 2018; Sullivan et al., 2014), two in India (Var & Rajeswaran, 2012; War & Rajeswaren, 2013), one in the USA (Bahraini et al., 2018), and one in the UK (Whittaker et al., 2007). Five of the studies collected their data using prospective longitudinal observations (Anderson & Fitzgerald, 2018; Jones et al., 2016; Snell et al., 2013; Snell et al., 2011; Whittaker et al., 2007), four used a cross-sectional design (Bahraini et al., 2018; Sullivan et al., 2014; Var & Rajeswaran, 2012; War & Rajeswaren, 2013), and one used a retrospective design (Jones et al., 2019).

Two different instruments developed from the CSMIR were used. They were the Illness Perceptions Questionnaire-Revised (IPQ-R) and the Brief Illness Perceptions Questionnaire (BIPQ). The IPQ-R was used in six studies (Anderson & Fitzgerald, 2018; Bahraini et al., 2018; Snell et al., 2013; Snell et al., 2011; Sullivan et al., 2014; Whittaker et al., 2007), and the BIPQ was used in four studies (Jones et al., 2016; Jones et al., 2019; Var & Rajeswaran, 2012; War & Rajeswaren, 2013).

Dimensions of illness representation in mTBI

Seven of the ten studies used all of eight IR dimensions (Anderson & Fitzgerald, 2018; Jones et al.,

2016; Jones et al., 2019; Snell et al., 2013; Snell et al., 2011; Var & Rajeswaran, 2012; War & Rajeswaren, 2013). Two studies reported using only three dimensions, namely, consequences, illness coherence and emotional representations (Bahraini et al., 2018), identity, timeline (acute/chronic) and consequences (Whittaker et al., 2007). One study used only two of them, namely, timeline (acute/chronic) and consequences (Sullivan et al., 2014). Two studies divided the measured IRs scores into three groups, namely, low, medium, and high groups (Var & Rajeswaran, 2012; War & Rajeswaren, 2013). Regarding the IR dimensions, both the IPQ-R and BIPQ measure eight dimensions. It should be noted, however that the IPQ-R specifically divides the timeline dimension into two parts (acute/chronic (A/C), and cyclical), while the BIPQ includes two items used to assess the emotional representation dimension (namely, the concern and emotions items).

Identity: symptoms that the individual patient labels as being related to their injury

Most of the studies, consistently reported that patients with mTBI identified few symptoms that appeared to be a result of their mTBI (Jones et al., 2016; Snell et al., 2013; Snell et al., 2011; Var & Rajeswaran, 2012; War & Rajeswaren, 2013).

Timeline: the progress and duration of the injury (i.e., acute, chronic, or cyclic)

Three studies reported that patients with mTBI were more confident that their injury would only affect them for a short time (Jones et al., 2016; Var & Rajeswaran, 2012; War & Rajeswaren, 2013). These findings, however, were in contrast to those of other studies, which found the mTBI patients perceived that the impacts of their injury would last longer/that they would

Table 4 Study characteristics, Dimensions of illness representation, and Factors related to illness representations

Authors, year, country	Population	Research Design	Measure	Findings
Whittaker et al. (2007), UK	73 patients with mild head injury	Longitudinal study	IPQ-R RPQ	Symptomatic mTBI was correlated with identity and consequences.
Snell et al. (2011), New Zealand	147 patients with mTBI	Prospective observational study	IPQ-R RPQ	Identity, timeline, illness coherence, and emotional representations were correlated with PCS.
Var & Rajeswaran. (2012), India	31 patients with mild to moderate TBI	Cross-sectional	BIPQ RPQ	Consequences, timeline, personal control, treatment control, concern, and emotional representations were correlated with PCS.
Snell et al. (2013), New Zealand	147 patients with mTBI	Prospective observational study	IPQ-R RPQ	Emotional representations, identity, and consequences were correlated with PCS.
War & Rajeswaren. (2013), India	30 patients with a mild to moderate TBI	Cross-sectional	BIPQ RPQ WHOQOL-BREF	Consequences, concern, personal control, and emotional representations were correlated with physical QOL, and the timeline dimension was correlated with psychological QOL.
Sullivan et al. (2014), Australia	108 volunteers with diagnosis of mTBI (n = 27), minor head injury (n = 24), concussion (n = 31), no diagnosis (n = 26).	Cross-sectional	IPQ-R NSI mBIAS	Patients who were diagnosed with mTBI perceived worse undesirability, timeline, and consequence.
Jones et al. (2016), New Zealand	245 adults with predominantly mTBI	Prospective longitudinal study	BIPQ RPQ	Greater drawing of brain damage at one month was correlated with the consequences and, timeline dimensions for recovery at six months.
Jones et al. (2019), New Zealand	92 adults following mTBI	Retrospective observational study	BIPQ RPQ	Greater drawing of brain damage at one month was correlated with perceived greater impacts on life, including in the timeline, identity, and emotional representation dimensions at four years.
Bahraini et al. (2018), USA	80 patients (mTBI and PTSD, mTBI and no PTSD, non-TBI and PTSD, non TBI and no PTSD)	Cross-sectional	IPQ-R PCL-C	Consequences and emotional representations were correlated with PTSD symptom severity, irrespective of mTBI vs non-TBI.
Anderson & Fitzgerald. (2018), Australia	61 individuals who were admitted to hospital after mTBI	Prospective observational	IPQ-R RPQ	Identity was correlated with whole PCS symptoms, and timeline-cyclical was correlated with late enduring PCS.

Abbreviations: mTBI: mild Traumatic Brain Injury, TBI: Traumatic Brain Injury, PTSD: Post Traumatic Stress Disorder, IPQ-R: Illness Perception Questionnaire-Revised, BIPQ: Brief Illness Perception Questionnaire, RPQ: Rivermead Post Concussion Questionnaire, NSI: Neurobehavioral Symptom Inventory, PCL-C: PTSD Checklist-Civilian Version, WHOQOL BREF: WHO Quality of Life BREF Version, mBIAS: mild Brain Injury Atypical Symptoms Scale

take some time to recover (Snell et al., [2013](#); Sullivan et al., [2014](#)).

Consequences: patient's perception of the severity or negative influence of their injury

The majority of the studies reported that the investigated patients perceived that their mTBI might severely impact their lives (Bahraini et al., [2018](#); Snell et al., [2013](#); Snell et al., [2011](#); Sullivan et al., [2014](#); Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#); Whittaker et al., [2007](#)). Only one study reported that the investigated patients believed that their mTBI would not severely and negatively influence their lives (Jones et al., [2016](#)).

Illness coherence: the degree to which the injury can be understood by the patient

Consistent findings regarding mTBI coherence were found in several of the reviewed studies, with several reporting patients with mTBI can comprehend their injury (Bahraini et al., [2018](#); Jones et al., [2016](#); Snell et al., [2013](#); Snell et al., [2011](#); Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#)).

Personal control: patients' beliefs about themselves that can control the injury

The reviewed studies consistently reported that the investigated patients with mTBI perceived themselves as having a high level of control over their condition (Jones et al., [2016](#); Snell et al., [2013](#); Snell et al., [2011](#); Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#)).

Treatment control: patients' expectations the medical treatments can control over the injury

The findings from the earlier reviewed studies repeatedly indicated that the included patients' viewed their medical treatments as effective in controlling their injury (Snell et al., [2013](#); Snell et al., [2011](#); Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#)). Surprisingly, however, one study reported that the investigated patients with mTBI viewed their medical treatments as in-adequate for their condition (Jones et al., [2016](#)).

Concern: how concerned are individuals toward their injury

The investigated patients with mTBI reported being relatively worried and concerned about their injury (Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#)). However, one of the studies conducted by Jones and his colleagues ([2016](#)) found that the investigated patients were less concerned about their condition as of one month after the mTBI (Jones et al., [2016](#)).

Emotional representations: the amount of negative emotion that individuals showed as results of an injury

Patients with mTBI may show emotional responses such as anger, fear, becoming upset, and even depression. This was shown by a number of the reviewed studies, which all found that most of the investigated patients exhibited a lot of emotional responses to their injury (Bahraini et al., [2018](#); Snell et al., [2013](#); Snell et al., [2011](#); Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#)). However, one of the more recent reviewed studies found that the investigated patients exhibited fewer emotional responses as of one month after their mTBI (Jones et al., [2016](#)).

Factors related to illness representations

This review found that IRs are associated with several factors in mTBI including post-concussion symptoms (PCS), post-traumatic stress disorder (PTSD), and quality of life (QOL) ([Table 4](#)). Factors that have a relationship with IRs, are statistically described with p-value <0.05. Many of the reviewed studies reported that IRs have a relationship with PCS (Anderson & Fitzgerald, [2018](#); Snell et al., [2013](#); Snell et al., [2011](#); Sullivan et al., [2014](#); Var & Rajeswaran, [2012](#); Whittaker et al., [2007](#)). One study reported a link between PTSD and IRs (Bahraini et al., [2018](#)), while another reported correlation among IRs and physical, psychological, and environmental aspects of QOL for patients with mTBI (War & Rajeswaren, [2013](#)).

Discussions

This review aims to review the current literature regarding illness representation dimensions in mild traumatic brain injury and their related factors. The results showed that patients had negative perceptions toward their mTBI. The results also showed that the IRs are correlated with PCS, PTSD, and QOL.

The findings for the identity dimension were clear in those cases in which patients with mTBI experienced symptoms. The symptoms following an mTBI include early and late-onset symptoms, which the common in physical symptoms (eg, headaches), the most frequent in affective/social symptoms (eg, anxiety), and cognitive impairments (eg, difficulty in concentration) (McAllister, [2008](#)). Studies found that patients perceived fewer symptoms (identity) as a result of mTBI (Jones et al., [2016](#); Snell et al., [2013](#); Snell et al., [2011](#); Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#)). In addition, these previous studies consistently showed that patients' perceptions of symptoms were positively related to the occurrence of PCS (Anderson & Fitzgerald,

2018; Snell et al., 2013; Snell et al., 2011; Whittaker et al., 2007). It was indicated among patients with mTBI, those with more beliefs or concerns regarding the illness label and their symptoms experienced more PCS and vice versa. Relatedly, the identity domain itself was considered an important factor. The misattribution or labeling of symptoms could influence individuals' health-related behaviors, such as adherence (Clarke et al., 2016). Moreover, it was found as a significant predictor of quality of life three months after injury (Tonapa et al., 2021). Thus, understanding how patients perceive their symptoms after injuries is essential for developing a nursing care plan.

Patients may have various expectations and beliefs regarding the duration and timeline of an mTBI. Some found that recently injured TBI patients relative to beliefs that their injury would end for briefly (Var & Rajeswaran, 2012; War & Rajeswaren, 2013), with other studies finding that, as time passes, mTBI patients tend to perceive that their injury will take more time to recover (Snell et al., 2013; Sullivan et al., 2014). Also, previous studies have noted that the expected timeline has an impact on the mTBI recovery process, psychological health, and the occurrence of PCS (Snell et al., 2011; Var & Rajeswaran, 2012; War & Rajeswaren, 2013). In other words, how patients perceive their injury duration and progress is very important, such that nurses should devote some attention to clarifying these perceptions.

Patients' perceptions of the extent to which an injury will impact their life are notably important, because those perceptions may affect their health-related outcomes. A number of the previous studies have found that strong perceptions regarding injury consequences are correlated with the perceived negative effect of brain damage, more symptomatic events, and the occurrence of PTSD (Bahraini et al., 2018; Jones et al., 2016; Jones et al., 2019; Snell et al., 2013; Var & Rajeswaran, 2012; Whittaker et al., 2007). The current review further revealed that patients generally perceive their mTBIs to have badly impacted their lives. Therefore, taking patient perceptions of mTBI consequences into account may reduce the risk of adverse outcomes.

Patient's understandings of their illness are necessarily valuable because their perceptions may influence the recovery process. This review revealed that patients with mTBI can comprehend their injury (Bahraini et al., 2018; Jones et al., 2016; Jones et al., 2019; Snell et al., 2013; Var & Rajeswaran, 2012;

Whittaker et al., 2007). One of the reviewed studies reported that illness coherence is related to the experience of PCS (Snell et al., 2011), findings that lower level of understanding of these conditions are correlated with the appearance of more PCS. Another study reported an association between coherence and PTSD severity symptoms, finding that among veterans with mTBI, PTSD symptoms were experienced in individuals with a poorer understanding of their injury (Bahraini et al., 2018). As such, providing relevant educational interventions could potentially prevent adverse outcomes.

Patient's control perceptions are considered an important factor driving post-injury behavioral adjustment. This review found that mTBI is generally considered to be a condition that can be controlled by patients (Jones et al., 2016; Snell et al., 2013; Snell et al., 2011; Var & Rajeswaran, 2012; War & Rajeswaren, 2013). Additionally, the current review found that if patients have inappropriate personal control, it may affect their QOL (War & Rajeswaren, 2013). Further, concerning treatment control, the reviewed studies indicated that the majority of patients with mTBI believe that their medical treatments are sufficient for caring for their injuries (Snell et al., 2013; Snell et al., 2011; Var & Rajeswaran, 2012; War & Rajeswaren, 2013). Personal and treatment control are notably important because past study results imply the importance of partnerships between healthcare providers with patients and further indicate the importance of patient adherence to treatment plans (Martin et al., 2005). In addition, a recent prospective study showed that patients with negative perceptions of their personal control and treatment control at hospital discharge had a higher risk of impaired quality of life three months post-discharge than those with positive perceptions (Tonapa et al., 2021). Hence, enculturing patients have an optimistic perception of themselves and treatment is warranted for nurses.

This review found that some patients with mTBI are highly concerned about their conditions (Var & Rajeswaran, 2012; War & Rajeswaren, 2013). However, it should be underlined that such perceptions may change as time passes because patients may gain more knowledge regarding the nature of their injuries and may in turn become less concerned with their conditions (Jones et al., 2016). Providing specific interventions to lead mTBI patients toward having appropriate levels of concern is among the responsibilities of nurses, especially with respect to trauma care that has physical or psychological impacts.

Showing negative emotions as a result of injury might contribute to behavioral changes. In the early phase after being injured, mTBI patients may show a lot of emotional responses, but as of a few months after the mTBI, their emotional responses may be reduced. In addition, nurses should be careful in taking emotional representations into account, because it was related to the occurrence of PCS (Snell et al., [2013](#); Snell et al., [2011](#); Var & Rajeswaran, [2012](#); War & Rajeswaren, [2013](#)) and, the perceived negative effects of brain injury (Jones et al., [2016](#); Jones et al., [2019](#)), and may also be a determinant of QOL (War & Rajeswaren, [2013](#)). For example, having more emotional responses such as anger, fear, and depression can result in patients having poorer physical and psychological health.

IRs are the foundation of the CSMIR, commonly used to determine individuals' illness-related behaviors or coping responses to mitigate health threats. The complete CSMIR can be used to capture patients' perceptions and, coping methods, which in turn impact their health outcomes. For example, different patterns of coping and patient perception were found related to patients' behaviors in enduring PCS symptoms (Anderson & Fitzgerald, [2018](#)). Also, a recent study found that Indonesian adults with extremity injuries who harbored harmful IR were less focused on using adaptive coping strategies and more on using maladaptive coping strategies, and these mediations significantly explain the lower quality of life (Tonapa et al., [2022](#)). Regarding the benefits of the CSMIR and the limited number of studies in mTBI, further studies should apply the whole model in investigating mTBI patient groups.

In sum, IR dimensions, including the identity, timeline, consequences, coherence, and emotional representation dimensions, have been found to be related to factors affecting mTBI patient groups, including PCS, PTSD, and QOL. Patients with mTBI tend to have inappropriate perceptions of their post-injury condition that may influence their recovery process. The findings of this study demonstrate the strength of the evidence regarding the value, in clinical practice, of routinely assessing patients' cognitive and emotional perceptions and preparing appropriate interventions to improve the recovery processes and outcomes of patients with mTBI.

Implication and limitations

Capturing the illness representation dimensions of mild traumatic brain injury patients is necessary to

ascertain the needs of patients who will receive trauma nursing care. Based on the findings of this review, it is important for clinical practice to regularly assess illness representations to identify what trauma interventions are needed. Furthermore, it is essential to build interventions based on illness representation dimensions to ensure that patients have appropriate interpretations of their injuries, which can enhance the recovery process and health outcomes for patients with mild traumatic brain injury. For future researchers, these results can be used as a basis for further research, especially by considering the use of the entire Common Sense Model of Illness Representation model by adding coping assessment. This will be useful for providing a more comprehensive basis for developing intervention studies.

Three of the ten studies included in this review did not include all eight of the IR dimensions. It is possible that the exclusion of several dimensions could have fundamentally affected the findings of these studies.

Conclusions

Understanding the IR dimensions of mTBI patients and their related factors can help trauma nurses ascertain the needs of patients receiving trauma nursing care. Some dimensions of IR have been found to be related to factors affecting mTBI patient groups, including PCS, PTSD, and QOL. It is crucial in clinical practice to address this issue by focusing on the IR dimensions, such as by conducting routine IR assessments and providing interventions to make patients more adherent to their treatment and post-injury recovery. Thus, it would be beneficial to acknowledge the IR dimensions as a target for nursing interventions. The results of this study may provide critical evidence for influencing the recovery process and outcomes of patients with mTBI.

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Author contribution

MM & LBO conceiving and designing the work. MM, & TSI completed data collection. MM, LBO, TSI & AH took responsibilities for analyzing and interpreting the data. MM & LBO drafted the manuscript. MM, LBO, TSI

& AH revising the manuscript to make important changes in content. All authors have read and approved the final version for submission

Conflict of Interest Statement

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Exploring the supportive care needs for people with cancer undergoing chemotherapy: a qualitative descriptive study

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ABSTRACT

Introduction: Chemotherapy's side effects cause people with cancer to encounter difficult situations that might impact their supportive care needs. Exploration of supportive care needs may assist the nurse in improving the quality of life of people with cancer undergoing chemotherapy (PwCUC). Therefore, this study aims to explore the supportive care needs of PwCUCs.

Methods: A qualitative descriptive study from November 2021 until May 2022 was utilized through in-depth interviews and Focus Group Discussions (FGD) in three public health centers in Jember, Indonesia. Data saturation was achieved after the researcher conducted an in-depth interview of 27 informants and FGD of 13 informants. A total 40 informants from PwCUCs, family of PwCUCs, doctors, and nurses was recruited based on inclusion criteria using purposive sampling technique. The researcher developed an in-depth interview and FGD guidelines to collect the data. Six-step thematic analysis was used. Triangulation, member-checking, and thick description were performed to maintain trustworthiness.

Results: The study yielded four themes that represent participants' voices. These were 1) social support needs, 2) accompanying needs, 3) information needs, and 4) healthcare service support.

Conclusions: Supportive care needs for PwCUCs is a complex and contextual phenomenon. This study revealed that PwCUCs required individual, social, and healthcare service support to meet their needs. Therefore, further study is required regarding developing a nursing care plan for PwCUCs based on cultural-sensitive supportive care needs.

Keywords: healthcare service system, people with cancer, supportive care needs, qualitative study

Introduction

Cancer is still a major public health issue across the world. Cancer is the cause of death in one in six persons (WHO, [2020](#)). In 2020, there were 19.3 million new cases with mortality. up by 10 million (Sung et al., [2021](#)). Cancer incidences in Indonesia grew to 2.6 million in 2021, up from 1 million in 2018 (Ministry of Health, [2022](#)). Furthermore, in SDGs issues, globally, premature death (30-69 years) because of cancer decreases but insignificantly. Whereas, the SDGs aim to reduce one third premature death by 2030 relative to 2015 level

(Bennett et al., [2020](#)). As a result, reaching this goal will need a concerted effort. The WHO already has a priority plan for dealing with cancer issues, particularly in order to meet the SDG's objectives. Improving the quality of treatment for people with cancer is a part of their aims (WHO, [2020](#)).

One of the cancer treatments is cytotoxic chemotherapy. Chemotherapy can improve the quality of life of people with cancers and also increase their life expectancy (Parkes et al., [2019](#)). In Indonesia, people with cancer with chemotherapy are 24.9% of the total



people with cancer (Ministry of Health, [2018](#)). However, chemotherapy can affect the physical, psychological, and social life of people with cancers (Suwankhong and Liamputtong, [2018](#)). People with cancer undergoing chemotherapy have a complex problem. In general, chemotherapy will affect the patient's physical condition due to the side effects and will cause trauma to daily life activities (Wampaalu et al., [2016](#)). Moreover, people with cancer with chemotherapy need adequate social support in facing the chemotherapy process, which is a long-term care treatment (Shahrokni et al., [2020](#)). Therefore, people with cancer and during the chemotherapy process make PWC have complex needs and needs to be explored.

Supportive care is defined as providing health promotion, curative support, palliative care, and bereavement services to patients and caregivers that meet their physical, psychological, social, informational, and spiritual needs during their diagnostic, treatment, or rehabilitation phases (Boyes, Girgis and Lecathelinais, [2009](#); Hui et al., [2013](#); Hui, [2014](#)). Supportive care aims to improve the QoL of patients with severe or life-threatening diseases (Choi et al., [2022](#)). In the context of people with cancer, supportive care is constructed from human needs, cognitive appraisal, and coping adaptation conceptualized from the cancer experience (Fitch, [2008](#)). In previous study in the cancer context, several studies regarding supportive care needs have been performed in quantitative, qualitative and systematic review approaches. In Iran, a qualitative study on cancer patients found that the main needs of cancer patients are deficiencies in disease management and the importance of a sympathetic and knowledgeable caregiver (Mazhari and Khoshnood, [2021](#)). In another context, Chua and Tan ([2020](#)) found that the supportive needs of cancer patients with ambulatory treatment including chemotherapy in Singapore were focused on psychosocial and supportive care needs, information needs and information delivery by health professionals.

Furthermore, Boyes, Girgis and Lecathelinais ([2009](#)) have formulated a tool to measure supportive care needs for cancer patients with five domains. This questionnaire has been performed in Brazil for all cancer patients with ambulatory treatment (Calvo, Sepulveda-Carrillo and Judith, [2017](#)), in Japan for colorectal cancer (Sakamoto et al., [2017](#)), in Indonesia for gynecological cancer (Putri et al., [2018](#)) and in the Netherlands for head and neck cancer (Jansen et al., [2016](#)). Those studies explored the supportive care needs in various cancer patients' contexts using five domains with different results. Nonetheless, many scholars argue that

expanding supportive care needs through a subjective view could see the nature of supportive care needs in people with cancer holistically and comprehensively (Chua and Tan, [2020](#); Mazhari and Khoshnood, [2021](#); Khan et al., [2022](#)). In another research approach, Wabula, Yunitasari and Wahyudi ([2020](#)) and Webb et al. ([2021](#)) reviewed quantitative and qualitative articles to expose a synthesis of support and care needs in people with cancer.

Although existing studies have discussed supportive care needs in many contexts and approaches, surprisingly, studies focusing on cancer patients undergoing chemotherapy (PwCUC) are rarely conducted, even though the complex conditions of chemotherapy may differ from cancer with other treatments. Furthermore, in Indonesia, studies discussing supportive care needs are scarce. From the literature review results, only one quantitative study was found related to supportive care needs, but focusing on gynecological cancer, not general cancer cases.

In addition, in terms of meeting the needs for supportive care, PwCUCs are linked to other social support systems (Tamulee, [2013](#); Røen et al., [2019](#)). Families and healthcare providers are the significant support systems that influence PwCUCs in meeting their supportive care needs (Berman et al., [2020](#)). Description of supportive care needs requires study with multi-perspective views from other systems of PwCUCs. Supportive and care needs are multidimensional, contextual, subjective and ambiguous; this study aimed to explore the supportive and care needs of PwCUCs using a qualitative approach.

Materials and Methods.

This study utilized a qualitative descriptive study design (Doyle et al., [2020](#)). In addition, the Multiple Perspective Interviews (MPI) method was used for triangulation analysis. MPI is a type of qualitative analysis that involves the use of multiple informant groups. MPI can also be used to preserve the credibility of qualitative data (Vogl, Schmidt and Zartler, [2019](#)). Three public health center areas: Kaliwates, Jember Kidul, and Gladak Pakem, were involved in the Jember region of Indonesia. These three public health centers have the highest number of cancer patients in the Jember area. This research was conducted on PwCUCs diagnosed as cancer by a doctor, registered in the public health center, aged 18-70 years, able to communicate without memory and hearing impairment, and had

chemotherapy treatment in one of the private hospitals in Jember.

Moreover, in seeing multiple perspectives, other informants were recruited. Other informants are families of PwCUCs at least 18 years old, have no memory impairment, average hearing ability, can communicate and live together with patients and care for patients' daily lives for more than one year during the chemotherapy process. Furthermore, the informants were also healthcare providers (doctors and nurses) who worked in the hospital or community. Purposive sampling was utilized in this study.

The data were collected through in-depth interviews and Focus Group Discussions (FGD) with three groups of informants (PwCUCs, family of PwCUCs and healthcare providers). As many as 27 informants were recruited for in-depth interview: nine PwCUC, eight families of PwCUCs, eight nurses, and two doctors. In-depth interviews used interview guidelines and were conducted in two sessions for each informant. The in-depth interview duration was 40-60 minutes per session face-to-face with informants and were held from November 2021 to March 2022. All researchers conducted in-depth interviews at the informant's home and used a tape recorder. Researchers obtained patient address information from medical records in one of the private hospitals in Jember. Saturation of data is an indicator of the number of recruited informants. Researchers discussed to determine data saturation in every informant. The list of questions from the in-depth interview can be seen in Table 1. The Indonesian language was used in the in-depth interview and FGD.

Moreover, in the FGD method, three groups were recruited. There were four informants in PwC undergoing chemotherapy, four in the family of PwC undergoing chemotherapy, and five healthcare providers (HCP) including one doctor and four nurses. FGD was conducted in one session of 60-90 minutes. The FGD was held in April-May 2022. The FGD was conducted online through the Zoom application and the FGD process recorded using application tools. To ensure that the online FGD activities ran well, the researchers added inclusion criteria for informants in the FGDs by having a compatible device for Google/Zoom meetings, either mobile phones or personal computers.

MZA conducted both in-depth interviews and FGDs and KN provided input regarding the interview guide. All transcripts of both in-depth interviews and FGDs were translated into English. It is important because the research was conducted in Indonesia, and KN is a non-Indonesian researcher. For the translating framework,

Table 1 List of questions for informant in in-depth interview and FGD

List of Questions For PwCUC	
1.	How do you feel about conducting chemotherapy treatment?
2.	Could you tell me, what your important needs are during chemotherapy?
3.	How does your family respond to your condition?
4.	How do HCPs or volunteers near you respond to your condition?
5.	How do you fulfill your basic needs when you undergo chemotherapy?
6.	What support and care do you expect from family, HCPs and volunteers related to your condition now?
For family of PwCUC	
1.	What do you think about chemotherapy?
2.	As your experience, what do people with cancer want during her/his treatment?
3.	Do you think people with cancer are satisfied with the healthcare service and volunteering service?
4.	As family, what do you expect from HCPs and volunteers related to your family's condition?
For HCP	
1.	What do you think about PwCUCs?
2.	Could you talk about your experience during caring for a PwCUC?
3.	In your experience, what do people with cancer want during her/his treatment?
4.	Do you think people with cancer are satisfied with the healthcare service and volunteering service?

the researcher used the Abfalter, Mueller-Seeger and Raich (2021) framework translated from all stages.

Furthermore, researchers used code to facilitate analysis and maintain the confidentiality of informants. The codes used for in-depth interviews and PwC FGDs were IDI-P 1-9 and FGD-P 1-4. Then, the code for the family of a PwC was IDI-F 1-8 and FGD-F 1-4. Lastly, IDI-H 1-10 and FGD-H 1-5 were used for HCPs.

In this study, researchers utilized a six-step thematic analysis from Braun and Clarke (2019): Familiarizing the data: Generating initial codes: Searching for themes: Reviewing themes: Defining and naming themes: Producing the report. After making transcripts of all in-depth interviews and FGDs, MZA and KN did the initial codes from each sentence with meaning and searching themes. Next, KN reviewed the themes based on the supportive care needs' theoretical framework to help researchers to analyze the themes. Finally, MZA and KN defined and named the themes and produced the report. In addition, researchers utilized multiple perspective interview analyses. Researchers compared each datum to understand contrasts and overlaps in every group of informants (Vogl, Schmidt and Zartler, 2019). After compiling the themes and making a report, MZA returned the analysis results to the informants for correction and feedback. Researchers utilized ATLAS.ti

version 8.4.4 to help manage data. To maintain quality for this research report, the 32 items of the Consolidated criteria for Reporting Qualitative Research (COREQ) checklist were utilized (Tong et al., 2012).

In maintaining accurate interpretation (credibility), the researcher used triangulation in informants and methods. In the triangulation technique, given a complete result, the researcher recruited not only PwCUCs as informants but also the family of PwCUCs and HCPs. Also, triangulation data utilized the FGD method to complement the in-depth interview method. Moreover, the researchers also did member checking by involving 31 informants to provide feedback on the themes that had been made. In ensuring that the result can be transferred in another context (transferability), the researcher conducted a thick description by contrasting and comparing the results with experienced researchers. The researcher conducted an audit trail to maintain the stability of findings (dependability and confirmability). Researchers recorded the research process from the beginning to the end of the research process.

This research obtained a permit from The Khon Kaen University ethics committee with number HE642139 on August 12, 2021. The researcher has also obtained permission from the Jember Health Department, the Public Health Centre and the private hospital. When collecting data, the informants could choose to withdraw without further prejudice. The researcher ensured that all informants remained anonymous. In addition, the researcher verified that the informants' privacy and confidentiality were protected. The researcher did not use a specific name and relied on the code instead. The researcher also kept all documents from informants securely.

Results

Forty participants agreed to be informants in the in-depth interviews and FGDs from 42 targets of the participants who met the inclusion criteria. One PwCUC and one family of a PwCUC refused to be an informant because of family conditions. However, using 40 informants, the data met saturation. The majority of informants of PwC, either in-depth interview or FGD, were married women with a mean age of 52.3±10.9 and 44±6.3, respectively. In the family of PwC, the majority in in-depth interviews were men and a husband. The FGD group mainly included the husband and the same proportion between men and women. The average age of the family of PwC was 47.9±13.1 in an in-depth interview and 40.7±12.6 in FGD. Furthermore, in HCPs,

Table 2 Informants' characteristics in in-depth interview

Informant Characteristic	Frequency	Percentages (%)
PwCUC (n=9)		
Gender		
Female	8	88.9
Male	1	11.1
Age (Mean±SD)		52.3±10.9
Married status		
Married	6	66.7
Widowed	3	33.3
Level of Education		
Elementary school	1	9.1
Junior high school	0	0
Senior high school	3	33.3
Bachelor	5	55.6
Duration of Chemotherapy		
2 years	4	44.4
More than 2 years	5	55.6
Family of PwCUC (n=8)		
Gender		
Female	3	37.5
Male	5	62.5
Age (Mean±SD)		47.9±13.1
Married status		
Married	8	100
Widowed	0	0
Level of Education		
Elementary school	0	0
Junior high school	0	0
Senior high school	2	25
Bachelor	6	75
PwC relationship		
Husband/wife	4	50
Child	3	37.5
Sister/brother	0	0
Others	1	12.5
HCPs (n=10)		
Gender		
Female	5	50
Male	5	50
Age (Mean±SD)		38.7±9.2
Profession		
Chemotherapy nurse	2	20
Public health center's nurse	6	60
Chemotherapy doctor	1	10
Public health center's doctor	1	10

the majority was a nurse, either in FGD or in-depth interview.

The in-depth interviews had the same proportion between men and women, with 38.7±9.2 in average age. However, in FGD, all informants were women with 34.2±3.6 in average age. Details can be seen in [Table 2](#) and [Table 3](#).

All researchers analyzed transcript results from in-depth interviews and FGDs. Using MIP analysis, researchers also compared each group of informants, namely PwCUCs, the family of PwCUCs, and HCPs. Twenty-seven codes were found in in-depth interviews and FGDs. Then the researchers extracted four themes based on grouping codes that had been discussed together. The themes are 1) social support needs, 2) accompanying needs, 3) information needs, and 4) healthcare service support.

Table 3 Informants' characteristics in in FGD

Informant Characteristic	Frequency	Percentages (%)
	PwCUC group (n=4)	
Gender		
Female	4	100
Male	0	0
Age (Mean±SD)	44±6.3	
Married status		
Married	3	75
Widowed	1	25
Level of Education		
Elementary school	0	0
Junior high school	0	0
Senior high school	1	25
Bachelor	3	75
Duration of Chemotherapy		
2 years	2	50
More than 2 years	2	50
Family of PwCUC group (n=4)		
Gender		
Female	2	50
Male	2	50
Age (Mean±SD)	40.7±12.6	
Married status		
Married	3	75
Widowed	0	0
Not married	1	25
Level of Education		
Elementary school	1	25
Junior high school	0	0
Senior high school	1	25
Bachelor	2	50
PwCUC relationship		
Husband/wife	2	50
Child	1	25
Sister/brother	1	25
Others	0	0
HCPs group (n=5)		
Gender		
Female	5	100
Male	0	0
Age (Mean±SD)	34.2±3.6	
Profession		
Chemotherapy nurse	2	40
Public health center's nurse	2	40
Chemotherapy doctor	0	0
Public health center's doctor	1	20

Theme 1: Social support needs

Based on the informants' results, the social support needs of PwCUCs consisted of environmental, peer, and family support. In environmental support, the informants stated that environmental management such as Public Health Center (PHC), neighbors and surroundings from PwCUCs needed optimal management. Moreover, supportive management of the environment can reduce PwC stress and is an essential requirement for PwCUCs. It can be seen in the statement in the in-depth interview:

"We need support from neighbors, not only from family. Neighbors know more about our condition.

Support from the environment, such as neighbors or from cadres, is important to us." (IDI-P 7).

"Apart support from the family, also support from the Puskesmas (PHC), from the surrounding environment support, it's also possible, cancer patients need support like that." (IDI-H 2)

Then, the need for peer support is part of PwCUC's social support needs. The peer support referred to support from cancer survivors and close friends. The informant explained that having peer support, both from cancer survival and close friends, can have a different impact and increase PwCUCs' resilience in dealing with their condition, as in the quote below:

"Sometimes a cancer survivor has more support (from friends) than family in my opinion." (IDI-P 9)

"It might just be prayer and support from those who were close to me to pray for me to be tough to face this problem. Then, I could be resilient, it's been incredible for me."(IDI-P 3)

Lastly, the social support needs expressed by the informants were family support needs. Informants explained that family support could come from husband/wife, children, and siblings. The informants also explained that the form of support is a prayer given to PwC. In addition, support can take the form of helping all PwCUCs' needs, both physical and psychological. Several informants also mentioned that support motivates PwCUCs to be more decisive in dealing with their illness. It can be seen in the quotes from PwCUCs below:

"Family is really important, it's important to me. If anything happens, first, I will contact the family." (IDI-P 9)

"Support from my family is very meaningful. They helped me when I was weak." (FGD-P 2)

A HCP also confirmed that family needs are essential support for PwCUCs. The HCP said:

"In my opinion, they need support from my family about the disease, right? Some chemotherapy programs are long, some are short, so it needs support from family too." (FGD-H 2)

Theme 2: Accompanying needs

According to informants, accompanying needs are the needs for PwCUCs to be accompanied by family, peers, or significant others, such as volunteers. Accompanying is a "being there" and is not deeply involved in the patient's treatment process.

Accompanying needs focus on intimacy and the presence of a significant other. The situation stated by an informant was that when a friend or colleague who was there accompanied him at home or in the hospital, it was thought that he was assisting the patient in the healing process without any further support. Accompanying needs can be seen in the quotes below:

"I also involve the children to accompany my mother while in the hospital. My child is waiting with my mother and my mother feels that there is still someone who cares, so she doesn't feel lonely." (IDI-F 2)

"Accompanying patients has reduced this pain percentage. The patient is getting weaker, sometimes he is sad, sometimes he is anxious. If someone accompanies them, it can at least reduce the pain a little bit." (IDI-F 4)

Theme 3: Information needs

Information needs based on findings from informants are the need for openness and clarity of information about the disease from HCPs, clarity in questions from PwCUCs and re-energized information. PwCs want clarification of questions arising from the disease and its treatment process from HCPs or volunteers. One of the PwCUC informants stated that:

"Many question that need to be clarified. It (cancer) is no ordinary disease, so many questions from me, it is so important." (IDI-P 2)

Moreover, information about treatment delivered by informants is an essential requirement for PwCUCs. Informants, in detail, stated that they needed information about problems after chemotherapy, mental treatment and cancer treatment. One informant stated that:

"From my mother's stories, there are still many cancer people who don't know about cancer, such as the treatment and how to treat it, how it is, and information about mental treatment as well." (FGD-F 2)

Then, information about the medication process was stated by the informants as information needs from PwCs. Informants revealed administration process and document preparation is an essential requirement for PwCs. The informant said:

"Sometimes at the first, it we do not know, like in this hospital, what we should do?" (IDI-F 3)

Another information needed by PwCs undergoing chemotherapy is re-energize information. Informants mentioned that sometimes PwCs and their families experience bad conditions due to cancer and the

chemotherapy process. Thus, re-energized information needs to be provided by HCPs or volunteers to patients and families to strengthen their psychological state. An informant stated that:

"Most people, if someone suffers from cancer, they immediately, that is, it was a drop. So they need information on how to re-energize patients and families." (IDI-H 3)

Theme 4. Healthcare services support

Based on the informants' subjective experience, healthcare services support is a PwCUC requirement that must be met in the chemotherapy process. The desired support is support from medical equipment and HCPs. Support from medical equipment includes the completeness of medical equipment in the chemotherapy process, both in the hospital and in the community (at home or at PHC). One informant said:

"I hope that there is more complete medical device, sir. Not only in this hospital but also in other hospitals in Jember." (IDI-P 4)

Healthcare provider support was also widely disclosed by informants. The support needed is how the nurse or doctor treats PwCUCs. Informants mentioned that good communication and a professional HCP is a form of HCP support. Informants revealed that good communication in HCPs should be better. One informant said:

"Communication from nurses also needs to be better to support us. Sometimes I don't understand what the doctor is saying about my condition. Nurses should help us to translate the doctor's language so that it is more understandable." (IDI-P 5)

Then, informants revealed that HCPs should also be professional in caring for PwCUCs and their family. Informants mentioned that nurses should be thoughtful in carrying out their caring activities. Informants stated that PwCUCs mostly had high sensitivity due to their illness. Furthermore, PwCUCs also need special attention from HCPs. Informants think that PwCUCs have different conditions from people with other diseases. Some informants expressed:

"Nurses should be more thoughtful, sir. They have to be more patient in dealing with cancer patients because cancer patients are really sensitive." (IDI-P 6)

"Cancer patients should get special attention from HCP for these rather severe diseases, such as cancer. I personally think the patient should be considered as a relative by the HCP." (FGD-F 1)

“Cancer patients are really different from patients with cases like the usual internal medicine. It’s very different.” (IDI-H 8)

Discussions

This study revealed four themes: social support needs, accompanying needs, information needs, and health care service support. The first theme revealed was social support needs. Environmental, peer, and family support are social support needs conveyed by informants. This theme is similar to social, spiritual and emotional in Webb's framework. Moreover, in Boyes' framework, social support needs are similar to patient care and support, although the emphasis on each domain is slightly different. In this study context, environment, peer and family support are part of social support needs. Peer support is the need for cancer patients to get information, strengthen their emotions and empower themselves (Ziegler et al., 2022). Family or caregiver is also a component of the social aspect of cancer patients as their support system. A qualitative study from Mazhari and Khoshnood (2021) in Iran states that one of the needs of cancer patients is the need for sympathetic and knowledgeable caregivers. Next, environmental support is also needed by cancer patients. The environmental aspect is part of the social support for cancer patients. In their scoping review, Lehto et al. (2021) found environmental aspects, especially the natural environment, play a role in improving the psychological status of cancer patients and their families. However, a more profound research exploration in environmental needs aspect in PwCUCs is needed.

Second theme revealed was accompanying needs. Informants argued that accompanying needs are the needs for PwCUCs to be accompanied by family, peers, or significant others, such as volunteers. This theme is not explicitly seen in the domains presented in previous conceptual frameworks, either Boyes et al. (2009) or Webb et al. (2021). However, if this theme is analyzed from its context and essence, accompanying needs are part of the sexual needs of cancer patients. The stressing point of this equation is the intimacy of cancer patients' partners, children, or close friends. The results of quantitative research by Hawkins et al. (2009) in Australia stated that there was a decrease in intimacy, which is part of sexual needs, in cancer patients. Wang (2022) added that countries in the Asian region still have barriers to conveying and expressing those related to their sexual needs. It is one of the reasons intimacy in this context appears as accompanying needs, not sexual

needs. Furthermore, chemotherapy treatment is a long-term treatment for cancer patients, requiring PwCUCs to rely on close friends or family for support during their treatment.

Third theme revealed was information needs: openness and clarity of information about the disease from HCPs, clarity in questions from PwCUCs and re-energized information are information needs argued by informants. Information needs are similar with Webb or Boyes' frameworks. However, in the previous frameworks, the informational need is not the primary need for cancer patients. Webb et al. (2021) Webb revealed that informational needs are part of work-related illness and argued that information needs are related to cancer treatment support. Khoshnood et al. (2019) also found that cancer patients in Iran needed information about cancer diagnosis and treatment. In this study, the information needs found were beyond that. Informants wanted information not only related to treatment and disease but also about how to come to terms with the condition and how the cancer patient could recover from the side effects of his chemotherapy.

Fourth theme revealed was healthcare services support. For the healthcare service system, the Webb or Boyes' framework focuses on the HCP's ability to treat patients related to how the HCP provides services and treats patients. Mazhari and Khoshnood (2021) found that healthcare equipment is also a need expressed by PwCUC. However, this research was conducted in a rural area, so access to services for cancer patients is still limited. In contrast, the previous studies were done in the cancer centre in urban areas with complete equipment and an optimal health support system.

Supportive care is a concept developed by nursing scholars in 1994. Fitch created a framework related to specific supportive care for cancer patients. This framework aimed to assist nurses in preparing care planning for cancer patients with a holistic and multidisciplinary approach (Fitch, 2008). This framework also explains that supportive care should be patient-centered because the needs of cancer patients vary. Therefore, a study with a subjective approach is needed to explore the needs of cancer patients. The theme in this study can serve as a basis for helping nurses in the hospital and the community to develop nursing care plans for PwCUCs based on Fitch's framework.

The qualitative approach is one of the strengths of this study. It can provide in-depth results on the support and care needs of PwCUCs. Also, this study involves various perspectives to provide comprehensive results. Furthermore, the research used multi-method to

triangulate data and enrich research results. Subjective view, besides having strengths, also has weaknesses in seeing phenomena or social problems. This view allows the resulting theme to be influenced by the author. However, we used bracketing techniques and member-checking with another author to minimize subjectivity. Moreover, in limitations, we were not quite sure whether our findings were generalizable to the greater PwCUC population because we only interviewed a small percentage of informants.

Conclusions

This qualitative study gives insight into the supportive care needs of people with cancer undergoing chemotherapy. PwCUCs need not only individual support but also social support and support from healthcare services in dealing with their condition. Healthcare services support has an essential role that needs to be addressed. PwCUCs have to be investigated more in terms of healthcare services support and its relationship to the health system to improve PwCUCs' quality of life. As a result, this study can serve as a foundation for nurses to build supportive care planning for PwCUCs, particularly in community settings involving the healthcare service system.

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Conflict of Interest

The authors have declared no conflicts of interest.

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Resilience after stroke and its correlation with functional independence

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ABSTRACT

Introduction: Resilience involves the ability to adapt to the conditions of disability experienced by post-stroke patients. The purpose of this study was to investigate the resilience of post-stroke patients and determine the relationship with the patient's functional ability.

Methods: This research was a cross-sectional study that included 122 post-stroke patient respondents who had undergone a stroke recovery phase for 5 - 8 weeks. Selection of the sample used simple random sampling method. Univariate analysis was used to describe the characteristics of each respondent. Bivariate analysis was carried out to determine the relationship between resilience and functional abilities of respondents, especially functional abilities related to activities of daily living.

Results: The results of this study found that there was a significant relationship between resilience and functional ability of the respondents ($p = 0.000$; 95% CI).

Conclusions: Respondents with a high level of resilience can make better use of their abilities so that they can increase their functional independence abilities. Thus, it can achieve a better quality of life improvement.

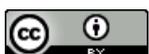
Keywords: activities of daily living, functional independence, resilience, stroke

Introduction

Stroke is responsible for an estimated 5.5 million deaths worldwide (Méndez-Gallardo et al., 2020). Based on the results of basic health research / Riset Kesehatan Dasar (Riskesdas) in 2018, stroke begins to occur at the age of 15 years and the highest prevalence is at the age of 75 years and over (Kementerian Kesehatan Republik Indonesia, 2019). Based on the age group numbers, the highest incidence of stroke occurred in the age group of 55-64 years (33.3%) and the lowest occurred in the group aged 15-24 years (Kementerian Kesehatan Republik Indonesia, 2019). Stroke causes severe long-term disability (Hollist et al., 2021). Disability is one of the sequelae of stroke that affects the patient's quality of life (Chen & Tung, 2021) and affects activities of daily living (Tiwari et al., 2021; Wassenius et al., 2022). Approximately 3/4 of stroke patients experienced

paralysis and experienced severe disability rates of up to 40% or more (Li et al., 2020). Post-stroke dysfunction, which includes disturbances in movement, language, and cognition, affects the patient's activities of daily living (ADL) (Li et al., 2020). Stroke sequelae also have negative effects on patients' self-care abilities and social participation (Lv et al., 2021). The inability to carry out activities is not only related to physical, cognitive, or emotional disturbances, but also to the ability to adapt (Wassenius et al., 2022).

Resilience involves the ability to adapt to stressful events that can affect the impact of major health crises and reduce the damage caused by stress (Chen & Tung, 2021). Adaptation to stroke sequelae requires balancing all aspects of life including physical and psychological. The results showed that resilience was protective against the limitations of activities of daily living (ADL)



and modifies the relationship between the emergence of new chronic conditions and the occurrence of subsequent disabilities. This shows that individuals who had a higher level of resilience experience a lower level of disability (Chen & Tung, [2021](#)). Resilience involves a dynamic development process that enables individuals to bounce back from adversity (Chen & Tung, [2021](#)).

In post-stroke patients, less adaptive psychological factors have been shown to be negatively related to participation over time, while resilience has been shown to act as an independent predictor of quality of life and physical independence (Norvang et al., [2022](#)). For this reason, resilience is a factor that needs to be considered in optimizing the functional abilities of patients after stroke, including their ability to care for themselves. So far, various efforts have been made to increase the participation of post-stroke patients in care, but have not examined or measured patient responsibility in achieving increased functional abilities independently. However, it has not been studied in more depth to what degree the patient's resilience has an effect on improving the functional independence status of post-stroke patients. Previous research found that resilience had a significant effect on ADL ability in two weeks up to the first three months after stroke, but after three months there was no significant effect on changes in ADL ability in post-stroke patients, thus recommending the need to link resilience with the psychosocial aspects of post-stroke patients (Norvang et al., [2022](#)). In this study, respondents were selected by considering the psychosocial aspects of patients, such as those who have a passion for rehabilitation, enthusiasm for carrying out daily activities according to their abilities, including positive thinking and drawing closer to God.

Resilience also includes a deeper understanding of the relationship between intrapersonal, interpersonal, and socio-ecological constructs because it has been highlighted as important for understanding the neurophysiological and neuropsychological mechanisms of resilience in post-stroke patients. Interventions carried out to increase the patient's functional independence require active participation from the patient. This requires patient resilience. A person who is resilient is considered to have comprehensive psychological resources needed to overcome adverse events, including self-confidence, personal competence, and interpersonal interactions (Chen & Tung, [2021](#)). For this reason, this study aims to investigate the resilience of post-stroke patients and determine its relationship with the patient's functional abilities.

Materials and Methods

Study design

This research was a correlation study using a cross-sectional approach. This research was conducted from February to July 2022 at the Badan Layanan Umum Daerah (BLUD) rehabilitation unit of Bahteramas Hospital and Kendari City Public Hospital, Southeast Sulawesi, Indonesia.

Sample

As many as 122 respondents to this study were taken based on simple random sampling technique. Respondents experienced a stroke recovery phase for 5-8 weeks. This is based on the results of previous studies that the post-stroke recovery process achieves the most significant improvement in the first week to two months after an acute stroke (Grefkes & Fink, [2020](#); Helty, [2022](#)). After three months, the recovery related to motor becomes less significant (Grefkes & Fink, [2020](#)). Respondents aged 35-65 years, in stable condition, not experiencing cognitive impairment, able to communicate, were actively encouraged to carry out daily activities independently according to their abilities, to do exercises in the rehabilitation unit regularly, carry out diet management such as managing food that can increase blood pressure; they were also encouraged to do stress management by thinking positively and worshiping. To ensure it, the researcher asked respondents about their daily activities and how to deal with problems, then the researcher validated the respondent's answer with the family living with the respondent

Instrument

The instruments used in this were The Brief study Resilience Scale and the Barthel Index instrument. The Brief Resilience Scale (BRS) is an instrument used to measure a patient's ability to solve the problems they face (Norvang et al., [2022](#)). The instrument reflects the toughness of the patient while dealing with his illness. This instrument consists of six question items, using a Likert scale with an assessment score of 1 (totally disagree) to 5 (strongly agree) (Norvang et al., [2022](#); Smith, [2008](#)). All items in the BRS start with and revolve around 'self' or belief in one's ability to bounce back (such as the question item: "I tend to get back on my feet quickly after hard times") (Ye e al., [2022](#)). The BRS scores are divided into three categories, namely 1.00-2.99 (low resilience), 3.00-4.30 (normal resilience), 4.31-5.00 (high resilience). BRS had good internal consistency, with an alpha coefficient / Cronbach's alpha

value of 0.71. This result was consistent with the alpha value (range from 0.71 to 0.85) (Fung, 2020). This instrument had also demonstrated an adequate reliability value (alpha 0.83) (Rodríguez-Rey et al., 2016).

The Barthel Index (BI) is used to measure the patient's functional ability, especially the ability to perform daily activities. BI has demonstrated high internal consistency and inter-rater reliability, good validity, and adequate response among samples from various populations, such as stroke patients and neurorehabilitation patients (Yi et al., 2020). The results showed that the Barthel Index is a reliable measure, with adequate internal consistency and is valid for measuring patient functional independence (Cronbach's alpha = 0.942) (dos Santos Barros et al., 2022).

The BI score was the cumulative score of all (10) question items, with a maximum score of 10 indicating independence, and a minimum score of 0 indicating total dependence. The BI rating hierarchy can assist in understanding the sequence of loss of ADL ability in patients and provides useful information for observing and identifying potential functional disorders that occur in patients. For example, inability to perform the easiest ADLs (such as transfers) indicates severe functional dependence of the patient, whereas inability to perform only the most difficult ADLs (such as bathing) indicates a patient's mild functional dependence (Yi et al., 2020). BI scores are divided into five categories, namely 0-20 (total dependent), 25-40 (severe dependent), 45-60 (moderate dependent), 65-80 (mild dependent), and 85-100 (independent) (Li et al., 2020).

Data collection

Data collection was carried out from February to July 2022. Respondent resilience data were collected through a survey conducted by researchers and research assistants. Respondents were given an explanation of each question item contained in the questionnaire. Data on the respondent's ability to carry out daily activities were measured by the research assistant.

Data analysis

Descriptive data analysis and Chi-square were used in this study. Descriptive data analysis was carried out to analyze the respondent's demographic and clinical data. Testing the relationship between resilience and functional independence used the Pearson Chi-square test. All data were analyzed using SPSS version 25 where the significance level was $p < 0.05$.

Data collection

This research has received ethical approval from the ethical commission of the University of Mandala Waluya Kendari (number of ethical letter: 422/UMW/II/2022). All respondents were given an explanation about the research before signing the informed consent.

Ethical consideration

This research has received an ethical certificate from the Ethics Commission (KEPK) of Airlangga University, Faculty of Nursing with No. 2144-KEPK, approval date 13 January 2021 and expiration date 13 January 2022. At the beginning of this study, participants fulfilled informed consent and demographic data. The researchers kept the data of each participant secret by using a code.

Results

The characteristics of the respondents can be seen in [Table 1](#), that the average age of the respondents was 53 years (with an age range of 35-65 years). There were more female respondents than male respondents. Last education most graduated from high school (45.1%). Most respondents experienced hemiparesis on the left side of the body (61.5%). Most of the respondents were married (55.7%). All respondents had a comorbidity, the most experienced being hypertension. The degree of

Table 1 Characteristics of respondents (n=122)

Characteristics of respondents	n	%
Gender		
Woman	67	54.9
Man	55	45.1
Last education		
College	38	31.1
High school	55	45.1
Middle/Elementary School	29	23.8
Type of hemiparesis		
Hemiparesis on the left side of the body	75	61.5
Hemiparesis on the right side of the body	47	38.5
Marital status		
Marry	68	55.7
Widow/widower/not married	54	44.3
Comorbid		
Hypertension	50	41
Hypertension + diabetes	43	35.2
Hypertension + diabetes + hypercholesterolemia	29	23.8
Stroke severity		
Low	35	28.7
Moderate	87	71.3
		M±SD
Age		53.20±10.46

severity of stroke that was most experienced by respondents was moderate (71.3%).

Table 2 shows that more respondents experienced normal resilience (77.0%) than high resilience, which was only 10.7%. In addition, in Table 2 it can be seen that more respondents experienced a moderate dependent (65.6%) in carrying out their daily activities than those who experienced severe dependent which was only 16.4%. In this study, there were no respondents who were in the total dependent and independent categories.

Table 3 shows that resilience has a significant relationship with the independence of respondents in carrying out their daily activities (p value = 0.000). The results of the correlation test analysis also show that the relationship between resilience and the level of independence of the respondents has a strong relationship and a positive pattern, meaning that the better the level of one's resilience, the higher the level of independence.

Discussions

Based on the results of this study, 79.8% of respondents in the normal category of resilience experienced a moderate dependent. Stroke patients and even mild stroke patients experience ADL dependence (Wurzinger et al., 2021). Research proves that most ADL recovery usually occurs within the first six weeks after a stroke (Wurzinger et al., 2021). Respondents in this study had been undergoing stroke treatment for eight weeks so they had shown an increase in ADL independence, although the increase in functional ability that was achieved was mostly in the moderate dependent category. This is in line with the results of other studies where there was an increase in basic ADL independence during the first three months after stroke (Norvang et al., 2022). Although Norvang et al. (2022) stated that resilience is not related to functional improvement in stroke patients, other studies have found that high resilience can increase functional independence by 55% in postoperative hip fracture patients (Tan et al., 2021). In this study, respondents were actively motivated to carry out daily activities

Table 2 Frequency distribution of resilience and independence of post-stroke patients in carrying out daily activities

Variable	Frequency (f)	Percentage (%)
Post-stroke patient resilience		
Low resilience	15	12.3
Normal resilience	94	77.0
High resilience	13	10.7
Patient independence in performing daily activities		
Total dependent	0	0
Severe dependent	20	16.4
Moderate dependent	80	65.6
Mild dependent	22	18.0
Independent	0	0

independently according to their abilities, encouraged to do regular exercises in the rehabilitation unit, make dietary adjustments, carry out stress management by thinking positively and worshipping as these can improve respondent resilience capacity.

In this study, it was also found that there were more respondents who were in the moderate dependent category (65.6%) compared to the severe dependent category (16.4%). The achievement of functional abilities of respondents in the category of mild dependent was only 18.0%. This can be associated with the presence of comorbidities experienced by respondents thereby limiting the respondent's ability to achieve optimal functional abilities. Patients with more comorbidities have poorer functional outcomes after stroke (Simić-Panić et al., 2018). Stroke patients with diabetes mellitus achieve poorer functional recovery and longer recovery after stroke, thus prolonging rehabilitation treatment (Simić-Panić et al., 2018).

Stroke recovery is a long-term process in which resilience has been shown to be a very important factor in the stroke recovery process (Han et al., 2021). To achieve this recovery, effort and a process of adaptation of the patient to the conditions of the disability that they experience are needed. Resilient individuals are able to successfully adapt to adversity and maintain mental health (Han et al., 2021). Resilience is a way to help relieve stress and emotional pressure so that it can influence the response of stroke patients to rehabilitation and achieve better long-term functional achievement results. The high level of resilience ability of the respondents in this study can also be associated with age, where the respondents have an average age

Table 3 The relationship between resilience and independence in carrying out daily activities in post-stroke patients

Resilience	Patient independence in performing daily activities					Total (n= 122)	p value	r
	Total dependent (n=0) n (%)	Severe dependent (n=20) n (%)	Moderate dependent (n=80) n (%)	Mild dependent (n=22) n (%)	Independent (n=0) n (%)			
Low resilience	0	10 (66.7)	3 (20.0)	2 (13.3)	0	15	0.000	0.676
Normal resilience	0	9 (9.6)	75 (79.8)	10 (10.6)	0	94		
High resilience	0	1 (7.7)	2 (15.4)	10 (76.9)	0	13		

of 53 years with an age range of 35-65 years. This is in line with other studies which prove that the older the patient is, the better the resilience and healthcare outcomes achieved (Chen & Tung, [2021](#)).

The results of this study indicate that there was a strong relationship between resilience and increased patient independence in performing ADLs. This relates to the patient's adaptability to the conditions they experienced. Post-stroke patients who can adapt to the conditions they experience are associated with more positive emotions, which are generally related to mental health and better quality of life (Matérne et al., [2022](#)). Stroke not only damages the sufferer's physical health, but also affects his mental health (Zhao et al., [2021](#)). Resilience is closely related to positive emotions that contribute to positive mental health and act as a buffer against negative psychological stress and psychological distress (Matérne et al., [2022](#)). A low level of resistance is associated with a greater susceptibility to pathological reactions that occur in stroke patients. In contrast, patients with high levels of resilience can make better use of their abilities to adaptively cope with and adapt to negative life events (Zhao et al., [2021](#)).

Based on a longitudinal developmental perspective, the effect of resilience on mental health status has a chain effect: mental health status appears to affect resilience, then resilience in turn influences mental health status (Wu et al., [2020](#)). Through sufficient resilience, individuals have the ability to overcome the negative effects of stress and face challenging life changes (Chen & Tung, [2021](#)). This can explain that post-stroke patients who have good resilience have a better level of independence in performing ADLs. Independence can be achieved through a process of training, including rehabilitation. Stroke patients undergoing rehabilitation are required to be active participants in their treatment, and are motivated to participate actively (Yoshida et al., [2021](#)). The active participation of the patient can improve the patient's functional ability (Helty, [2022](#)). Active participation can be achieved by cultivating enthusiasm within the patient to carry out activities (Helty, [2021](#)). This enthusiasm is part of resilience.

Even so, in this study there were 9.6% of normal resilience respondents who were severe dependent. This is related to the lack of support system received by respondents, where, based on marital status, it can be seen that some respondents have the status of a widower, widow, and are not married. Even though many of them have married status, there are still respondents who do not get social support from their families. This can be due to the age of the respondent's

partner who has also entered the elderly stage and the fatigue experienced by the respondent's partner so that it is not optimal in providing physical, psychological, and emotional support to the respondent.

Lack of social support is considered a risk factor for impaired resilience (Lima et al., [2020](#)). Resilience as an interactive and multifactorial process involving individuals and the environment, including the family. Continuity of care at home can affect an individual's capacity to deal with the disease. This continuity includes family functions and acceptance, financial resources, education level, spiritual beliefs, service availability, and health information (Lima et al., [2020](#)). Support for post-stroke patients is very important for rehabilitation, increasing individual resilience, and preventing mental disorders such as post-stroke depression. The support provided by the family includes emotional support which includes trust, empathy, affection, love, listening, information support, availability of facilities and information. There was evidence that emotional support is an important factor in health recovery (Lima et al., [2020](#)).

In addition to emotional support, post-stroke patients also need informational support. The results of the study show that resilience was also correlated with the availability of information (Han et al., [2021](#)). The family as a source of support for patients also contributes in providing information to patients. Information will help patients to better understand the conditions they were experiencing so that they can perform better resilience. Research proves that a greater level of resilience will be associated with better cognitive and emotional outcomes (Gyawali et al., [2020](#)). When individuals think they are unable to control what happens in a situation, then their adaptive skills become limited and often ineffective, leading to powerlessness. Conversely, when individuals believe that life events and outcomes can be managed, they will make active efforts to overcome adverse situations, opening possibilities for moving forward and achieving resilience. By becoming resilient, individuals gain the strength to adapt, resist stress, and potentially thrive in the face of adversity (Chen & Tung, [2021](#)).

The findings from this study have several practical implications for the care of post-stroke patients. In optimizing patient resilience in an effort to improve the functional abilities of post-stroke patients, nurses need to improve providing information to patients and their families. Information can be conveyed through leaflet media. Patients and families are also always motivated and confident in their ability to achieve better functional abilities. These efforts are aimed at increasing patient

resilience and can be included in nursing care interventions.

However, this study also had limitations, where the results cannot be generalized to the general population, considering that this research was conducted in Kendari, Southeast Sulawesi, which only covered a small portion of the ethnic groups in Indonesia. In addition, the resilience measurement instrument used in this study has not explored in depth the indicators of life principles or cultural values as things that increase resilience.

Conclusions

This study proves that resilience was related to the independence of post-stroke patients in performing ADLs. The achievement of resilience is inseparable from the patient's ability to understand the importance of doing exercises during rehabilitation. This is also inseparable from family support in providing information, infrastructure, financial, emotional for the healing of patients. Future research needs to add aspects that need to be assessed in patient resilience such as related to norms and customs because these aspects effect on increasing patient resilience. The higher the patient's resilience level, the greater the patient's level of independence to improve the patient's quality of life.

Conclusions

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Conclusions

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Health literacy and post-vaccination covid-19 prevention behavior in the community: a cross-sectional study in Indonesia

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ABSTRACT

Introduction: The government has made vaccination as the primary strategy to control the COVID-19 pandemic. However, the public still needs to implement COVID-19 prevention behavior even though they have been vaccinated. This study aimed to determine the correlation between health literacy and post-vaccination COVID-19 prevention behavior of the community in the work area of the Patrang Public Health Center, Jember Regency, Indonesia.

Methods: A cross-sectional design was performed in the public health center in Jember Regency Indonesia, in May 2022. The sample in this study was 435 people selected by purposive sampling with the inclusion criteria of those aged >17 years old and receiving a total primary vaccination dose. The data were collected using the Health Literacy Survey Coronavirus Disease Questionnaire 22 (HLS-COVID-Q22) and the COVID-19 prevention behavior questionnaire. The data were analyzed by using Spearman test with a significance level of $\alpha < 0.05$.

Results: The results showed that the most of health literacies were inadequate ($n=188$, 43.2%), and the post-vaccination COVID-19 prevention behavior was in the moderate category ($n=186$, 42.7%). There was a moderate correlation between health literacy and post-vaccination COVID-19 prevention behavior ($p < 0.001$; $r = 0.513$).

Conclusions: The higher the health literacy, the better the post-vaccination COVID-19 prevention behavior. The nurse was important in providing health education about COVID-19 by paying attention to community health literacy ability. Improving health literacy is an important strategy to enhance COVID-19 prevention behavior and reduce coronavirus transmission.

Keywords: COVID-19 prevention behavior; health literacy; post-vaccination

Introduction

Vaccines are the primary strategy for controlling the pandemic that is effective in overcoming infections of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV-2) and cases of Coronavirus Disease 2019 (COVID-19) (Haas et al., 2021; World Health Organization, 2021). However, COVID-19 prevention behavior, despite vaccination, still needs to be done because COVID-19 infection with symptoms or without symptoms can still occur (Bahl et al., 2021; Jain, Iyengar and Ish, 2021). People who have been fully vaccinated but are infected with SARS CoV-2 are called

"breakthrough infections" (Centers for Disease Control and Prevention, 2021). Individuals loosen COVID-19 preventive behavior after vaccination, it can be seen that fewer people are wearing masks in public area after vaccination. This behavior can increase the potential risk of infection in a new wave of virus variants and would possibly provide loopholes for causing virus transmission (Zhang et al., 2021; Satuan Tugas Penanganan COVID-19, 2022).

Health promotion and preventive measures still need to be implemented to stop the pandemic (Yuan et al., 2021). However, there are still global gaps in the

availability and accessibility of various preventive and public health protection measures that can prevent the virus's spread and future global pandemics (Taggart et al., 2022). Sometimes information is subjected to contradictory opinions and experts' views. Too much information made it hard to distinguish between correct and incorrect information, allowing for the introduction of misconceptions and wrong beliefs, often under cover of almost scientific language (Silva and Santos, 2021). Even if fully vaccinated, precautions such as keeping a distance of at least 1 meter from other people, wearing a mask, avoiding poorly ventilated places, washing hands frequently, staying home if unwell and testing for COVID-19, staying informed about COVID-19 must be still implemented (World Health Organization, 2020). But a loosening of the behavior of COVID-19 prevention has happened globally. Based on research in Israel, preventive behavior was reported to show a decrease in the rate of wearing masks (21.1%) and implementing social distancing (47.3%) in people who had been vaccinated (Rahamim-Cohen et al., 2021). Facts related to the application of preventive behavior in data as of January 30, 2022, in Indonesia show that 88.89% of people adhere to wearing masks and 85.61% adhere to keeping their distance. However, individuals actually weaken the behavior prevention of COVID-19 after vaccination (Zhang et al., 2021).

One of the factors that can influence COVID-19 prevention behavior is the level of health literacy (Sánchez-Arenas et al., 2021). Health literacy is defined as an ability that requires knowledge, motivation, and individual competence to seek or access information, understand its meaning, and assess health information to make decisions so that they can adequately apply information into actions in daily life. This health information relates to healthcare, disease prevention, and health promotion to maintain and improve a better quality of life (Okan et al., 2019). Good health literacy levels are associated with better attitudes as a key to prevention strategies against COVID-19 and its spread leading to better health outcomes (Silva and Santos, 2021).

Health literacy during the pandemic is essential to find or access information about COVID-19, transmission, preventive behavior that needs to be done, understand what it means, and assess the information so that decisions can be made to apply knowledge to behavioral compliance (Sørensen et al., 2012; Do et al., 2020; Hong et al., 2021). Good health literacy allows individuals to gain knowledge about COVID-19, seek relevant facts about infection transmission and prevention behavior, and find the

necessary information and apply it in daily life (Do et al., 2020). Increasing health literacy becomes very important at the individual and community level to deal with pandemic situations that require immediate and rapid action (Abdel-Latif, 2020). Accordingly, this study aimed to determine the relationship between health literacy and post-vaccination COVID-19 prevention behavior.

Materials and Methods

Research design

This study used a descriptive correlation with a cross-sectional approach to determine the correlation between health literacy and post-vaccination COVID-19 prevention behavior.

Respondents

The sample was 435 people in the work area of the Patrang Public Health Center which covers a geographical area consisting of the sub-districts of Patrang, Gebang and Jember Lor in May 2022. The sample was collected by purposive sampling in order to get the complete address of the respondent, as there were no clear data about the address of the respondents from Public Health Center. Minimum total sample based on the Lemeshow formula $n = [Z_{21-\alpha} \times (p) \times (1 - p)]/d^2$, assuming the proportion of the COVID-19 vaccination coverage rate as 50% with a precision level of 0.05 (Nursalam, 2020). The inclusion criteria were aged >17 years old and receiving 2 or 3 doses of COVID-19 vaccine. The exclusion criteria were healthcare workers, because the health workers are likely to have good health literacy, and people with mental and cognitive disorders validated by the Mini-Mental State Examination (MMSE) for the respondents >65 years old. The MMSE is used in respondents >65 to determine the presence of dementia, and are suspected of experiencing cognitive problems related to aging beyond normal memory problems. Respondents with mental and cognitive disorders such as mental disorders, mental retardation were immediately excluded from the study. During the research the MMSE test was conducted on 37 respondents with the interpretation that all respondents had normal cognitive status.

Instruments

This research used the self-report data collection techniques by filling out a questionnaire. The questionnaires used were the respondent's characteristics (age, gender, marital status, education level, occupation, income level, history of comorbidities, and sources of information about COVID-19), Health

Literacy Survey Coronavirus Disease Questionnaire 22 (HLS-COVID-Q22) and COVID-19 preventive behavior questionnaire. This questionnaire is specifically used to analyze health literacy during the COVID-19 Infodemic.

Health literacy is measured by the HLS-COVID-22Q designed by Okan et al. (2020). This questionnaire has been translated into the Indonesian language by Utami et al. (2021) with the results of the validity test having a correlation coefficient of 0.412–0.690 ($r > 0.300$) and Cronbach's alpha reliability test showing $\alpha = 0.921$. This questionnaire consists of 22 questions that are used to assess the difficulty or ease felt by respondents when accessing (6 questions), understanding (6 questions), considering (5 questions), and applying (5 questions) the health information about COVID-19. The assessment in this questionnaire uses a Likert scale of 1-4 with a score of 1 (very difficult) to 4 (very easy). This questionnaire used an interval scale with a minimum score of 22 and a maximum score of 88 which obtained by adding up the answer scores for each question item (Okan et al., 2020; Utami et al., 2021). According to Okan et al. (2020), the final assessment of this questionnaire can also be presented as an index or category of health literacy. The presentation of the data is by using the average cut-off values which the average value was 2.5 (inadequate health literacy), >2.5 – <3 (problematic health literacy), and 3 (sufficient health literacy).

Post-vaccination COVID-19 prevention behavior was measured by a questionnaire consisting of seven favorable and unfavorable questions based on the guidelines of the Ministry of Health of the Republic of Indonesia. The questionnaire includes wash hands with soap or use hand sanitizer after handling objects in public places, take a shower and change clothes after coming home from traveling, wear a mask in public places, keep a distance of at least 1 meter, keep distance from elderly, don't attend large gatherings and don't use public facilities or go to public places. This questionnaire has been tested for validity and reliability by Yanti et al. (2020); with the results of the validity test having a correlation coefficient 0.187-1 ($r > 0.1409$) and the Cronbach alpha reliability test $\alpha = 0.770$. Assessment in this questionnaire used a Likert scale with 0-3 for favorable questions with the score of 0 (never), 1 (rarely), 2 (almost always), and 3 (always) and vice versa for unfavorable questions. The calculation for the prevention behavior had a total score 0-7 (low protocol adherence), 8-14 (moderate protocol adherence), and 15-21 (high protocol adherence).

The data were collected using a door-to-door technique where more than one respondent can be taken from each house according to the inclusion and

Table 1 Demographic characteristics of respondents (N=104)

Variable	n	%
Age (years)		
18-25	57	13.1
26-35	85	19.6
36-45	110	25.3
46-55	92	21.1
56-65	54	12.4
>65	37	8.5
Gender		
Male	100	23
Female	335	77
Marital status		
Married	365	83.9
Unmarried	45	10.3
Widowed	25	5.8
Educational level		
Elementary and lower	171	39.3
Junior high school	56	12.9
Senior high school	176	40.5
Collage	32	7.3
Occupation		
Unemployed	23	5.3
Student	10	2.3
Entrepreneur/trader	103	23.7
Farmer	10	2.3
Civil servant	7	1.6
Retired	12	2.7
Private employees	53	12.2
Laborer/driver/housekeeper	24	5.5
Housewife	193	44.4
Income level		
<Rp2.400.000,-	371	85.3
≥Rp2.400.000,-	64	14.7
History of comorbidities		
Have comorbidities	60	13.8
Hypertension	36	8.3
Diabetes	6	1.4
Asthma	13	3.0
Tuberculosis	2	0.5
Liver disease	1	0.2
Heart disease	1	0.2
Cancer	1	0.2
Have no comorbidities	375	86.2
Most used sources of information about COVID-19		
Television	163	37.5
Internet (Website/Online Magazine/etc.)	53	12.2
Newspaper/magazine	1	0.2
Radio	1	0.2
Social media (Instagram/Twitter/Facebook/etc.)	82	18.9
Message apps (WhatsApp/Line/Telegram/etc.)	11	2.5
Health workers	32	7.4
Family or friends	92	21.1

exclusion criteria. The data collection was assisted by two enumerators. Enumerators were selected from undergraduate students of Faculty of Nursing, Universitas Jember who were first given the training to equate perceptions and understanding about study, questionnaire and the data collection process used in this study. Search for the respondents' addresses was assisted by the head of the community association in the research area. Respondents were recruited from accessible communities and according to established inclusion and exclusion criteria.

Table 2 Health literacy in respondents (n=435)

Health Literacy	f	%
Inadequate health literacy	188	43.2
Problematic health literacy	92	21.2
Sufficient health literacy	155	35.6

Data analysis

Data analysis in this study used univariate and bivariate analysis using SPSS version 27. The results of the univariate analysis of health literacy and post-vaccination COVID-19 prevention behavior will be presented in frequency and percentage, while the bivariate analysis was carried out using the Spearman non-parametric correlation to determine the correlation between health literacy and post-vaccination COVID-19 prevention behavior.

Ethical consideration

This research was approved by the Health Research Ethics Committee of the Faculty of Nursing, Universitas Jember with a certificate No. 063/UN25.1.14/KEPK/2022. During the research the respondents and researchers continued to use masks and wash their hands with the handrub/hand sanitizer provided by the researchers before data collection was carried out and have agreed to informed consent as evidence of involvement in this study.

Results

Characteristic of the respondents

The results of the study which consisted of 435 respondents showed that the most age of respondents was 36-45 years (n=110, 25.3%), the most gender was female (n=335, 77%), and the majority of respondents were married (n= 365, 83.9%). Based on education level, most of the respondents were senior high school students (n=176, 40.5%) and most of the respondents in this study were housewives (n=193, 44.4%). Based on the income level it was at most less than IDR 2,400,000 (n = 371, 85.3%). Most of the respondents in this study did not have comorbidities (n = 375, 86.2%). The most frequently used source of information about COVID-19 by respondents was television (n=163, 37.5%). The details are shown in [Table 1](#).

Table 4 Post-vaccination COVID-19 prevention behavior in respondents (n=435)

Post-Vaccination COVID-19 Preventive Behavior	f	%
Low protocol adherence	69	15.9
Moderate protocol adherence	186	42.7
High protocol adherence	180	41.4

Table 3 Indicator of health literacy in respondents (n=435)

Indicator	Mean (SD)	Median (Min-Max)
Access	2.61 (±1.085)	3 (1-4)
Understand	2.67 (±1.020)	3 (1-4)
Appraise	2.37 (±0.999)	2 (1-4)
Apply	2.40 (±1.010)	2 (1-4)

Health literacy

[Table 2](#) shows that the health literacy in respondents' results were 155 (35.6%) in the sufficient health literacy, 92 (21.2%) in the problematic health literacy, and 188 (43.2 %) in the inadequate health literacy. Based on this research, the highest result is shown in the inadequate health literacy. Based on the indicators of health literacy, the highest and the lowest are present in [Table 3](#). The highest score of the average value per item of the indicators of health literacy ability is the ability to understand the health information (mean=2.67) and the lowest score is the ability to appraise the health information (mean=2.37).

Post-vaccination COVID-19 prevention behavior

[Table 4](#) shows that the highest level of community adherence was moderate protocol adherence 186 (42.7%) followed by high protocol adherence (41.4%) with a slight difference (1.3%). As seen in [Table 5](#), the best post-vaccination COVID-19 prevention behavior is wearing masks when in public places (mean=2.37). In contrast, the worst post-vaccination COVID-19 prevention behavior is shown in the behavior of keeping a distance from the elderly (mean=0.83).

The correlation between health literacy and post-vaccination COVID-19 prevention behavior

This research shows a moderate positive correlation between health literacy and post-vaccination COVID-19

Table 4 Post-vaccination COVID-19 prevention behavior in respondents (n=435)

Question	Mean (SD)	Median (Min-Max)
I wash my hands with soap or use hand sanitizer after handling objects in public places	2.2 (0.976)	3 (0-3)
I take a shower and change clothes after coming home from traveling	1.69 (0.935)	2 (0-3)
I wear a mask in public places (markets, terminals, prayer places, etc.)	2.37 (0.831)	3 (0-3)
I keep a distance of at least 1 meter from other people when outside the house	1.22 (0.952)	1 (0-3)
I keep my distance from elderly	0.83 (0.872)	1 (0-3)
I attended an event that gathered many people	2.16 (0.831)	2 (0-3)
I use public facilities or go to public places (public transportation, malls, markets, tourist attractions)	2.31 (0.896)	3 (0-3)

prevention behavior with a significance value <0.001 and a coefficient correlation $r=0.513$.

Discussions

The pandemic has been going on since January 2020. Even though the majority of people have received the COVID-19 vaccine, confirmed cases of COVID-19 are still significant showing an increase in the third wave of the new variant of the coronavirus. This study revealed that there is a positive correlation with moderate of relationship between health literacy and post-vaccination COVID-19 prevention behavior. This means that the higher the level of health literacy, the higher the community's adherence to prevention of COVID-19 behavior. Study about health literacy and COVID-19 prevention behavior found that health literacy was significantly related to COVID-19 awareness and COVID-19 prevention behavior (Gautam et al., [2021](#)).

Health literacy during the pandemic is very necessary to find or access information about COVID-19, transmission, preventive behavior that needs to be done, understand what it means, appraise, or interpret the information correctly so that they can make decisions and apply information in the form of behavior adherence in everyday life (Sørensen et al., [2012](#); Okan et al., [2019](#); Do et al., [2020](#); Bin Naeem and Kamel Boulos, [2021](#); Hong et al., [2021](#)). The better health literacy indicates the possibility for individuals to gain knowledge about COVID-19, seek relevant facts about infection transmission and prevention behavior using, and find the necessary information (Do et al., [2020](#)). Therefore, better attitudes are expected as a key to prevention strategies against COVID-19 and its spread leading to better health outcomes (Silva and Santos, [2021](#)).

Based on this study, most respondents had inadequate health literacy, but had already performed moderate to high protocol adherence of COVID-19 prevention. The best prevention behavior shown in this study is wearing a mask when in a public place although the easing of the use of masks has been announced (mean=2.37). Wearing masks has been practiced for health and cultural reasons so that the use of masks on COVID-19 prevention behavior does not cause conflicts that arise if people are forced to change cultural norms. In addition, the majority of the community also has a habit of wearing masks to overcome air pollution (Nguyen et al., [2020](#)).

Health literacy so far remains a concept that is underestimated as a public health problem in the context of the COVID-19 pandemic, although health

information about COVID-19 has dominated most of the sources of information and communication (Paakkari and Okan, [2020](#); Sentell, Vamos and Okan, [2020](#)). The respondents in this study had received two or three doses of COVID-19 vaccine, but still had inadequate health literacy. The respondents' ability to appraise the health information had the lowest average score (mean per item=2.37). Assessing and interpreting health information demands more excellent cognitive skills and resources. In addition, too much and complicated information in various media such as the internet or smartphone applications also increases the difficulty in processing those large amounts of information (Svendsen et al., [2020](#)).

Health literacy is an important competency that must be developed during the current pandemic (Luengo-Oroz et al., [2020](#)). Too many sources of information and inaccurate information (hoax) related to COVID-19 caused the spread of fear and panic among the public much faster than the virus (Abdel-Latif, [2020](#)). Health literacy is needed because it has the potential to make individuals understand the reasons for the recommendations and the impact or results of implementing COVID-19 preventive behavior. Improved health literacy will reduce health expenditure costs and ease the tremendous burden on the healthcare system (Shaukat, Asghar and Naveed, [2021](#)). Health literacy limited to individuals, populations, and systems can cause adverse effects for some and even entire communities. When people are not competent to assess health information critically, health information providers cannot ensure the means to protect valid and useful information against the many sources that spread invalid information (hoax information). This can cause panic, and interfere with the effectiveness of information distribution and health interventions in the community (Okan et al., [2020](#)).

The results of this research have implications for the importance of providing health education or counseling, especially regarding COVID-19, by paying attention to the health literacy ability of the community. Nurses as educators can play a role in increasing health literacy, one of which is by providing health education or counseling, especially related to COVID-19 as a form of new normal for society to continue to carry out healthy living behaviors not only to prevent COVID-19 but other infectious diseases. In addition, a strategy that can be done is to improve the quality of health information and training to improve information search skills about COVID-19.

Limitation of the study

The limitation in this study is that the sampling technique used purposive sampling which can limit the generalization of the findings. Furthermore, self-reported technique could be biased for filling the questionnaire

Conclusions

The majority of respondents to this study had inadequate health literacy. They already understand the information but have low ability to assess valid information. Post-vaccination COVID-19 prevention behavior in respondents showed moderate adherence to health protocols as indicated by adherence to wearing masks in public places. Thus, this study reveals that there is a moderate positive correlation between health literacy and post-vaccination COVID-19 prevention behavior. This means that the higher the health literacy, the better the post-vaccination COVID-19 prevention behavior. Based on the results of this study, it is necessary to improve community health literacy. Further research is expected to be able to develop a model of increasing community health literacy that can be applied effectively.

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Conflict of interest

There is no conflict of interest

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Effects of the tailored intervention program in lowering blood glucose levels and diabetes distress among patients with diabetes in Indonesia: a randomized controlled trial

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ABSTRACT

Introduction: Blood glucose levels and diabetes distress are the foremost factors contributing to diabetes treatment outcomes and managements. No tailored intervention program was implemented for patients with diabetes in Indonesia. This study aimed to investigate the effectiveness of a tailored intervention program in lowering blood glucose levels and diabetes distress among patients with diabetes patients in Indonesia.

Methods: A randomized controlled trial (RCT) with pre-test and post-tests was applied. A total of 163 people with diabetes were collected for both intervention (n=80) and control (n=83) groups: A diabetes-tailored intervention program was attempted in the intervention group. Descriptive statistics, Analysis of Variant (ANOVA) and inferential statistics were used to analyze the data (significance level <0.05)..

Results: The mean blood glucose levels and diabetes distress before and after in the intervention group were 255.19 mg/dl, and 245.60 mg/dl (p-value >0.05); 2.46 and 2.01 (p-value <0.01). While the control group's mean of blood glucose levels and diabetes distress before and after the intervention was were 227.81 mg/dl, and 245.94 mg/dl (p-value <0.05); and 2.37 (p-value >0.05).

Conclusions: The diabetes-tailored intervention program is effective on decreasing blood glucose levels and diabetes distress, and showed a significant result to diabetes distress.

Keywords: blood glucose, diabetes, diabetes distress, personalized

Introduction

Diabetes is considered a major global health problem that causes diabetes distress (Hu et al., 2020; Jeong & Reifsnider, 2018; Young et al., 2020). Diabetes distress happens because of unstable blood glucose levels and

medication needed for a long time (Young et al., 2020). Blood glucose levels and diabetes distress are the most important factors contributing to treatment outcomes and management of diabetes (Hu et al., 2020). Diabetes distress releases the excessed glucocorticoid hormone that impairs glucose production in the liver and reduces



the cell's sensitivity to insulin which causes hyperglycemia (Farm et al., [2017](#)).

The prevalence of distress was high among patients with diabetes (Batais et al., [2021](#)). Simultaneous increases in blood glucose levels due to diabetes distress have also been reported (Dekkers & Hertroijs, [2018](#); Pranata et al., [2022](#)). Moreover, the routine interventions implemented by health professionals for glycemic control and distress management in several countries are health education (Suciana & Arifianto, [2019](#)). Health education alone is not enough, we need to understand health-seeking behaviors based on patient culturally (Seligman et al., [2018](#); Widayanti, [2018](#)). Moreover, support from various groups, especially families and health professionals, is needed (Pranata et al., [2021](#)). However, health professionals' health education and support in the hospital for patients with diabetes did not meet the patient's personal needs (Cimo & Dewa, [2019](#); Kolb, [2021](#)).

Health education and support should be tailored to patients' requirements (social-cognitive factors, intention, and behaviour) (Pranata et al., [2022](#)). Every patient has the obligation and right to participate in individual and group healthcare planning and implementation. Additionally, patient-centred education and support increase satisfaction and is crucial for efficient patient education (Sassen, [2018](#)).

Four thousand years ago, a collection of sacred Indian literature, a tailored intervention, was first addressed (Dekkers & Hertroijs, [2018](#)). Its goal was to customize treatment through education and support to each person to establish a balance between body, mind, and spirit. At the time, it was known as Ayurvedic medicine. Today, tailored intervention aims to improve patients' health outcomes and care experience by taking their unique requirements and preferences into consideration while creating a treatment plan (Dekkers & Hertroijs, [2018](#); Hertroijs et al., [2018](#)). Such an approach might be a personalized strategy based on patient phenotyping. According to this method, patients' biopsychosocial characteristics are used to distinguish subgroups of patients with comparable care requirements, capacities, and preferences so that customized treatment plans can be constructed (Dekkers & Hertroijs, [2018](#); Pranata et al., [2022](#)).

The increasing rates of morbidity and death now seen in the diabetes community may be reduced by modifying program delivery for education and support programs customized to that population (Cimo et al., [2020](#)). Patient preferences, cultural sensitivity, patient center, and support reference to tailored intervention (Hertroijs et al., [2018](#); Mayor, [2017](#)). All components of

tailored intervention are allowing clients' requirements to direct diabetes education, adapting instruction to match individual needs, and supporting and empowering clients to self-manage (Cimo & Dewa, [2019](#)). There is a lot of opportunity for personalized care in tailored intervention to be implemented in Indonesia as an innovation in enhancing health services for diabetic patients (Pranata et al., [2021](#)). A tailored intervention plan for managing diabetes may help patients control their condition, provide tools to manage it more successfully, and lower blood glucose levels and diabetes distress simultaneously. Thus, this study's objective was to assess how effective a tailored intervention program is for diabetic patients. The evaluation focused on lowering blood glucose levels and diabetes distress.

Materials and Methods.

Design of the study

A randomized controlled trial (RCT) with two groups for the pre-and post-test design was used to examine a repeated measure with a single-blind for a tailored intervention program. The study was carried out from January 7 to April 7, 2021.

Population and sample of the study

Laboratory testing of blood glucose levels, as well as a doctor's diagnosis, were used to diagnose the diabetes population in this study. The laboratory data were assessed by the medical records. People with diabetes who visited and registered at primary healthcare in Sumbawa City, West Nusa Tenggara, Indonesia, were included as study samples. Respondents were recruited from patient list data that had been recorded at the hospital and further randomized using the ABAB pattern. Group A is included in the intervention and group B is included in the control. The level of significance or alpha (α) = 0.05, population effect size (ES) = 0.5, and power ($1-\beta$) = 0.80 were used to calculate the sample size for the study (Kim, [2016](#)). The calculations showed that a sample size of 126 people (64 in each group) was necessary. To account for the possibility that a person would withdraw, the researcher increased the number of participants by 30%. Consequently, 168 volunteers were required for this investigation (84 per group). Simple randomization by computerized random numbers were used in this study. After randomization by researchers, each respondent received a different inform concern from one another. The intervention group received informed concerns about the implementation of tailed care and the control

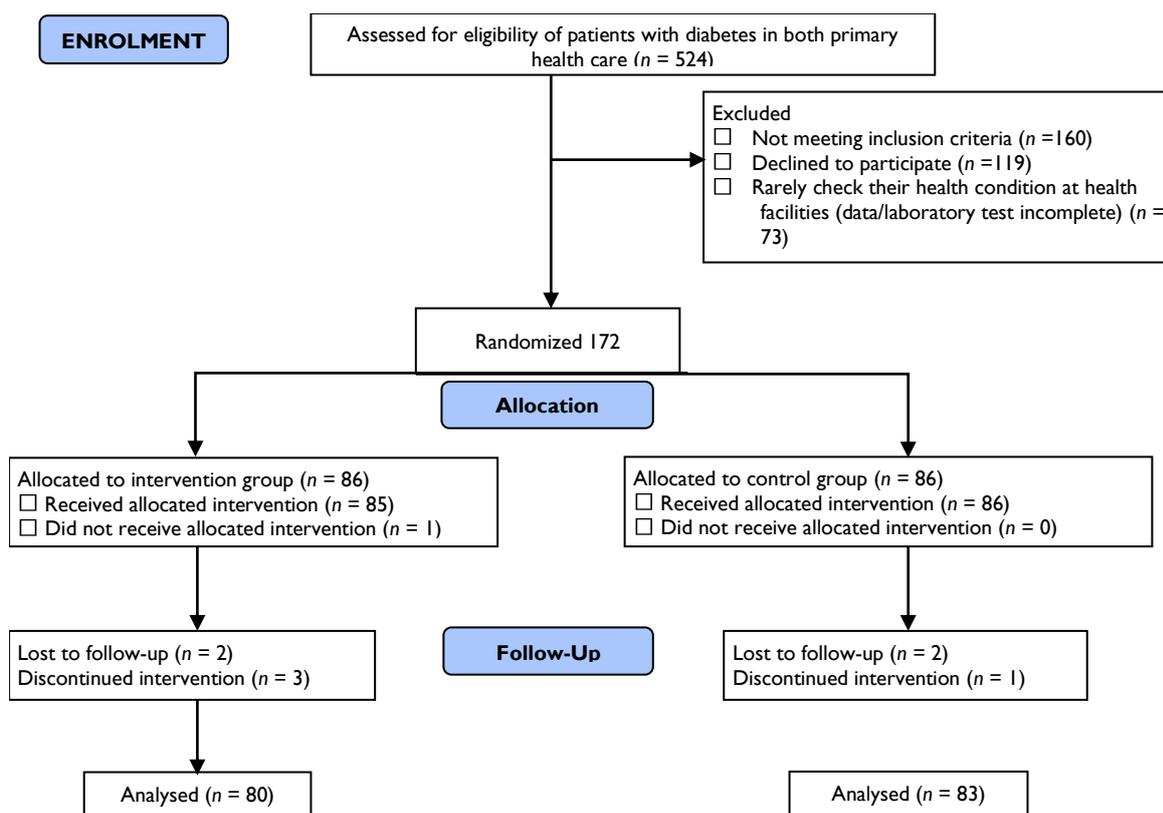


Figure 1 The recruitment process for the randomized controlled trial

group received traditional health education informed concerns.

The study included respondents older than 20 at the time of recruitment, identified as the Indonesian citizen, willing to participate, had a mobile device, and lived with the family. Twenty years is a mature age in which a person can make their own decisions (Icenogle, 2019). If patients reside with their families, the researcher will find it easier to contact them afterwards or to call them to remind them to follow the study protocol. The study excluded those have a history of or a diagnosis of ischemic heart disease, transient ischemic attack (TIA), peripheral vascular disease, or persistent mental health concerns. Medical condition is used as a criterion to reduce the risk of dropout.

Standard care

Standard care from the hospital includes routine blood sugar monitoring, blood pressure assessments, and monthly health counselling for each group (Suciana & Arifianto, 2019). The standard care services provided to diabetic patients typically concentrate on five key areas: diet, medications, physical activity, health education, and routine blood sugar monitoring (Sujana,

2019). Although many other media are used to provide health advice, a leaflet or booklet was primarily utilized in standard care (Srikartika et al., 2019). Advice on how to alter one's diet, use drugs like insulin or oral medications, and notice clinical signs of blood sugar swings are frequently included in leaflets and booklets (Nanda et al., 2018; Srikartika et al., 2019). Participants who received standard care are blinded to the allocation. It avoids those elements that have potentially influenced the outcomes from allocations. Participants were also blinded as to their group assignment to avoid their expectations for that treatment.

Tailored intervention program

The tailored intervention program strategies for diabetes were divided into seven steps: 1. Brief deducting teaching; 2. Assessment for self-management level; 3. Brainstorming through a support group for sharing patient's difficulty on glycaemic target and specific target behaviour; 4. Making a list of patients' needs and then ranking the priorities; 5. Setting a goal and writing action; 6. Follow-up; and 7. Report of goals attempt.

As presenters, brief deducting teaching activities were carried out by health professionals (nurse, physician and dietitian). Previously, health professionals had been briefed in detail to ensure that they delivered topics according to patient needs and research needs. The researchers also assessed the material they conveyed to the respondents. Health professionals explained about 1) treatment options for high or low blood sugar levels; 2) Proper nutritional treatment based on culturally sensitive dietary information; 3) How to combine daily physical activity and exercise; 4) A condition in which patients are required to consume drug or insulin medication; 5) teach patients for blood glucose self-monitoring test; 6) Acute comorbidity prevention, detection, and treatment; 7) chronic comorbidity prevention, detection, and treatment; 8) goal-setting and achievement-based health promotion; and 9) integration of psychological adjustment for daily living and problem-solving advice.

After the brief deductive teaching has been transferred, the respondent was assessed on his level of self-management. The level of self-management will determine the small group of each respondent. Respondents with a good level of self-management are grouped with good levels in small groups, moderate levels are grouped with moderate levels in small groups and so on. When they are in small groups, respondents exchange information with each other through the support group. In support groups, respondents learn from each other from the experience of group members to maintain glucose control. After they exchanged information, each respondent then made personal targets according to their respective abilities along with how long it would take them to reach these targets. The explanation in the support group is adjusted to the respondent's preferred language. The tailored care and support group target from the small group was evaluated twice a month for three months.

Research assistants were employed to deliver the support group and brainstorming after a brief deducting teaching. Two research assistants were selected from each primary health facilities where the study was conducted because they had a better understanding of the patients and conditions in the local area. The research assistant's qualifications were a bachelor's degree level and a working period of more than five years.

Before the assistant carried out the planned intervention, the research assistant was trained. This process was to ensure that they have the same understanding of each other about the study process and intervention.

Blinding

Each respondent received a different inform concern from one another. The intervention group acknowledged that they received the implementation of tailored care and the control group received traditional health education. It has been confirmed that there was no communication between participants in the intervention and the control group. The area of Sumbawa Island is quite large, with a less population, therefore, the distance between respondents was quite far and minimized the probability of them doing interaction. Further, applying a blinding process to the trial was important since it can be reduced perceptions of the impact of the treatment on the mental or physical responses among participants.

Instruments

Blood glucose level and diabetes distress were measured twice: at M1 (baseline, before the intervention) and M2 (3 months after the intervention). The laboratory test of blood glucose levels and the diabetes distress scale were used to collect the data.

Blood glucose levels

Blood glucose level was measured after the patient's blood sample is collected by the research assistant and further laboratory equipment analysis of the blood sample. Laboratory test was used to evaluate the participants' blood glucose levels in this study.

Diabetes distress scale (DDS)

DDS was developed by William H. Polonsky from the Problem Areas in Diabetes (PAID) instrument and has since become well-established and widely recommended for assessing the level of distress in patients with diabetes (Farm et al., [2017](#); Polonsky et al., [2005](#)). However, the DDS has a more precise and cross-culturally consistent factor structure (Polonsky et al., [2005](#)). The DDS consists of 17 items that measure patients' feelings in four general domains. First, the interpersonal distress domain (3 items) reflects the psychological emotions and feelings of patients with diabetes during their interaction with families, friends, or people around them. Second, the physician distress domain (4 items) portrays the distress patients with diabetes experience during interaction with their physician. The third domain, regimen distress (5 items), describes the distress felt by patients with diabetes because of the need to adhere to a therapy management plan. The last is the emotional burden domain (5 items), which describes the distress related to the personal emotions of the patients suffering from

type 2 diabetes, including fear of the possibility of diabetes-related complications (Farm et al., 2017; Polonsky et al., 2005).

The factor analysis of DDS instrument revealed a correlation among the four factors ranging from 0.40 to 0.67. The factor loadings of selected items from the four factors ranged from 0.41 to 0.98. The internal consistency for the four domains ranged from 0.78 to 0.83 (Farm et al., 2017). The DDS17 Bahasa Indonesia provides an initial psychometric validation study, factor structure, and internal consistency for assessing the distress of Indonesian type 2 diabetes outpatients (Farm et al., 2017). Diabetes distress data assessed by research assistants. the two research assistants did not know which was the intervention group and which was the control group. they only know that group one received tailored care interventions while the other group received traditional health education.

Demographic and disease characteristics

The demographic characteristics included the patient's age, time since the diagnosis of diabetes, sex, religion, educational level, marital status, occupation, and smoking status.

Process of participant recruitment

The current study was approved by Indonesia Centre for Health Resources and Services Research and Development (Registry number: INA-KFQZKG). [Figure 1](#) shows the recruitment process for this study.

Data analysis

IBM SPSS Statistics for Windows v. 20.0 (IBM Corporation, Armonk, NY, USA) was used for archiving and statistically analyzing. The statistical methods included descriptive statistics (frequency distributions,

percentages, means, and standard deviations), ANOVA and also inferential statistics (independent sample t-tests and paired t-tests) with significance level of 0.05.

Ethical considerations

To protect the human rights of the study participants, the current study was approved by the institutional review board No. 235/EA/KEPK-BUB-2020. Participants were invited to participate in the study after the researchers gave them an overview of it and completed an informed consent form. Participants in the study were all chosen voluntarily. For the creation of the questionnaire and data analysis, their information was coded anonymously. The participants were given the researcher's phone numbers and were told they may leave the research at any time without any consequences. After the study was completed, the control group also received tailored care interventions from a team of research assistants.

Results

Baseline respondent characteristics

There were no significant differences between the two groups on sex, religion, education level, marital status, complication and smoking status in the intervention and control groups. This indicates that in terms of respondent characteristics for both groups were similar.

The majority of respondents in this study were 78.75% female in the intervention group and 79.14% in the control group. Education level was 66.25% primary school in the intervention group and 63.86% in the control group, 98.75% married in the intervention group and 98.79% in the control group, 98.75% without complication in the intervention group and 97.59% in

Table 1 Respondents characteristics

Variables	Intervention		Control		n= 163 (%)	Significance
	n=80	(%)	n=83	(%)		
Sex						
Male	17	21.25%	17	20.48%	34 (20.86%)	0.905*
Female	63	78.75%	66	79.52%	129 (79.14%)	
Education level						
Illiteracy	1	1.25%	2	2.4%	3 (1.84%)	0.726*
Primary school	53	66.25%	53	63.86%	106 (65.03%)	
Junior high school	7	8.75%	5	6.03%	12 (7.36%)	
Senior high school	11	13.75%	13	15.66%	24 (14.73%)	
College	8	10%	10	12.05%	18 (11.04%)	
Marital status						
Single	0	0%	1	1.21%	1 (0.61%)	0.179*
Married	79	98.75%	82	98.79%	161 (98.78%)	
Complication						
None	79	98.75%	81	97.59%	160 (98.16%)	0.585*
Hypertension	1	1.25%	2	2.41%	3 (1.84%)	
Smoking						
Smoking	8	10%	6	7.23%	14 (8.59%)	0.531*
No smoking	72	90%	77	92.77%	149 (91.41%)	

Table 2 Participant characteristics

Variables	Intervention				Control				P-value
	Mean	SD	Min-max	CI 95%	Mean	SD	Min-max	CI 95%	
Age	55.53	9.237	37-76	53.47-57.58	57.61	9.243	33-79	55.60-.63	0.151*
Time since the diagnosis of diabetes in year	3.345	2.4770	1-11	2.794-3.896	3.837	3.3057	1-15	3.116-559	0.285*

*=ANOVA test

the control group, 90% smoking in the intervention group and 92.77% in the control group (Table 1).

In Table 2, there were no observable changes in age or the amount of time since diabetes diagnosis between the intervention and control groups. This indicates that in terms of participant characteristics, both groups shared similarities. Moreover, the mean age of respondents in this study was 55.53 years in the intervention group and 57.61 years in the control group. In addition, the mean of the diagnosis of diabetes in the intervention group was 3.3 years, while the control group was 3.8 years.

Description and comparison of the outcome indicators for the two groups in the pre-test and post-test

Before the intervention, there were no appreciable variations in blood glucose levels and diabetes distress between the intervention and control groups (Table 3) by ANOVA tested. This indicates that before the intervention, the participant characteristics of both groups were comparable.

The mean blood glucose levels before the intervention group received a tailored intervention program was 255.19 mg/dl, then decreased to 245.60 mg/dl. Furthermore, the diabetes distress scale from 2.46 (moderate) and then decreased to 2.01 (moderate). On the other hand, the mean blood glucose levels before the control group received traditional health education intervention program was 227.81 mg/dl, then increased to 245.94 mg/dl, and the diabetes

distress scale from 2.40 (moderate) then decreased to 2.37 (moderate).

Blood glucose levels and diabetes distress between groups before the intervention did not significantly change but did differ significantly after the intervention, according to independent t-test analysis in (Table 4). Therefore, it is required to conduct additional tests using the paired t-test to compare the effectiveness of traditional health education before and after the intervention with a tailored intervention program.

The paired t-test analysis (Table 5) showed that the intervention and control group's blood glucose levels decreased before and after treatment. Still, the decrease in blood glucose levels was bigger in the intervention group compared to the control group. Both groups were not statistically significant, with a p-value >0.05. However, the diabetes distress scale in the intervention group significantly decreased, namely 0.441, with a p-value <0.05. While in the control group, the decrease was only 0.036 with a p-value > 0.05.

Discussions

Both groups for blood glucose tested were not statistically significant with p-value 0.984. However, the blood glucose levels of participants in the intervention group who received a tailored intervention program were better than the control group who received traditional health education. Based on the study, traditional diabetes education models did not translate

Table 3 Description of the outcome indicators for the two groups

Variables	Baseline		P-value	Follow-Up (3-month)		P-value
	Intervention	Control		Intervention	Control	
Blood Glucose			Pre-test = 0.134 *			Post-test= 0.984 *
Mean	255.19	227.81		245.60	245.94	
Median	253.50	205		218	237	
SD	109.867	121.905		116.650	105.207	
Min-Max	76-512	72-594		84-595	91-595	
95% CI	230.74-279.64	201.19-254.43		219.64-271.56	222.97-268.91	
Diabetes Distress			Pre-test = 0.638 *			Post-test= 0.000 *
Mean	2.46	2.40		2.01	2.37	
Median	2.40	2.40		1.90	2.50	
SD	0.743	0.716		0.585	0.607	
Min-Max	1-5	1-4		1-4	1-4	
95% CI	2.29-2.62	2.25-2.56		1.88-2.15	2.23-2.50	

*=ANOVA test

Table 4 Comparison of blood glucose levels and diabetes distress in both groups (independent t-test)

Variable	Significance (p)
Blood glucose levels	
Pre-test	0.807
Post-test	0.356
Diabetes distress	0.688
Pre-test	0.000
Post-test	

appropriately and did not meet patients’ needs. The tailored care intervention program was better and more successful to improve the diabetes self-management through blood glucose indicator. Participants in the studies perceived themselves as becoming more informed about their disease and diabetes complications through tailored care intervention program. This encourages them to keep their blood glucose levels stable within normal limits. Evidenced by the blood glucose data in the intervention group which decreased compared to the control group. Intervention based on the participant’s preferred language and incorporated culturally sensitive dietary information by the same cultural group was the key in the tailored care intervention program (Navodia et al., 2019). Ideal members of each small group no more than ten members (Pranata et al., 2022).

Education programs that do not support behaviour change are potentially ineffective and inaccurate (Choi et al., 2017). On the other hand, intervention based on the participant’s preferred language and incorporating culturally sensitive dietary information and the same cultural group through tailored intervention program potentially influence participants’ engagement in behavioural changes, uptake adherence and further decrease the blood sugar level among respondents (Navodia et al., 2019). From our study, after 3 months of implementation of the tailored care intervention program, respondents became more active in seeking information from health professionals and regularly monitoring blood sugar in health facilities. With regular monitoring, respondents know more about their condition so they are able to make the best preventive choices towards the risk of complications in the future.

Table 5 Comparison of blood glucose levels and diabetes distress for the two groups (Paired t-test)

Variables	Mean difference	SD	P-value
Blood glucose			
Pair 1 pre-post	9.588	140.597	0.544
Pair 2 pre-post	-18.133	110.646	0.139
Diabetes distress			
Pair 1 pre-post	0.441	0.688	0.000
Pair 2 pre-post	0.036	0.284	0.250

Diabetes forces people to manage their diet and sometimes need medication for glycemic control. In the long course of treatment therapy, patients with diabetes might suffer from diabetes distress. To avoid these situations, some effort is required. Our study proved that tailored intervention program is better at reducing diabetes distress in the diabetes population compared to traditional health education. Diabetes distress in the intervention group before receiving the tailored intervention program was 2.46 (moderate), then decreased to 2.01 (moderate) with a p-value of 0.000.

Meanwhile, in the control group who received traditional health education, the diabetes distress score was 2.40 (moderate), decreased to 2.37 (moderate), and was not statistically significant. Our data related to another study by Lutes et al. (2018) was that tailored integrated intervention among uncontrolled type 2 diabetes patients has a good impact on reducing the level of diabetes distress (Lutes et al., 2018). Diabetes distress comprises several domains, such as emotional distress, distress with health professionals, medication and interpersonal distress (Farm et al., 2017). The decrease in diabetes distress shown by participants in this study is closely related to good communication between patients and health workers. In the tailored intervention program, professional staff is faced with conditions to place the expected intervention outcome by the profile of each patient (Cummings et al., 2019; Lake et al., 2020; Navodia et al., 2019). In addition, patient preferences are a determinant in the choice of medication. In the tailored intervention program, participants feel more valued for their opinions, which impacts a sense of responsibility for what they choose in medication (Hertroijs et al., 2018; Tinetti et al., 2016). Awareness of healthy behaviour that began to emerge among each respondent made them start doing self-management voluntarily without coercion from anyone. This condition makes each diabetic patient feel much more empowered, further affecting the reduction in diabetes distress.

Limitations

The single-blind design may appear to be biased in that participants may exaggerate the data they provide. In addition, blood glucose examination in this study was limited to the pre-test at the beginning of the test and the post-test after three months. Blood glucose examination was not able to accurately show blood glucose results in the previous three months but only at the time of examination. Bias results can happen if we just used blood glucose tested in this case. We suggest

that the HbA1c examination be carried out in future studies in order to observe the respondents' average blood glucose levels for the last three months.

Conclusions

Both the experimental and control groups' mean blood glucose levels were not statistically significant. Conversely, diabetes distress in the intervention group statistically decreased compared to the control group. This approach can be an important concern for improving the quality of services by health professionals, particularly nurses for diabetes distress prevented. Longer follow-up studies are required to see if there are any benefits over the course of the disease. In the future, more than 3 months of follow-up research will be needed.

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Conflict of Interest

The authors affirm no conflict of interest in this study.

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GABRA6 and SLC6A4 genotypes are correlated with the fasting blood glucose and physical fitness in the seemingly healthy young adults

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ABSTRACT

Introduction: We examined environmental and genetic factors potentially correlated with the blood glucose and physical fitness in Kediri, East Java, Indonesia to elucidate the predominant cardiovascular disease risk.

Methods: This was a cross-sectional study on 68 adults aged 18-22 years. Direct interview was conducted to get socio-economy, daily diets (rice/ R, snacks and sweets/ SS, veggies and fruits/ VF), daily activity (locomotors and non-locomotors) data. Peripheral blood-GABRA6 and SLC6A4 polymorphisms, fasting blood glucose (FBG), blood pressure, 3 fitness parameters (1 min push-up, 3 minutes step up, pulse rate after 3 minutes step-up) were measured by 2 independent and pre-trained medical doctors. Kruskal-Wallis, Chi-Square, and eta-coefficient tests were used to seek differences between genotypes and correlation strength between variables, respectively (significant if $p < 0.05$).

Results: Both gene's genotypes showed significant correlations with the FBG ($p=0.042$, $p=0.013$, respectively); GABRA6 polymorphism significantly correlated with SU ($p=0.033$). There was a significant difference in the FBG between 2 VF subgroups ($p=0.02$). Strongest association was found between FBG and SLC6A4 ($\eta=0.3$); PR and GABRA6 ($\eta=0.168$), PU and SLC6A4 ($\eta=0.38$); SU and Locomotors ($\eta=0.237$).

Conclusions: In these seemingly healthy young adults, daily diets and the genotypes of both genes have a good association with the FBG and physical fitness levels.

Keywords: diabetes mellitus, fitness, GABA, health risk, serotonin

Introduction

Pre-diabetes and hypertension would increase risk to develop metabolic disease including type 2 diabetes mellitus characterized by relative decreased insulin secretion and insulin resistance that constituting for approximately more than 90% of all diabetes cases (Qiu

et al., [2015](#); Hadi Alijanvand et al., [2020](#); Kalanjati et al., [2021](#)). The prevalence of T2DM and pre-diabetes have been increased worldwide, and reported to widely associate with an increase prevalence of cardiovascular diseases (CVD) including hypertension (Chia et al., [2020](#)). The prevalence of diabetes for all age groups was

approximately 2.8% in 2000 and will be around 4.4% in 2030 globally (Hakola, 2015; Hamasaki, 2016; NCD Risk Factor Collaboration (NCD-RisC), 2016). This could become a national burden, and is warranted for early detection and prevention. Management of pre-diabetes and pre-hypertension including changes in lifestyle and monitoring glycaemia also sodium intake to lower the risk of developing diabetes and CVD in the later life (Hamasaki 2016; Kamal et al 2020; Mathur et al. 2021).

Physical activity was reported to correlate with the levels of blood glucose (Osailan et al., 2021). Blood glucose also determines the health and physical fitness that normal levels would be allowing individuals to carry out daily activity without excessive fatigue. Amongst many factors determining the levels of physical fitness i.e. muscular strength, endurance, and flexibility as needed to perform sit-up and push up exercises (Hakola, 2015). It was reported that physical fitness can be used to assess university student's study performance (Sookhanaphibarn and Choensawat, 2015). Physical activity and low-carbohydrate diets improve glycemic control and decrease the risk of CVD and mortality rate in pre-diabetes patients with hypertension. Moderate to high-intensity exercise is recommended in controlling the glycemic levels and increasing the insulin sensitivity, however in certain cases walking for at least 30 minutes a day has been reported to reduce the T2DM risk by approximately 50% (Hakola 2015; Hamasaki 2016; Kam et al 2020). On the other hand, sedentary time was reported to have a close association with higher risk of diabetes and CVD incidence and mortality rate in adults (Biswas et al 2015).

On the other hand, the genotypes of SLC6A4 (Serotonin transporter gene, solute carrier family 6 member 4), which code serotonin transporters have been reported to associate with body mass index (BMI) and situation awareness performance in healthy young adults in Colombia (González-Giraldo et al., 2018). Serotonin uptake affects the mood and behavior through its work at the limbic system and hypothalamus (Dunn et al., 2012; González-Giraldo et al., 2018). This neurotransmission accounted for appetite, autonomic signals to regulate the blood pressure, emotion and higher cortical functions related to the hypothalamus,

limbic system and the prefrontal cortex (Qin et al., 2018; Simpson et al., 2008). In these area, gamma-amino butyric acid (GABA) has been observed to play major role as the predominant inhibitory neurotransmitter, and closely related with the stress response, specifically in obese persons (Arias et al., 2012; Lynch et al., 2015; Rosmond et al., 2002). GABRA6 (gamma amino-butyric acid type A receptor subunit alpha-6) gene polymorphism has been reported to correlate strongly with mood, anxiety and motor response; this gene encodes the GABA-A alpha-6 subunit protein receptors (Han et al., 2008; García-Martín et al., 2018). Although both neurotransmissions have been shown to relate with feeding behavior, stress response and lipid deposition, their impact on the blood glucose and other determinants of CVDs have yet widely explored and thus examined in the current study. The result of this study would provide evidence on the association of genetic and non-genetic determinants with the physical performance and risk factors to develop CVDs in later life.

Materials and Methods.

This study was carried out in accordance with the Declaration of Helsinki. All participants in this study signed written informed consents and this study has been granted by the health ethical committee (No. 226/EC/KEPK/FKUA/2020). We conducted an observational analytic study with a cross-sectional design to analyze the daily diets and activity, biomarkers and the genotypes of GABRA6 and SLC6A4 with the physical fitness of 68 consented participants aged 18-22 years old Javanese ethnicity males and females conducted in March-April 2020. All measurements were done in duplicate by 2 independent-pre trained medical doctors for minimizing any potential observer bias. We have done a preliminary study to ensure standard protocols can be applied thoroughly during the observation. We include participants with the current healthy condition and able, also willing to follow all protocols in this study. We exclude ones who have a history of any metabolic diseases i.e. type-2 diabetes mellitus, dyslipidemia and any cardiovascular diseases. We also exclude those with history of any major known

Table I Frequency of SLC6A4 and GABRA6 polymorphisms

Gene	Genotype	n	Frequency	Allele	n	Frequency	P Chi-Square test
SLC6A4	S/S	51	0.75	S	116	0.85	2.19 (p>0.05)
	L/S	14	0.21	L	20	0.15	
	L/L	3	0.04				
GABRA6	T/T	32	0.47	T	98	0.72	3.97 (>0.05)
	T/NT	34	0.5	NT	38	0.28	
	NT/NT	2	0.03				

diseases i.e. any type of neoplasms, major injury and autoimmune diseases. Information from each participant i.e. daily diet including approximate rice consumption (Rice) in a day (100 grams, 200 grams, ≥ 300 grams), vegetables and fruit (Veggies-Fruits) inclusion in daily diet (yes or no), daily sweets and snacks (Snacks-Sweets) consumption (yes or no); non-locomotors activity was measured from daily gadget usage (less than 30 minutes, 30 to 120 minutes, 120 to 240 minutes and more than 240 minutes); data of daily walking time/ locomotor (less than 45 minutes, 45 to 120 minutes, more than 120 minutes), age, family monthly income were also collected via direct interview (Biswas et al., 2015; Castro, Macedo-de la Concha and Pantoja-Meléndez 2017; Castro-Diehl et al., 2014). The age of each participant was confirmed from the data in the citizen card. Blood pressure was measured in participants in sitting position prior to other tests, after 5 minutes of rest at the time of survey, using digital

sphygmomanometer (HEM-7121, China) after checking for the device accuracy by comparing with the measurement through a mercury sphygmomanometer. The prehypertension blood pressure was defined by $120 \text{ mmHg} < \text{SBP} < 139 \text{ mmHg}$ and/ or $80 \text{ mmHg} < \text{DBP} < 89 \text{ mmHg}$. Hypertension blood pressure was defined by $\text{SBP} \geq 140 \text{ mmHg}$ and/ or $\text{DBP} \geq 90$ or if the patient was under antihypertensive drugs (Hadi Alijanvand et al., 2020). The fasting blood glucose (FBG) was analyzed using the Easy-Touch machine (Taiwan) by applying peripheral blood from the fingertip, after a 12-hour overnight fast. The FBG levels $70\text{-}100 \text{ mg/dL}$ was classified as normal, $>100\text{-}125 \text{ mg/dL}$ was classified as pre-diabetes (Chia et al., 2020; Hadi Alijanvand et al., 2020). The cardiovascular fitness were evaluated from the numbers of 1 minute push-up and 3 minutes step-up (PU and SU, respectively) were counted with resting intervals of 60 minutes, and the pulse rate after SU (PR) was measured subsequently (Sookhanaphibarn and Choensawat 2015). All parameters were measured by 2 medical doctors trained prior to the current study for standardized procedures. The average from two closest measurements of each variable were used.

The isolated DNA was obtained from 68 participants (from a peripheral blood-swab). The DNA was extracted using the DNA extraction kit (Instagene Matrix, BioRad, USA). The spectroscopy was done to quantify the DNA concentration (FluoStar Omega, BMG Labtech, Germany). The primer pair of SLC6A4 was 5'-TCC TCC GCT TTG GCG CCT CTT CC-3' and 5'-TGG GGG TTG CAG GGG AGA TCC TG-3' (González-Giraldo et al., 2018; González-Giraldo et al., 2018). The primer pair of GABA-a receptor subunit $\alpha 6$ (GABRA6) was 5'-GGA GGC ACC AGT AAA ATA GAC CAG-3' and 5'-AAT ACT GAA CAA TGG AAG ACA AAA-3' (García-Martín et al., 2018; Rosmond et al., 2002; Uhart et al., 2004). The PCR was done using 2x Go TagGreen master mix PCR (Promega) on a thermocycler (TC-5000, Techne, UK) in $20 \mu\text{l}$ of total reaction volume, contained 20 ng genomic DNA as template. The PCR reaction was set as follows: pre-denaturation at 95°C for 5 minutes, followed by reaction cycles of denaturation step at 94°C for 30 seconds, and elongation at 72°C for 40 seconds, and ended with post-elongation at 72°C for 10 minutes. For GABRA6 analysis, the next step was digestion of PCR product using AlwNI restriction enzyme (NEB) according to the NEB product manual (Han et al., 2008; Lynch et al., 2015). The digestion fragment size was determined after separation on agarose gel. The electrophoresis was done using 12% agarose gel containing ethidium bromide, and then were visualized on the UV box (BioDocAnalyze, Swiss). The approximate restriction

Table 2 Characteristics of the socioeconomic, environmental and health parameters of all participants (N=68)

No.	Variables	n (%)
1	Gender	
	Male	32 (47.1)
	Female	36 (52.9)
2	Age (years)	
	18	1 (1.5)
	19	10 (14.7)
	20	16 (23.5)
	21	29 (42.6)
	22	12 (17.6)
3	Family monthly income (IDR)	
	< 2 millions	3 (4.4)
	2-5 millions	46 (67.6)
	>5-10 millions	15 (22.1)
	>10 millions	4 (5.9)
4	Non-genetic determinants	
A	Daily walking time (locomotors activity)	
	<45 minutes	47 (69.1)
	45-120 minutes	15 (22.1)
	>120 minutes	6 (8.8)
B	Daily use of gadget time (non-locomotors)	
	<30 minutes	2 (2.9)
	30-120 minutes	24 (35.3)
	120-240 minutes	20 (29.4)
	>240 minutes	22 (32.4)
C	Daily rice intake (grams)	
	<100	24 (35.3)
	100-200	29 (42.6)
	200-300	15 (22.1)
	>300	0 (0)
D	Daily snacks and sweets intake	
	Yes	47 (69.1)
	No	21 (30.9)
E	Daily veggies and fruits intake	
	Yes	16 (23.5)
	No	52 (76.5)
5	Blood pressure	
	Normal	48 (70.6)
	Pre-hypertension	17 (25)
	Hypertension	3 (4.4)
6	Fasting blood glucose (mg/dL)	
	Normal	64 (94.1)
	Pre-diabetes	4 (5.9)
	Diabetes	0 (0)

Table 3 Differences in the blood pressure, FBG and physical fitness amongst SLC6A4 genotypes, GABRA6 genotypes, daily diets and activities subgroups

Groups	Blood Pressure		FBG (mg/dL)		Physical Fitness					
					Pulse rate after 3 minute step-up		Count of 1 minute push-up		Count of 3 minute step-up	
	P Kruskal-Wallis	P Chi-Square	P Kruskal-Wallis	P Chi-Square	P Kruskal-Wallis	P Chi-Square	P Kruskal-Wallis	P Chi-Square	P Kruskal-Wallis	P Chi-Square
SLC6A4	.996	.967	.381	.042*	.592	.211	.708	.335	.594	.947
GABRA6	.755	.877	.525	.013*	.280	.702	.461	.956	.523	.033*
Locomotors	.224	.266	.074	.271	.678	.902	.388	.59	.105	.051
Non- Locomotors	.716	.900	.431	.451	.816	.491	.753	.935	.906	.888
Rice	.706	.664	.200	.582	.777	.289	.795	.728	.373	.511
Snacks- Sweets	.802	.473	.099	.738	.729	.393	.609	.506	.627	.635
Veggies-Fruits	.084	.215	.016*	.493	.954	.048*	.648	.501	.582	.741

fragment length of GABRA6 T-allele was 423 base pairs and the non-T allele were 257 and 166 base pairs; whilst the SLC6A4 L-allele was 512 base pairs and S- allele was 469 base pairs. Fasting sub-sample for the PCR was used ($\pm 10\%$ of population) to confirm the genotype of each polymorphism. The distribution of individual genotype and frequency of the participants and control subjects were analyzed using Hardy-Weinberg Equilibrium calculator. Kolmogorov-Smirnov tests was used for normality test. Differences in the blood pressure, FBG and physical fitness between SLC6A4 genotypes, GABRA6 genotypes, daily diets and activity subgroups were assessed using Kruskal-Wallis and Chi-Square tests. Differences in genotype frequencies were assessed using the Chi-Square test. Pearson's' Chi-Square correlation was used to measure the significance of correlation of the SLC6A4 genotypes; GABRA6 genotypes; daily diets and activity subgroups with the blood pressure, whilst Eta-coefficient test was used to assessed the degree of association of the SLC6A4 genotypes; GABRA6 genotypes; daily diets and activity subgroups with the FBG and physical fitness parameters. A two-tailed $p < 0.05$ was considered statistically

significant (IBM SPSS Statistical Package Version 17.0, USA).

Results

There were 32 (47.1%) males and 36 (52.9%) females participating in this study. Approximately The mean age was 20.7 ± 0.99 years with predominant family monthly income was between 2-5 million IDR (46%). Daily activity of non-locomotors and locomotors mostly consisted of less than 45 minutes of walking (47%) and more than 30 minutes of using gadgets (97.1%; $n=66$). Whereas the daily diets consisted of more than 300 grams of rice was found in 22.1% of all participants; 69.1% had snacks and sweets whilst 76.5% had not veggies and fruits in their daily routine (Table 2).

We observed 3 polymorphism of SLC6A4 gene i.e. L/L, L/S, S/S; and 3 polymorphism of GABRA6 gene i.e. (T/T, T/NT, NT/NT) (Figure 1a-b). The distribution of L and S alleles of SLC6A4 and of T and NT alleles of GABRA6 followed the Hardy-Weinberg equilibrium. The frequency of L and S allele of SLC6A4 was 0.15% and 0.85%, with $p > 0.05$, respectively; whilst the frequency of T and NT allele of GABRA6 was 0.72% and 0.28%, with

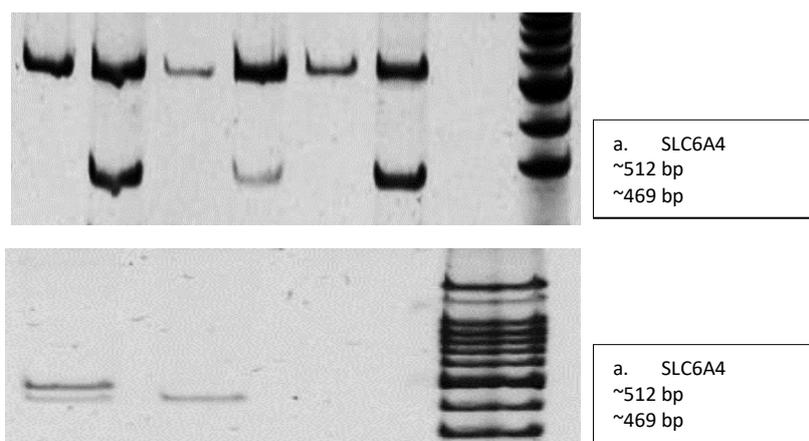


Figure 1 a-b. A representative gel of SLC6A4 showed 2 distinctive alleles i.e., L-allele (~512 base pairs) and S-allele (~469 base pairs); whilst GABRA6 showed 2 distinctive bands i.e., T-allele (~423 base pairs) and non-T/ C-allele (~257 base pairs).

$p > 0.05$, respectively. The frequency of SLC6A4 L/L, L/S and S/S was 0.04%, 0.21% and 0.75%, respectively; whilst GABRA6 T/T, T/NT and NT/NT was 0.47%, 0.5% and 0.03%, respectively (Table 1).

The fasting blood glucose (FBG) was found normal in 94.1% participants, whilst 5.9% was pre-diabetes with FBG levels was ≥ 100 mg/dL. The blood pressure was categorized normal-tension in 70.6%, pre-hypertension in 25% and hypertension with systole/ diastole pressure was $\geq 140/90$ mmHg in 4.4%.

We found no significant differences either on the blood pressure, FBG, physical fitness [PR, PU, SU], between 3 groups of SLC6A4 polymorphisms ($p=0.996$, $p=0.381$, [$p=0.592$, $p=0.708$, $p=0.594$]), and between 3 groups of GABRA6 polymorphisms ($p=0.775$, $p=0.525$, [$p=0.28$, $p=0.461$, $p=0.523$]), respectively. We found no significant differences either on the blood pressure, FBG or 3 physical fitness parameters [PR, PU, SU] amongst: (1) 3 groups with different quantity of daily rice intake ($p=0.706$, $p=0.2$, [$p=0.78$, $p=0.8$, $p=0.63$]); (2) 2 groups of snacks and sweets daily intake ($p=0.802$, $p=0.099$, [$p=0.73$, $p=0.61$, $p=0.58$]); (3) 3 groups of locomotors daily activity time ($p=0.224$, $p=0.074$, [$p=0.68$, $p=0.39$, $p=0.11$]); and (4) 4 groups of non-locomotors daily activity time ($p=0.716$, $p=0.431$, [$p=0.82$, $p=0.75$, $p=0.91$]), respectively. Although there were no significant differences on the blood pressure ($p=0.08$), or on the physical fitness [PR ($p=0.95$), PU ($p=0.65$), SU ($p=0.58$)]; **the FBG between those who include and exclude veggies and fruits from their daily diets was significantly different ($p=0.02$) (Table 3).**

We found no significant correlations between SLC6A4 polymorphism either with the blood pressure ($p=0.97$), or with the physical fitness [PR ($p=0.21$), PU ($p=0.34$), SU ($p=0.95$)]; **however significant correlation was found with FBG ($p=0.042$)**. We found no significant correlations between GABRA6 polymorphism either with the blood pressure ($p=0.88$), or with 2 physical fitness parameters [PR ($p=0.702$), PU ($p=0.96$)]; **however significant correlation was found with the SU ($p=0.033$) and with the FBG ($p=0.013$)**. We found **significant correlations between diastole and non-locomotors activity daily ($p=0.005$); and between the PR and daily intake of veggies and fruits ($p=0.048$)**. However no other significant correlations were observed either between the daily diets and the blood pressure, FBG or physical fitness; or between the daily activity time and these 3 cardiovascular risk factors (Table 3). **The highest eta-coefficient in the FBG was shown with the SLC6A4 genotypes ($\eta=0.3$); whilst in the physical fitness parameters [PR, PU, SU] was with the GABRA6 genotypes, with the SLC6A4 genotypes**

and with the daily locomotors activity ($\eta=0.168$, $\eta=0.38$, $\eta=0.237$, respectively) (Table 4).

Discussions

We found that the participants of this study were university students of the same race, and came from the low to middle class of family income. We also found that several of these seemingly healthy young adults suffered from the pre-diabetes and/ or pre-hypertension. Socioeconomic factors play a significant role to determine the utilization of healthcare and education, including cardiovascular-related preventive care (Mulyanto et al., 2019; Nadasya et al., 2021; NCD Risk Factor Collaboration (NCD-RisC) 2016). Castro-Diehl et al., (2014) reported variations in the correlations of income-wealth index and education with the cortisol levels (Castro et al., 2017). In African Americans race, this association tended to be strongest; it was reported that the income-wealth index showed contrast levels with the urinary stress hormones i.e. levels of cortisol,

Table 4. Association analysis of association degree between the blood pressure, FBG and 3 physical fitness parameters either with the SLC6A4 and GABRA6 genotypes or with the daily diets and activities

Dependent Variables	Independent Variables	P Pearson's Chi-Square test	Eta-Value (η^2)
BP	SLC6A4 genotypes	.967	-
	GABRA6 genotypes	.877	
	Rice	.644	
	Snacks_Sweets	.473	
	Vegies_Fruits	.215	
	Locomotors	.266	
	Non-Locomotors	.900	
[FBG]	SLC6A4 genotypes	-	.300 (.09)
	GABRA6 genotypes		.141
	Rice		.191
	Snacks_Sweets		.203
	Vegies_Fruits		.274
	Locomotors		.234
	Non-Locomotors		.175
PR	SLC6A4 genotypes	-	.159 (.03)
	GABRA6 genotypes		.168
	Rice		.069
	Snacks_Sweets		.064
	Vegies_Fruits		.016
	Locomotors		.103
	Non-Locomotors		.151
PU	SLC6A4 genotypes	-	.380 (.14)
	GABRA6 genotypes		.036
	Rice		.158
	Snacks_Sweets		.132
	Vegies_Fruits		.002
	Locomotors		.037
	Non-Locomotors		.100
SU	SLC6A4 genotypes	-	.109 (.06)
	GABRA6 genotypes		.134
	Rice		.173
	Snacks_Sweets		.070
	Vegies_Fruits		.063
	Locomotors		.237
	Non-Locomotors		.103

epinephrine, norepinephrine and dopamine; lower stress level was found amongst higher income-wealth group (Castro et al., [2017](#)).

In our study, the genotypes of both genes showed significant correlations with the fasting blood glucose, although stronger association was shown with the SLC6A4 compared to the GABRA6 genotypes. We also found that SLC6A4 and GABRA6 polymorphism had significant correlation with physical fitness. Stress response has been reported to be associated with the polymorphism of serotonin transporter gene's polymorphism, the SLC6A4. SLC6A4 plays a vital role in the reuptake of serotonin in the synaptic cleft, where this neurotransmitter can be found abundance both in the brain area controlling appetite and mood, also in the intestine where the digestion process actively occurs (García-Martín et al., [2018](#); González-Giraldo et al., [2018](#)). Mental status and motor response during various stressor induction have also been reported to correlate with the GABRA6 genotypes (Braat and Kooy [2015](#); Lynch et al., [2015](#)). GABRA6 is responsible for the expression of GABA-A alpha-6 receptors; this gene is located on chromosome 5q31.1-q35 (Rosmond et al., [2002](#)). By acting through this receptor, GABA (gamma-amino butyric acid) might affect the hormonal control of cortisol by reducing the secretion of corticotropin releasing hormone, which in turn increases the secretion of cortisol by the adrenal cortex. GABA is the predominant inhibitory neurotransmitter in the adult mammalian brain (Kalanjati et al., [2017](#); Miller et al., [2017](#); Qin et al., [2018](#)). Several natural diets component i.e. lithium, taurine, vitamin B6, vitamin B12 and folic acid from fermented milk products and/ or sprouts brown rice, barley and beans could raise the activity of GABA-ergic system. Gene alteration in GABA-A receptors have been shown to associate widely with the neurodevelopmental disorders due to the predominant inhibition modality in adult mammalian brain (Kalanjati et al., [2017](#); Rosmond et al., [2002](#); Uhart et al., [2004](#)). GABRA6 polymorphism correlates with abdominal obesity and cortisol secretion that leads to hypercortisolism. Environmental determinants including stress produce modulation on the GABA-hypothalamic-pituitary-adrenal systems in the individuals with genetic vulnerability. Polymorphism of GABRA6 alleles also associated with specific psychoneurological traits i.e. neuroticism, motor reflex response and mood disorders in women (Chiriboga et al., [2008](#); Han et al., [2008](#); Lynch et al., [2015](#)). Arias et al., ([2012](#)) reported that neuroticism as shown as harm avoidance traits connected to the anxiety, self-consciousness,

vulnerability and depression in persons with homozygous T allele in T1512C polymorphism were slightly higher than those with C allele carriers (Hadi Alijanvand et al., [2020](#)). García-Martín et al. ([2018](#)) reported that when certain dose of ethanol were induced, the polymorphism of GABRA6 rs4454083 T/C amongst these individuals were related to motor times, whilst the C/C genotype showed both basal and peak ethanol concentration-faster motor times; this was proposed to be the result of certain subunit expression levels and distribution in human's brain region (García-Martín et al., [2018](#); Rosmond et al., [2002](#); Simpson et al., [2008](#)).

Qiu et al., (2015) reported that hypertension with- or without pre-diabetes increased the chance to suffer from CVDs and T2DM when compared to those with normal blood pressure and blood glucose (Qiu et al., [2015](#)). However, weak associations were observed between blood pressure and genetics and non-genetic factors in the current study. No significant differences of the blood pressure of all participants were observed between different groups of either genetic or non-genetic determinants. Although, we observed significant differences on the FBGs between participants who included and excluded the veggies and fruits in their daily diets. We also found significant correlation between a parameter of physical fitness and the daily intake of veggies and fruits. Healthy eating by consuming the right type and quantity of food from 5 different food groups can ensure the proportional energy produced and prevent the excess calories that may lead to overweight and obesity. Mathur et al., ([2021](#)) reported that motor activity was amongst determinants of non-communicable diseases (NCD) risk factors in 1531 adolescents aged 15-17 years old in India. They observed that insufficient levels of physical activity was found in approximately 6.2% of overweight and 1.8% obese adolescents. A study by Chiriboga et al., ([2008](#)) reported that men gained 0.3 kg whilst women lost 0.2 kg over the 1-year study period. They also observed that greater leisure-time physical activity was amongst predictors for lower body weight at the baseline in both groups. Lower percentage of caloric intake and greater occupational physical activity were reported to correlate with lower body weight in men whilst increased total calorie intake and leisure-time in women were counted for the longitudinal predictors of 1-year weight gain. The study reported that children with overweight and obesity would likely suffer from similar conditions in their future life and increase the risk

of suffering from chronic diseases such as metabolic syndrome and CVDs.

Strength and Limitation

A novel aspect of this study is the investigation of both genetic and non-genetic factors as potential determinants correlated to the cardiovascular diseases risks and neuromuscular fitness. However, due to relatively limited and homogenous sample numbers with a cross-sectional type of study, the metabolism dynamic could not be captured thoroughly; extrapolation of results to other groups must be done in discretion.

Conclusions

Genetic polymorphism of SLC6A4 and GABRA6 along with the daily diets show significant correlations with the fasting blood glucose and the physical fitness levels in these seemingly healthy young adults.

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Conflict of Interest

The authors have declared no conflicts of interest.

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The experience of nurses in providing holistic nursing care for COVID-19 patients at Banyuwangi Hospital

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ABSTRACT

Introduction: COVID-19 is a new virus that was discovered at the end of December 2019 and has marked a global pandemic around the world. Not only has a high-risk infection, nurses as health workers who have the most contact with COVID-19 patients are also at risk of experiencing physical and emotional stress. Anxiety and nurses' fear about the risk of contracting the COVID-19 virus can lead to unprofessional attitudes and behavior of nurses in providing holistic nursing care to the patients. This study aimed to explore the experience of nurses in providing holistic nursing care to COVID-19 patients.

Methods: This research used phenomenological qualitative research. Data collection was done by in-depth interview. The participants in this study were 7 nurses who served in the isolation room of Blambangan Hospital, Banyuwangi. Purposive sampling method was used to select participants according to the inclusion criteria. Descriptions of nurses' experiences were analyzed using the Colaizzi approach.

Results: The study result revealed 6 themes; changes in the emotional status of nurses while caring for COVID-19, social stigma against COVID-19 nurses, support during caring for COVID-19 patients, expectations during caring for COVID-19, challenges during caring for COVID-19 patients, and fulfillment holistic nursing care for COVID-19 patients.

Conclusions: The nurses' experience in treating COVID-19 patients showed that when caring for patients, they have to go through ups and downs. This research was expected to improve nursing services, prepare nurses to adapt to the growing pandemic, and as a reference for further research related to the experience of nurses in treating COVID-19 patients.

Keywords: COVID-19, holistic nursing care, nurse experience

Introduction

At the beginning of 2020, the world was shocked by the presence of a new virus, namely a new type of coronavirus (SARS-CoV-2), the disease is called Coronavirus disease 2019 (COVID-19). This virus was first reported to have originated from Wuhan, China by the end of December 2019. On February 12, 2020, WHO named the disease Coronavirus 2019 (COVID-19) which is the seventh type known in man. SARS-CoV-2 is classified in the Beta coronavirus genus. Coronaviruses

are defined as family viruses that are transmitted between humans and animals (zoonosis) and can cause mild to severe symptoms. As happened in the past, there are two types of coronaviruses that have been identified to cause pathological effects in humans, these include Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS-CoV) (Moudy & Syakurah, 2020). The results of a preliminary study conducted on October 24, 2021 on five nurses using the interview method at the Blambangan Hospital,

Banyuwangi, showed four people stated that they had confirmed COVID-19. When they found out they were very shocked, worried that it would get worse, they were also afraid of infecting their family members, and they felt burdened with the stigma of friends and the surrounding community. Meanwhile the other person said he had never been confirmed as having COVID-19.

According to world COVID-19 data as of October 26, 2021, there were 243,857,028 confirmed cases of COVID-19, including 4,953,246 deaths, reported. Meanwhile, in Indonesia from January 3, 2020, to October 26, 2021, there have been 4,241,090 confirmed cases of COVID-19 with 143,270 deaths reported. As the front line in dealing with the COVID-19 pandemic, nurses are one of the professions that are at very high risk of contracting COVID-19. The International Council of Nurses (ICN) stated that as many as 90,000 health workers have been infected with COVID-19 and more than 260 nurses have died (ICN, [2021](#)). The death rate of health workers due to infection with the COVID-19 virus in Indonesia is the highest among countries in Southeast Asia (Pusparisa, [2020](#)). Meanwhile, the results of a study of 4679 doctors and 348 hospital nurses during the COVID-19 pandemic showed 15.9% psychological distress, 16.0% anxiety symptoms and 34.6% depression symptoms (Liu, Z. et al., [2020](#)). The results of the study stated that COVID-19 caused a psychosocial impact of anxiety on nurses, namely 154 respondents (34.00%) experienced mild anxiety, 16 respondents (3.53%) experienced moderate anxiety and two respondents (0.44%) experienced severe anxiety (Cui et al., [2021](#)).

Nursing personnel are one of the healthcare workers who interact with patients the most often compared to other components of health workers (Romadhoni & Widowati, [2017](#)). Medical personnel such as nurses are in the top position in the types of work that are most often exposed to diseases and infections such as the risk of facing an exposure to COVID-19 (Tiasari, [2020](#)). The high risk, according to Ehrlich, McKenney, and Elkbuli ([2021](#)), is caused by the length of interaction with patients and the large number of patients causing an increase in the number of viruses around them; these factors are exacerbated by the lack of the personal protective equipment (PPE) and lack of knowledge related to the use of the PPE. During the COVID-19 pandemic nurses sacrificed themselves to actively participate in services against the pandemic. Facing this situation results in higher stress levels experienced by nurses, so they are at the risk of experiencing a burnout (Sun et al., [2020](#)). The fear of contracting COVID-19 is a trigger for psychological problems, anxiety, and

depression, which is very detrimental to health workers and can have an adverse effect on the quality of care. They must overcome the anxiety so that they can treat patients according to the established care process (Wang et al., [2020](#)).

The phenomena of anxiety, depression, workload, and worrying about being infected by patients make nurses not optimal in providing holistic nursing care to COVID-19 patients. In this case, nurses in particular have an important role in the readiness to handle COVID-19 patients (Li et al., [2020](#)). One way to improve the quality of nursing services is supported by the development of nursing theories, namely by applying the caring theory by Swanson. The experience of nurses can be seen in aspects of knowledge, motivation, and psychological conditions. Efforts should be made to reduce the distribution and role of nurses in providing nursing care. These aspects can be influenced by the caring behavior of nurses such as the center of attention on people, respect for self-esteem and humanity, presence, empathy, nurse motivation to be able to care more for clients and be able to take actions according to client needs (Dwiyanti et al., [2015](#)).

In general, discussions related to nursing care for COVID-19 patients are still in the form of quantitative research that focuses more on disease prevalence (Hui et al., [2020](#)), clinical characteristics, diagnosis, and treatment (Huang & Zhao, [2020](#)). The holistic approach of nursing includes interventions that focus on the patient's response that heal the whole person and promote balance; therapy includes biological, psychological, social, and spiritual. Therefore, researchers are interested in exploring the experience of nurses in providing holistic nursing care to COVID-19 patients at the Banyuwangi Hospital.

Materials and Methods.

Research Design

This research used a qualitative design with a phenomenological approach. This design was chosen so that participants' experiences can be explored to be more revealed so that the picture of nurses' experiences in caring for COVID-19 patients can be depicted in a real way. The research method with a phenomenological approach is to explore perceptions, life experiences and understanding the essence of an individual's life. This method is appropriate to use to explore the phenomenon of nurses in treating COVID-19 patients because each nurse has their own perception of their life experiences according to their views on themselves.

With this method, it was hoped that various themes can be generated about the experience of nurses in treating COVID-19 patients.

Participant

This research was conducted in Banyuwangi Hospital from November 2021 until January 2022. The number of participants in qualitative research should be based on information needs. Therefore, the principle in sampling is data saturation, namely sampling to a point of saturation where no new information is obtained and redundancy is achieved (Polit, 2018). The population in this study was 32 nurses at the Blambangan Hospital, Banyuwangi who had treated COVID-19 patients. The criteria for participants were willing to be a participant and nurses who have experience working to treat COVID-19 patients for more than five months. The sampling technique used in this study used a purposive sampling technique. This resulted in seven participants.

Research Instrument

The tools used in the study as data collection instruments were demographic data questionnaires, interview guides, field notes, and voice recorders. Researchers conducted in-depth interviews to explore or explore in depth the experiences of nurses in treating COVID-19 patients. Researchers used questionnaires using participant demographic data which included initials, age of participants, gender of participants, and length of work. In addition, the researcher also used an interview guide during the data collection process. The interview guide contains questions based on Swanson’s caring theory and consists of: physiological attitude toward others (in general) and to the patient being treated (specifically); show a caring attitude, and provide motivation to recover from COVID-19; patients informed understanding of the clinical condition (in general) and the situation and client (in specific; nurses seek in-depth information regarding information and disease history; message conveyed to client; fully present, providing support, comfort, and monitoring to COVID-19 patients; therapeutic actions; perform nursing actions according to established ethics and procedures, demonstrate professional skills, and protect patient rights; validate every action that has been taken, provide information to improve the health of patients and families of COVID-19 patients. Holistic care includes biological, psychological, social, spiritual. Interview guides are made based on theoretical foundations that are relevant to the problems to be explored in the research. The interview guide is in-depth, begins with open-ended questions, and is not rigid. Questions can

Table. 1 The Theme Extraction

Theme 1: Changes in the emotional status of nurses while caring for COVID-19 patients
Sub-Theme: 1. Feeling sad when the patients die 2. Feeling happy caring for patients until they recover 3. Feeling of fear and stress
Theme 2: Social stigma against COVID-19 nurses
Sub-Theme: 1. Avoided and shunned by colleagues 2. Expelled and ostracized by society
Theme 3: Support while treating COVID-19 patients
Sub-Theme: 1. Support from hospital management 2. Support from family 3. Support from the government 4. Support from colleagues
Theme 4: Hope while treating COVID-19 patients
Sub-Theme: 1. Hope the pandemic ends 2. Expectations of nurses’ welfare 3. Hope for the welfare of society
Theme 5: Social stigma against COVID-19 nurses
Sub-Theme: 1. Difficulty acting and using PPE 2. Dealing with uncooperative patients and families 3. Difficulty performing actions with less amount of energy
Theme 6: Fulfillment of holistic nursing care for COVID-19 patients
Sub-Theme: 1. Meeting the biological needs of COVID-19 patients 2. Meeting the psychological needs of COVID-19 patients 3. Meeting the social needs of COVID-19 patients 4. Meeting the spiritual needs of COVID-19 patients

develop according to the ongoing process during the interview without leaving the theoretical foundation that has been established. The interview guide was made to make it easier for researchers so that the interviews were directed and in accordance with the research objectives. In addition, interview guides were used to remind researchers of the main issues discussed. The questions asked were related to the experience of nurses in treating COVID-19 patients. The interview guide has been tested for content validity by an expert. The purpose of this step is to assess the relevance of each item to the desired measure. The interview guides were: 1. Tell us about your current experience carrying out patient assessments for COVID-19 2. How do you prepare when doing assessment to the patient? 3. How do you build good therapeutic communication to a COVID-19 patient? 4. How often do you take the time to communicate with COVID-19 patients? 5. How do you motivate patients to survive the conditions they suffer from COVID-19? 6. Do you help COVID-19 patients in carrying out their prayers? 7. What are the problems when using PPE when treating COVID-19 patients?

Field notes are used by researchers to collect field note data, which comprise a written record of what is heard, seen, experienced, thoughts in the context of collecting data and reflecting on data in qualitative research in the form of documentation of non-verbal

responses during the interview process. The researcher also used a voice recorder to record conversations during the interview, then the results of the interview were typed in the form of a transcript.

Data Collection

Data collection in this study used an in-depth interview method with a duration of 30-60 minutes. Data collection was done through direct interviews. This research used in-depth interview guide to be submitted to participants. The in-depth interview method used an interview guide that contains questions to be asked to participants. This could make it easier for researchers to conduct interviews, collect information, data, and then depend on improvisation when at the research location. The researcher gave freedom to the participants to express their experiences with the questions asked during the interview process so that the data obtained naturally matched the experiences of the participants. Participants in the study amounted to seven nurses who met the research criteria, namely being willing to be participants, having experience working caring for COVID-19 patients >5 months, not experiencing communication disorders.

Data Analysis

The descriptive Colaizzi method was used to analyze the obtained data. This method consists of seven steps, as follows: (1) collecting the participants' descriptions; (2) understanding the depth of the meanings; (3) extracting the important sentences; (4) conceptualizing important themes; (5) categorizing the concepts and topics; (6) constructing comprehensive descriptions of the issues examined; and (7) validating the data following the four criteria set out by Lincoln and Guba: known as credibility, dependability, confirmability, and transferability.

Ethical Consideration

This research has gone through an ethical test conducted at the health research ethics commission of the Banyuwangi Institute of Health Science permission to research, number 041/01/KEPK-STIKESBWI/II/2022. All participants signed informed consent. The authors promise that there will be no academic misconduct such as plagiarism, data fabrication, falsification, and repeated publication.

Results

The data obtained showed that generally there were six participants aged 27-36 years (90%) and one person

aged 49 years (10%), the gender of the overall participants was one woman (10%) and six men (90%); the participant's position as deputy head of the room was one person (10%): due to a shortage of personnel in the COVID-19 isolation room at Banyuwangi Hospital, the deputy head of the room participated in treating COVID-19 patients. PJ shift was as many as one person (50%) and implementing nurses as many as five people (40%), generally the length of work of participants is 18-24 months as many as seven people (100%), generally the length of working hours/ day of participants is 7-10 hours as many as seven people (100%), and the training that has been attended by all participants is the use of PPE and the relocation of bodies as many as seven people (100%), while for the BTCLS training there are four people, and for the ICU/ICCU training there are three people. The demographic data of the participants is shown in detail in the form of a frequency distribution table. Result should be presented continuously start from main result until supporting results. Unit of measurement used should follow the prevailing international system. It also allowed to present diagram, table, picture, and graphic followed by narration of them.

The results of this study were analyzed according to the Colaizzi method and found six themes, namely: (1) Changes in the emotional status of nurses while caring for COVID-19 patients; (2) Social stigma against COVID-19 nurses; (3) Support while caring for COVID-19 patients; (4) Expectations while treating COVID-19 patients; (5) Challenges while treating COVID-19; (6) Fulfillment of holistic nursing care for COVID-19 patients. These themes will be discussed in detail to interpret the experience of nurses in caring for COVID-19 patients.

Theme 1: Changes in the emotional status of nurses while caring for COVID-19 patients

Changes in the emotional status of nurses while treating COVID-19 are feelings experienced by nurses when they are happy about something, angry with someone, or afraid of something while caring for a COVID-19 patient. This is illustrated by the sub-themes, namely: 1) feelings of sadness when the patient dies; 2) feelings of happiness in caring for patients until they recover; 3) feelings of fear and stress. Each sub-theme will be explained as follows:

Feeling sad when patient dies

The nurse's sadness when she saw the patient, she was caring for died. This statement corresponds to the following expressions:

"Of course, there are feelings of sadness and happiness. For the sad feeling is when many of the patients we care must die. When the number of COVID is high, every day I see patients who die. So, we as nurses feel sad when we see it." (P1)

"We feel sad for failing to treat patients." (P4)

"Sometimes we also feel sad when a patient who dies is not accompanied by his family, so we have to carry out the relocation of the corpse." (P6)

"Sad moment when the patient goes home not accompanied by his family, especially the patient who died. And the handling of the corpse is quite complicated, such as having to use a coffin, the corpse can't be outside for too long, it can't be family. This makes for an unspeakable experience." (P7)

Feelings of happiness that they can take care of patients until they recover

The happiest thing for nurses is when they see patients being treated can recover from COVID-19 and can reunite with their families; it is a happiness that exceeds anything for nurses. This statement corresponds to the following expressions:

"The happy experience is that many patients recover, the patients we take home recover, the patients who come with shortness of breath recover, of course we are happy." (P1)

"Very grateful when the patient recovers. Because what I do with other friends and doctors is not in vain, everyone works in unison and helps each other." (P2)

"When a patient recovered, we were very proud and moved to tears, the patient said goodbye by waving." (P4)

"Then the other happy person is when the patient we have treated is declared negative, it is a special happiness that cannot be expressed in anything." (P6)

Feelings of fear and stress

Fear and stress while treating COVID-19 patients are experienced by nurses who must serve patients, because nurses are the front-line troops in handling the fight against COVID-19. This statement corresponds to the following expressions:

"Of course, personally, I am afraid, afraid of transmitting the COVID virus to the family at home. Even though we are afraid, we still carry out our obligations as health workers." (P1)

"Feeling stressed because we can't see the outside world. It's just being locked up in an isolation room; the trials of life at this time sometimes we can think for ourselves, if later we will be more stressed. Sometimes we try to strengthen ourselves while praying so that God will continue to be given health." (P6)

"At the beginning of the COVID case, I was afraid because many died. And many nurses abroad and at home are also infected. So I feel afraid that later I will be infected with the virus, from there many doubts arise in me." (P7)

Theme 2: Social stigma against COVID-19 nurses

Social stigma against COVID-19 nurses is a negative view between a person, a group of people who share characteristics of nurses working in COVID-19 treatment rooms. The current COVID-19 pandemic is causing fear for some people. Feelings of fear can make a person stay alert but when the feeling of fear becomes excessive about COVID-19, it causes the emergence of social stigma against the person or place associated with the disease. This is illustrated by the sub-themes, namely: 1) being avoided and shunned by peers, and 2) being expelled and ostracized by the community.

Avoided and shunned by colleagues

While treating COVID-19 patients, nurses are shunned by colleagues on duty from other treatment rooms. When you pass or meet a COVID-19 nurse, there are colleagues from other rooms who fix masks and even run away and stay away. This statement corresponds to the following expressions:

"Other nurses avoided, they said you were taking care of COVID, bro. Indirectly, it offends them, they don't know our sacrifice while in the COVID isolation room." (P3)

"I have been shunned by colleagues. When I came with my friends to another room, they suddenly drifted away. One time when I am delivering food for the patient's diet, the door of the room was closed, and I was not allowed to enter the room. I had to give the patient's diet from outside. So, I was thought to be carrying the virus, and I felt a little offended when I was treated that way." (P4)

Expelled and ostracized by society

Nurses were evicted from their homes and even the families and children of nurses who treated COVID-19 patients were ostracized from their environment. This statement corresponds to the following expressions:

"After finishing work from the hospital, there are some of us who stay at boarding house and the owner says just move from here, so they rent a house and gather in one house." (P1)

"My neighbor once asked, 'Are you a COVID nurse?' I said yes ma'am. So please don't stay here, poor people, instead of getting infected with the virus by you, you should go." (P5)

Theme 3: Support while treating COVID-19 patients

Support while caring for COVID-19 patients is encouragement, motivation given by a group of people who are close to the social environment of nurses while caring for COVID-19 patients. Support in the form of caring, respect and love. This is reflected in the sub-themes, namely: 1) support from hospital management, 2) support from family, 3) support from the government, and 4) support from colleagues.

Support from hospital management

Hospital management support is such as providing facilities for COVID-19 nurses while on duty, namely housing for nurses, food and vitamins, providing attention and support and inquiring about the condition of nurses while on duty caring for COVID-19 patients. This statement corresponds to the following expressions:

"The management team always supports us, for example they always provide additional supplements and vitamins for the health workers here, the hospital director also makes phone calls and video calls with nurses and talks and laughs together, it makes us happy and feel cared for." (P1)

"They always support us, 'Keep fighting ya', they always send the support by WA group. Then they ask, 'how are you? Are you still healthy? Don't forget to take care of your health according to the protocol...' (P3)

"A lot of support is facilities for patients. For the nurses themselves, almost 50% of us get help. We are grateful because we get two days off, so we have time to rest, there are also supplements for our health." (P6)

Support from family

Support from family is an effort given by the family and motivation from parents, husband/wife, and children if nurses treat COVID-19 patients. This statement corresponds to the following expressions:

"Support from my husband, I have been married for 10 months ago, my husband supports me by going to the hospital. Sometimes he also leaves food for me". (P4)

"Parents are very supportive. When I feel very tired after coming home from work, a phone call with my parents has become an encouragement, I think support from parents is very important." (P1)

"Support from family, when I go home from work, my parents call and encourage us." (P6)

Support from the government

Support from the government is an award in the form of incentives to health workers who treat COVID-19 patients. Support from the government is urgently needed by health workers, especially nurses who oversee treating COVID-19 patients. This statement corresponds to the following expression:

"We get incentives from the government and from the Ministry of Health. So that is one form of reward for the nurses' struggle while treating COVID." (P1)

Support from colleagues

Support from colleagues is the motivation given by friends who are on duty while treating COVID-19, a form of attention, enthusiasm and providing support while treating COVID-19 patients. This statement corresponds to the following expressions:

"As a friend, we always support each other. If one of us is tired, we always say, 'we must be patient and strengthen each other'." (P3)

"From our colleagues we support each other. Because we also experience the same suffering, happy and sad together." (P6)

Theme 4: Expectations while treating COVID-19 patients

Hope while treating COVID-19 patients is a wish that bears fruit and will be obtained from an incident while treating such patients. Expectations of nurses while caring for COVID-19 patients based on sub-themes are: 1) hope for the end of the pandemic, 2) hope for the welfare of nurses, 3) hope for the community.

Hope the pandemic ends

That the pandemic will end soon is a nurse's wish and dream to be free from COVID-19. This statement corresponds to the following expressions:

"I hope this pandemic will pass quickly." (P3)

"I hope that COVID will end quickly, hopefully there won't be more patients." (P5)

"Hopefully this COVID will pass quickly, so that our country will recover again as before." (P6)

Expectations for the welfare of nurses

As a profession, nurses should get welfare in accordance with expectations. Expectations for the welfare of nurses while caring for COVID-19 patients are in accordance with the following expressions:

"The hope is that the nurse's salary is not below the minimum wage, and they are given properly, because nursing is a profession that deserves to be rewarded with a decent salary." (P1)

"Hopefully the incentives will be disbursed quickly." (P3)

"After this pandemic, all nurses were not underestimated, no one thought we were lying about this disease, no one said we killed their citizens, all the nurses who take care of them are healthy..." (P7)

Hope for society

The nurse's hope for the community is the desire while caring for COVID-19 patients, namely with the COVID-19 pandemic, the community adheres to the health protocols recommended by the government and breaks the chain of transmission of COVID-19, hoping to keep themselves healthy in order to avoid COVID-19. This statement corresponds to the following expressions:

"I hope that the society is aware that they will continue to comply with the health protocols." (P5)

"...Especially for the elderly, I mean families who have elderly, take care of them because the elderly are more vulnerable than young children, especially those with small children..." (P7)

Theme 5: Challenges while treating COVID-19 patients

Challenges while treating COVID-19 patients are things or activities that aim to inspire nurses' abilities while caring for COVID-19 patients. Various kinds of challenges faced by nurses while caring for COVID-19 were based on sub-themes, namely: 1) difficulty acting and using PPE, 2) dealing with uncooperative patients and families, 3) difficulty taking action with a lack of personnel, and 4) the challenge of rotating the corpses of COVID victims and the challenge of ridding the corpse of COVID-19.

Difficulty acting and using PPE

While on duty and using PPE for hours, nurses find it difficult to act on COVID-19 patients. The use of complete PPE is a challenge for nurses when dealing with COVID-19 patients, according to the following expressions:

"There are many difficulties, especially the limitations for treating COVID, it's because we use PPE like astronauts, it's automatically hard to wear boots, use goggles, use face shields, use hazmat, already wear surgical masks, wear N-95 masks, sometimes when you do this, it becomes condensed from steam. The vapor of breath condenses onto his glasses, onto his goggles so he can't see." (P1)

"The difficulties are mostly related to the use of PPE, it is what makes us congested, sometimes we have to be careful to control our breath, that's all." (P3)

"From the beginning of the pandemic, it was difficult for us to wear PPE because it was hot, stuffy and heavy, especially when we were about to perform actions such as installing an IV, we had difficulty because our glasses were foggy, making it difficult to find the vein." (P5)

Dealing with uncooperative patients and families

The challenges nurses face while caring for COVID-19 patients when dealing with uncooperative patients and their families. Nurses are also often scolded by patients and their families while treating COVID-19, according to the following expressions:

"The patients don't want to be given an IV, they don't want to take medicine, ask their family but the family is not allowed in, that's also an obstacle when treating patients in the COVID room." (P1)

"The problem is, in patient's family, they don't know our position, how to deal with what's inside, while at that time we are short on power, lack of medical personnel, there are many patients with various levels, that's how it is; sometimes they just judging us, they said that we don't pay attention to the patients, they said we don't feed them, they said we have all kinds of things, it's hard to explain to their families how we are here." (P3)

Difficulty performing actions with less amount of energy

The number of COVID-19 patients that continues to increase makes medical personnel, especially nurses, have difficulty when providing care; the number of personnel is not proportional to the number of patients, thus making services less than optimal, and making nurses overwhelmed with inappropriate workloads, according to the following expressions:

"There are so many difficulties when treating this COVID patient, the nurse has to feed the patient if the patient is elderly, change the cloth too, automatically it will take 15 minutes to stay in the room the fastest, while the patient who wants to do the procedure is there 20 people and only three nurses on duty; automatically

going to other patients will take a long time, the patient will be noisy even though due to limitations in things such as moving, because the weight that the PPE wears takes a long time, then overheating like that is the real obstacle.” (P1)

“Yes, for example the patient is already in serious condition, so sometimes we have a lot of our patients, for example, it's not that busy when the nurses are there, sometimes they are tired.” (P6)

Theme 6: Fulfillment of holistic nursing care for COVID-19 patients

As a nurse, the fulfillment of holistic care given to COVID-19 patients is very important. In addition to requiring emergency treatment and pharmacological therapy, of course nurses in the room must also pay attention to the holistic needs of patients including biological, psychological, social, and spiritual so that patients achieve their well-being. This has been stated in the sub-themes, namely: 1). meeting the biological needs of COVID-19 patients, 2). fulfillment of the psychology of COVID-19 patients, 3). social fulfillment of COVID-19 patients, 4). fulfilling the spiritual needs of COVID-19 patients.

Meeting the biological needs of COVID-19 patients

In meeting the needs of nutrition, ADL, and personal hygiene, patients with total care cannot do it alone and must be assisted by nurses in the room. This is certainly a separate experience for nurses in providing nursing care to COVID-19 patients with total care in the isolation room. The experience has been expressed by the nurses as follows:

“...for the biological needs of the patient, such as ADL, nutrition, eating drinking, defecating or urinating, we are all helping the patient.” (P1)

“On average, all the patients here are total care. So, the activity of eating and drinking, if the patients want to defecate, we change their diaper, bathe all of us and we will do it alternately, so it will take a while.” (P2)

“We have to feed the patient one by one patiently, then we have to take turn too.” (P3)

Meeting the psychological needs of COVID-19 patients

It is natural for COVID-19 patients to experience psychological stress. With the environmental conditions in the isolation room that is not accompanied by family and like being locked up in an aquarium, it can trigger excessive anxiety and worry. The nurses' statements correspond to the following expressions:

“... we usually entertain them. Singing together is one of our ways to entertain and not to stress or worry the patient.” (P2)

“Sometimes we give motivation in the form of entertainment and jokes to patients so as to reduce the stress they feel, such as singing and dancing to strong patients or patients who are still conscious.” (P4)

“Maybe there is a television in the room or we play music.” (P6)

Meeting the social needs of COVID-19 patients

Support for the social conditions needed by COVID-19 patients in isolation rooms is very important. Being able to meet with family and get attention and support from nurses when carrying out nursing actions can have a positive impact on COVID-19 patients. The experience of meeting the social needs of patients given by nurses can be seen from the expressions stated by nurses as follows:

“So we provide cellphones for video calls with their families. So we also ensure that patients can communicate with their families, so they don't stress them out.” (P4)

“For patients whose vital signs are still good, we will facilitate cellphones so that patients can still communicate via video calls, but for patients who are critical and have shortness of breath, we cannot provide cellphone facilities because it will hinder the patient.” (P5)

“In the past, before the delta variant, patients were allowed to operate cell phones, but at that time there were so many delta patients, we were worried, and we restricted them from using cell phones. For communication tools with family using cellphones belonging to the COVID room. To update the condition that we will convey to the patient's family.” (P6)

Fulfilling the spiritual needs of COVID-19 patients

The need for worship for each patient is very important to continue to be carried out so that patients can still get peace and feel good with God Almighty. This is in accordance with the following expressions:

“For worship, for Muslims, we will provide clean water for ablution so that some patients can perform their prayers properly. So, it is still well-facilitated, so that the spirituality is carried out.” (P2)

“We sometimes talk about tayammum for patients who are Muslim because most of them pray here in bed so we teach them how to worship or pray in bed.” (P4)

“For the Muslim patient, we play videos of murottal, so they can get their spiritual needs.” (P5)

Discussions

This study focuses on the experience of nurses in treating COVID-19 patients. Participants were selected according to the inclusion criteria of the study and worked in the COVID-19 ward. Based on the results of this study, the researchers identified six themes and 20 sub themes related to the nurses' experience in treating COVID-19 patients at the Blambangan Hospital, Banyuwangi.

Changes in the emotional status of nurses while caring for COVID-19 patients

Emotional status is a feeling or reaction to something. Emotions can be shown when feeling happy, angry, or afraid of something. While caring for COVID-19 patients, nurses experience changes in emotional status. The COVID-19 pandemic has an impact on the mental health of nurses around the world in the form of burnout, anxiety, depression, and fear of societal stigma and discrimination (ICN, [2020](#)). The importance of the position of nurses in handling the COVID-19 pandemic and projections that the pandemic will continue into the second half of 2021 (Vaishnav, Dalal, & Javed, [2020](#)); nurses' mental health factors need to be a concern. Based on this picture, the struggle of nurses in dealing with the virus while maintaining their mental health condition is not over.

The results showed that changes in emotional status experienced by nurses while caring for COVID-19 patients resulted in sub-themes, namely feeling sad when a patient being treated died, feeling happy when a COVID-19 patient was declared cured, feeling afraid and stressed when caring for a COVID-19 patient.

The experience of nurses while caring for COVID-19 patients causes sadness when a COVID-19 patient dies. According to the assumption of researchers that loss can cause feelings of sadness or grief. This is in line with research by Galehdar et al. ([2020](#)) and Karimi et al. ([2021](#)) which states that the death of patients, especially young ones, provides a painful experience, as well as the strict funeral protocols that limit the patient's family from farewell and proper burial processions.

An extraordinary experience while treating COVID-19 patients is that nurses feel happy when patients who have been tested positive for COVID-19 can recover. According to the researcher's assumption, the feeling of happiness experienced by nurses is gratitude for having succeeded in providing support, enthusiasm and service

to COVID-19 patients while undergoing treatment. This is in line with the research conducted by Yona and Nursasi ([2008](#)) regarding the treatment of infectious patients that the extraordinary experience while treating patients is that nurses feel happy when patients who have been declared positive for Avian Influenza can recover.

Nurses experience feeling afraid and stressed when caring for COVID-19 patients. According to the researchers' assumptions, at the beginning of the pandemic nurses were afraid of new diseases, difficult to predict and the number of patients who continued to grow. Uncertain treatment procedures cause fear for nurses who must learn many new things related to procedures for treating patients with COVID-19. Nurses also experience stress while caring for COVID-19 patients; the stress experienced arises because of situations that make nurses feel afraid. This is in line with research conducted by Liu, Y.E. et al. ([2020](#)) which states that the lack of experience and information about COVID-19 and having to treat infected patients makes nurses feel afraid of contracting. Caring for COVID-19 patients is the duty of nurses as the frontline profession, but it becomes a stressor for nurses so that psychological problems arise for nurses.

Social stigma against COVID-19 nurses

Stigma is a negative belief from an individual or group about something. Stigma is formed because of construction by society and culture in certain contexts and has a significant impact on individuals and society. Stigma can take the form of social rejection, gossip, physical abuse, and denial of service. The results showed that the social stigma of COVID-19 nurses resulted in sub-themes, namely being avoided, and shunned by peers, expelled, and ostracized by the community.

The experience of nurses in caring for COVID-19 patients at the beginning of the pandemic was being avoided and shunned by colleagues when they passed each other and met in the hospital environment. According to the researcher's assumption, nurses from other units avoid and stay away when meeting with COVID-19 nurses because they are afraid of being infected and infected if they come into direct contact with COVID-19 nurses. The experience of nurses caring for COVID-19 patients is of being expelled and ostracized from society. The refusal was made by the community because they were worried and afraid that the nurses in charge of caring for COVID-19 patients would carry the virus and infect the surrounding environment. This is in line with research conducted by Agung ([2020](#)) which states that the negative stigma of the COVID-19 disease

makes people tend to commit acts that violate norms. Socially, stigma has an impact on nurses and their presence is denied when they are known to be on duty as a COVID-19 nurse. The results of a survey conducted by the Faculty of Nursing at the University of Indonesia also stated that nurses received unpleasant treatment from the community for treating COVID-19 patients or serving in COVID-19 referral hospitals. The community refused because they were worried about contracting the COVID-19 virus (Raisa, [2020](#)).

Support while treating COVID-19 patients

Support is a form of caring, existence, respect and love given to someone. As social beings, you will need support from those closest to you. Nurses need great support from various parties while on duty to treat COVID-19 patients. The results of the study produced sub-themes, namely support from hospital management, support from family, support from the government, and support from colleagues. Support from hospital management, family, government and colleagues is in line with research conducted by Liu, Q. et al ([2020](#)) which states that nurses need great support to minimize the stress experienced and to change the stage of psychological change into energy renewal nurses need support from social, support from fellow nurses, the community and the government (Zhang et al., [2020](#)).

Based on the results of the study, the support provided by the hospital management is in the form of material and immaterial support. While on duty to care for COVID-19 patients, the hospital provides facilities in the form of places to stay, eat and drink and all the needs of nurses. The hospital management paid attention to the COVID-19 nurses at the Banyuwangi Hospital by communicating via video calls, asking about the condition of the nurses and their health. The support from the hospital management makes nurses more enthusiastic and feel cared for.

Support from family is the most important thing for nurses while on duty caring for COVID-19 patients. The results showed that all participants stated that support from their families, both parents and husbands, was needed to stay motivated and not stressed while caring for COVID-19 patients. According to the researcher's assumption, family support is needed because while on duty nurses are dealing directly with COVID-19 patients whose transmission risk is very high, but because of the demands of the task as the frontline nurses, they must do it professionally. Therefore, family support, both parents and husbands, is important so that it can

increase enthusiasm and immunity while carrying out duties.

Government support for COVID-19 nurses is also very much needed. The support provided by the government is in the form of awards, namely incentives for nurses who treat COVID-19 patients. Based on the results of interviews that nurses receive incentives from the government as a reward for COVID-19 nurses, the incentives received by nurses are often delayed. According to the researcher's assumption, awards in the form of incentives from the government are needed by nurses, because incentives are used for daily needs and needs after nurses are on duty; the government should distribute incentives regularly every month so that nurses who treat COVID-19 patients are more enthusiastic and enthusiastic in carrying out their duties.

Support from colleagues is very much needed by nurses while on duty to handle COVID-19 patients. Colleagues are closest, in the same fate, and share the same responsibility while on duty, so that the support of colleagues becomes an encouragement and reinforcement while on duty in the COVID-19 patient care room. According to the researcher's assumption, support from fellow nurses will be needed to minimize the stress experienced by nurses. Good support from various parties can increase a good emotional response in nurses, so that it can increase endorphins. With the increase in endorphins, nurses will automatically increase immunity (ICN, [2021](#)) so that nurses remain in good health and do not contract COVID-19, even though nurses are in close contact with patients who have COVID-19.

Expectations while treating COVID-19 patients

The results of the study with the theme of nurses' expectations while caring for COVID-19 patients produced sub-themes, namely hope for the end of the pandemic, hope for the welfare of nurses, and hope for the community.

The nurse in charge of treating COVID-19 patients hopes that the pandemic will end soon. In this study, six out of seven participants expressed that they wished the pandemic would pass quickly and COVID-19 patients would recover quickly. This is in line with the research conducted by Sukiman, Waluyo, and Irawati ([2021](#)) who revealed that nurses hoped that the pandemic would end soon and patients would recover soon so they could gather with their families.

Expectations for the welfare of nurses while handling COVID-19 patients were expressed by nurses during interviews. Welfare in question is welfare that is

financial in nature, then family welfare such as additional food, donations, then extra sufficient holidays, adequate rest, lodging facilities, vitamins, and moral support. This is in line with research conducted by Sun et al. (2020) which states that hospitals must have a reward and welfare system to support and motivate nurses. Another study was also conducted by Yona and Nursasi (2008) regarding phenomenological analysis of the experience of nurses in providing nursing care to patients with Avian Influenza, which stated that external factors that support respondents to carry out their obligations as nurses are support from the institution where they work, such as there are rewards in the form of money, transportation, additional food and vitamins that are sufficient to support the stamina of nurses as long as they treat patients.

The nurse's hope for the community is to implement health protocols, while maintaining health to avoid COVID-19. Based on the results of research through interviews, it shows that nurses' expectations of the community are to carry out the rules that have been made by the government, namely maintaining distance when interacting with other people, reducing mobility, staying away from crowds, washing hands with running water or using hand sanitizers and using masks when leaving the house. According to the assumptions of the researchers, nurses hope that everyone is aware that, by implementing health protocols, we can reduce the number of cases of the spread of COVID-19 which is increasing day by day.

Challenges while treating COVID-19 patients

During their duty to care for COVID-19 patients, nurses experienced obstacles and challenges identified through four sub-themes, namely difficulties in taking action and using PPE, dealing with uncooperative patients and families, difficulties in taking action with a lack of manpower, and the challenge of rotating the bodies of COVID-19 patients.

Based on the results of the study, all participants revealed that when handling COVID-19 patients experienced difficulties, namely difficulties and limitations of movement when doing infusions, NGT insertion, difficulty acting because eye protection (goggles) were cloudy, and five of seven participants experienced shortness of breath when using PPE. This constraint is since PPE complicates the procedure. This is in line with research conducted by Prasetyo Eko (2015) on a simulation exercise for health workers wearing PPE in hospitals in the UK who reported that they found the use of PPE uncomfortable, and even basic tasks took longer than usual when wearing it. According to the

researcher's assumptions, nurses who treat COVID-19 patients also experience physical changes that occur due to the use of complete PPE. Physical changes found in this study were physical complaints and physical limitations. Physical changes are in the form of physical complaints that are felt in the form of fatigue and discomfort, while physical changes are in the form of physical limitations, namely limited field of view and limitations in movement.

Another challenge that nurses face when dealing with COVID-19 patients is dealing with uncooperative patients and families. This is based on the results of interviews with participants who revealed that often the patient's family calls the nurse to ask the patient's condition, scolds the nurse because the family wants the patient to be prioritized while other patients must be followed up. This is in line with the research conducted by Sukiman et al. (2021) that the negative response from patients and families did not accept the conditions and treatments carried out for COVID-19 patients. According to the researcher's assumptions, the negative response from the patient's family is a sense of concern for the condition of the patient being treated and isolated in the hospital. The patient's family does not directly see the patient's condition and does not know how the treatment is carried out on the patient; the patient's family only receives information from the patient. Difficulty taking action with a lack of manpower is a challenge experienced by nurses when dealing with COVID-19 patients.

The results of another study revealed that nurses who handled COVID-19 patients had difficulties due to the large workload, but the number of patients was not balanced with the number of nurses. This is in line with research conducted by Shen et al. (2020) that nurses caring for COVID-19 patients have a greater workload than in caring for non-COVID-19 patients, and nurses experience fatigue, sleeplessness, and decreased appetite. According to the researcher's assumptions, the high workload of nurses caring for COVID-19 patients has a long impact on acting against other patients. In addition, nurses also experience fatigue when caring for patients because the number of patients is large but not proportional to the number of nurses. For this reason, it is better to arrange working hours and shifts for nurses so that fatigue in nurses caring for COVID-19 can be reduced. Nurses experience challenges when moving the bodies of COVID-19 patients.

Fulfillment of holistic nursing care for COVID-19 patients

The results of interviews with all participants said that meeting the needs of patients holistically including biological, psychological, social, spiritual, nurses at the Banyuwangi Hospital as much as possible help meet the needs of patients. Considering that many COVID-19 patients in the isolation room are patients with total care, the treatment that must be given must be maximal. This happens when carrying out actions such as providing food and nutrition to patients and wiping the corpses of COVID-19 patients.

Meanwhile, the results of research on meeting the psychological needs of patients revealed that nurses who treated COVID-19 patients at the Banyuwangi Hospital provided optimal psychological support to patients by providing entertainment such as playing and singing together, listening to music or murottal to patients, and providing entertainment and motivation to the patient at the time of action. This is done because COVID-19 patients generally experience psychological changes. The findings are consistent that people tend to feel anxious and insecure when their environment changes. In the case of an epidemic infectious disease, when the cause or progression of the disease and the outcome are unclear, rumors develop and a closed attitude occurs (Ren et al., 2020). Another study conducted by Shaban et al. (2020) also stated the same thing where patients who were positively infected with COVID-19 felt shocked and anxious when they were first diagnosed. According to the researcher's assumption, by entertaining patients, listening to music, listening to lectures or murottal, and inviting patients to play and sing, patients in the isolation room will tend to be happy and not stressed with their illness. Therefore, having nurses who apply a caring attitude to patients can reduce stressors for COVID-19 patients in the isolation room.

The results of the research on meeting the social needs of patients revealed that the palliative care provided by the health team to patients by involving families could help the healing process of patients who were treated in isolation rooms. Families can provide support through video calls, provide pictures, or letters of motivation from the family provided by the palliative care team. This is proven to support the progress of the patient's condition. This is supported by research conducted by Brooke and Clark (2020) explaining that innovative approaches involving family members in inpatient care during the COVID-19 pandemic can lead to long-term progress, not setbacks. This has become the standard of family-centered care that has recently been achieved by the community and health services. In

this study, the strategy to support family presence during physical distance relies heavily on electronic media such as smartphones and existing patient or family computers, stable internet access, and technological literacy.

Based on the theory described above, the researcher assumes that the family support provided to COVID-19 patients during the current pandemic has a positive impact on the progress of the patient's condition during the treatment period. Family support is considered influential in reducing the anxiety felt by patients due to treatment.

The results of the study of fulfilling the spiritual needs of COVID-19 patients revealed that nurses in the isolation room of the Banyuwangi Hospital had provided the spiritual needs of COVID-19 patients well, provided spiritual fulfillment by showing feelings such as (praying (giving closeness to clients), supporting healing relationships (relationships from family, friends or friends), and support of religious rituals. Moral support and prayers from family, friends, and health workers are important factors for the recovery of patients who are confirmed positive for COVID-19 (Rosyanti & Hadi, 2020). The results of these efforts will provide positive thinking for the patient to be patient and surrender to God for the test given. Forms of spiritual support during the COVID-19 pandemic are carried out by: increasing friendship, reading scriptures, reducing news exposure from the media, taking time to worship, and taking time to get closer to God (Ratnaningsih & Nisak, 2022).

According to the researcher's assumption, fulfilled spiritual needs can improve coping to face difficult or challenging situations. In a pandemic like this, spiritual life will be a very important part of coping. A good spiritual life will build a spiritually strong community in the face of difficult times during the COVID-19 pandemic.

Conclusions

This study provides an in-depth understanding of nurses' experiences in treating COVID-19 patients which are illustrated in six themes and 20 sub-themes. In this study the nurses stated that, during caring for COVID-19 patients, they feel ups and downs. The experience of nurses who were initially afraid to treat COVID-19 patients are now accustomed and comfortable because they get new experiences and new knowledge related to handling COVID-19 patients, although they experienced various challenges and most nurses had difficulty taking action using complete PPE. Nurses also hope that incentives from the government will be immediately

issued, and COVID-19 will soon disappear from the face of the earth. It is very important for COVID-19 patients to fulfill the needs of patients holistically. Not only focusing on pharmacological treatment, complementary medicine with holistic therapy is also very helpful for improving patient well-being and accelerating the recovery of COVID-19 patients.

Conflict of Interest

The authors have declared no conflicts of interest.

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Wireless stethoscope for auscultation of the heart and lungs in critically ill patients: a systematic review

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ABSTRACT

Introduction: Examining the heart and lungs is necessary for critically ill patients, as these individuals may have abnormalities with either or both of these organs. This review systematically determined how the auscultation of the heart and lungs using a wireless stethoscope affected the results.

Methods: The research design used was a systematic review following preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. Databases were searched using the search terms "auscultation," "critical patients," and "stethoscope wireless" and associated MeSH terms. The abstracts of the selected articles were examined independently by two researchers. A systematic search was conducted through several databases (Scopus, PubMed, JSTOR, and Springer-link), which were published from July 2012 to July 2022. After reading the full content of the included studies, key themes and concepts were extracted and synthesized.

Results: In total 142 articles were screened. Five articles met the inclusion criteria and were analyzed. The analysis revealed that wireless stethoscopes have increased sensitivity with indicators capable of diagnosing abnormal auscultation results in patients who have abnormal auscultation results on the gold standard. Three out of five studies suggested that the auscultation of the heart and lungs by wireless stethoscopes are more sensitive, while two other studies stated that wireless stethoscopes have the same sensitivity as manual acoustic stethoscopes.

Conclusions: Based on this systematic review, a wireless stethoscope may be more sensitive than an acoustic one. Nevertheless, due to limited studies, a more well-controlled human study is warranted to be done.

Keywords: auscultation, critical patient, stethoscope wireless

Introduction

Technological advances are currently growing very rapidly in all fields, including the health sector, which affects both patients and health workers. Technological advancements in the health sector, particularly medical devices, are needed by health workers because those devices play a pivotal role in supporting their work (Tian et al., 2019). Since its first invention, the stethoscope has undergone some transformative improvements, including the introduction of electronic systems in the last two decades. Improvement in technology has led to

the advancement of electronic stethoscope design that dramatically reduces external noise contamination through hardware redesign and dynamic signal processing (McLane et al., 2021).

A stethoscope is a typical medical acoustic equipment used to listen to the noise in the human body, making it one of the most important tools used by nurses and other healthcare professionals (Qu et al., 2021). Stethoscopes are considered one of the most valuable medical devices because they are non-invasive, real-time, and provide informative information (Sarkar



et al., [2015](#)). In professional healthcare, nurses frequently use stethoscopes to assist the voice or auscultate both when listening to heart sounds, lungs, and systolic and diastolic pressures, thus, making the stethoscope an indispensable tool in carrying out its work (Pratiwi et al., [2021](#)).

Patient monitoring has evolved over the years, including critically ill patients, from the use of monitors to the development of devices that can be used to monitor patients, especially monitoring the patient's vital signs, to check whether their health is normal or deteriorating for some time (Barnett et al., [2022](#)). In addition to monitoring vital signs, finding the cause of decreased vital signs must be done by carrying out a physical examination of these vital organs, one of which is by auscultation. The critical patient is physiologically unstable patient and experiences dysfunctional disorder, namely multi-organ failure, and his survival depends on sophisticated therapy and monitoring tools. In addition, In addition, critical patients have changes in physiological function which affect vital signs and these changes can get worse at any time so this situation can be life-threatening (Saketkoo et al., [2021](#)).

One of the physical examinations that must be carried out by nurses in critical patients is by carrying out auscultation of the heart and lungs to find out any abnormalities in these organs (Harcharran, [2022](#)). Abnormal sounds that are usually heard when auscultating the lungs in critical patients, namely wheezes, stridor, crackles while on auscultation of the heart, friction rub and gallop, although not all critical patients have these sounds (Mehmood et al., [2014](#)). Poor auscultation results can affect the accuracy in carrying out care and treatment so that the treatment of patients is not optimal and causes lengthy treatment (Hu et al., [2017](#)).

Factors that can improve the quality of auscultation, namely the use of a stethoscope that has a good level of sensitivity as well as the use of a more flexible stethoscope can assist nurses in carrying out auscultation, especially in critical patients because such patients often have other tools in their bodies that interfere with the auscultation process (Goldsworthy et al., [2021](#)). Stethoscopes have experienced better development starting from the use of wireless which can help stethoscopes become more flexible, this is because there is no dangling tubing which limits auscultation (Andrès et al., [2018](#); Swarup & Makaryus, [2018](#)).

Some studies have compared acoustic and wireless stethoscopes in clinical settings. Wireless stethoscopes were compared with standard stethoscopes and concluded that acoustic stethoscopes were preferred.

However, they suggested that an ideal stethoscope would combine the advantages of both acoustic and wireless stethoscopes (Høyte et al., [2005](#); Iversen et al., [2006](#)).

Wireless stethoscope is a solution to solve the problem of remote auscultation (Perri, [2010](#)). Additionally, wireless stethoscopes have another advantage over classic stethoscopes, namely that they can increase the sound produced (A-Mohannadi et al., [2022](#)); and contribute to better performance on auscultation, as personalized adjustments can be made (Høyte et al., [2005b](#)). They cannot, however, be used in noisy environments because wireless stethoscopes are very sensitive to sound waves. However, there is limited evidence that compares the sensitivity of wireless stethoscopes for diagnostic purposes with an acoustic stethoscope. Thus, this review systematically assessed studies investigating the sensitivity of using a wireless stethoscope compared to acoustic wireless in critically ill patients.

Materials and Methods

This systematic review was conducted by the PRISMA guidelines (Page et al., [2021](#)). Systematic reviews can facilitate the critical roles in providing a synthesis of knowledge statements and addressing answered phenomena.

Search strategy

We conducted an exploration of the title and abstract in four databases: Scopus, PubMed, JSTOR, and Springer-link. Articles published from July 2012 to July 2022 were searched using a comprehensive search strategy. We constructed the search keywords in this systematic review based on PICOS (Patient, Intervention, Control, Outcome, and Study Design). In this review, the subject was a critically ill patient; the study used a digital wireless stethoscope, compared wireless stethoscopes and acoustic stethoscopes, and the outcome was sensitivity in determining auscultation for diagnostics. Therefore, we used several main keywords such as (stethoscope wireless OR digital stethoscope) AND (auscultation) AND (critical ill OR critical patients). A complete search can be found in Supplementary [Table 3](#).

Inclusion and exclusion criteria

The inclusion criteria were full paper articles with quantitative research methods comparing the sensitivity of wireless stethoscopes and acoustic stethoscopes. The

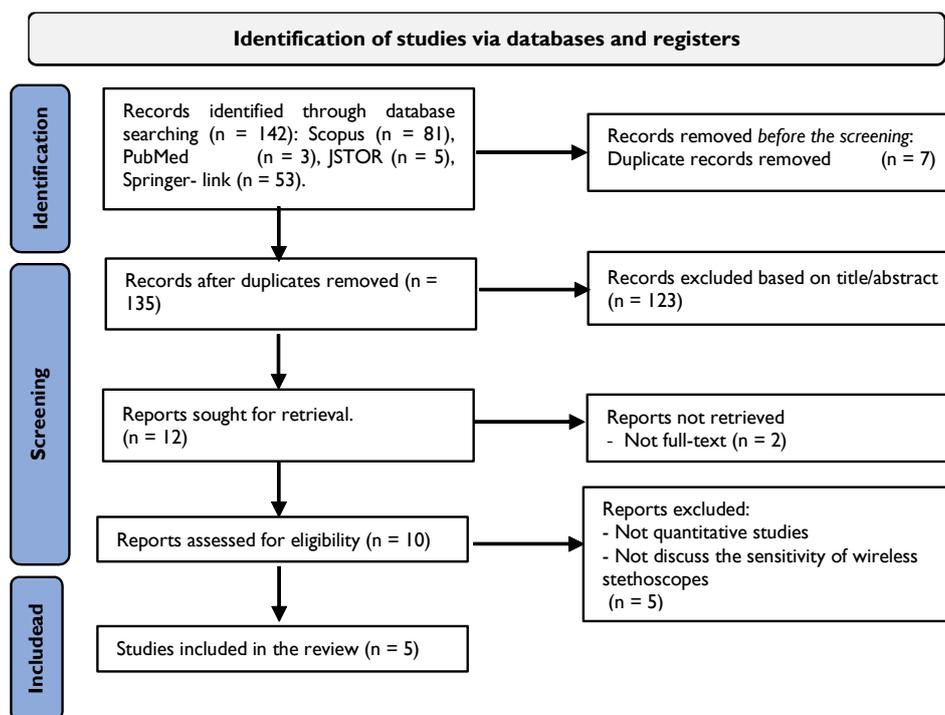


Figure 1 Prisma diagram of the systematic data searching and extraction

exclusion criteria in this study were non-quantitative studies, the articles were not full text and were not published in English.

Search outcomes

A total of 142 potentially relevant articles were initially identified in the four databases. A total of 135 of those remained after duplications were removed using Endnote software. Next, the titles and abstracts of those articles were read one by one for further screening, after which the remaining 10 full-text articles were further assessed for eligibility. Subsequently, five of those articles were excluded for various reasons (i.e., did not compare the sensitivity of wireless stethoscopes and was not tested by health workers). Finally, five studies were deemed eligible for inclusion in this review (Figure 1). The study selection process was carried out by two of

this study's authors (RP and SI) independently, after which they reached an agreement. There was no disagreement between the two authors during the selection process.

Assessment of methodological quality

The methodological quality of the articles was assessed using the JBI Critical Assessment Checklist guidelines. The instruments used consist of two types which are adjusted based on the research design according to the screening in this screening system. The instruments were the JBI Critical Appraisal Checklist for Randomized Controlled Trial Studies which consists of 13 questions, and the JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies which consists of eight questions. The JBI Critical Assessment Checklist is an instrument used to assess the methodological quality of

Table 1. Quality assessment for RCT studies

Authors	Checklist criteria for RCT studies												
	1	2	3	4	5	6	7	8	9	10	11	12	13
(Kalinauskienė et al., 2019)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
(Hirosawa et al., 2021b)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
(Gottlieb et al., 2018)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
(Islam et al., 2019)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Y = yes; N = no; U = unclear. 1. Was true randomization used for assignment of participants to treatment groups? 2. Was allocation to treatment groups concealed? 3. Were treatment groups similar at the baseline? 4. Were participants blind to treatment assignment? 5. Were those delivering treatment blind to treatment assignment? 6. Were outcomes assessors blind to treatment assignment? 7. Were treatment groups treated identically other than the intervention of interest? 8. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed? 9. Were participants analyzed in the groups to which they were randomized? 10. Were outcomes measured in the same way for treatment groups? 11. Were outcomes measured in a reliable way? 12. Was appropriate statistical analysis used? 13. Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?

Table 2 Quality assessment for cross-sectional studies

Authors	Checklist criteria for cross-sectional studies							
	1	2	3	4	5	6	7	8
(Zhang et al., 2021)	Y	Y	Y	Y	Y	Y	Y	Y

Y = yes; N = no; U = unclear. 1. Were the criteria for inclusion in the sample clearly defined? 2. Were the study subjects and the setting described in detail? 3. Was the exposure measured in a valid and reliable way? 4. Were objective, standard criteria used for measurement of the condition? 5. Were confounding factors identified? 6. Were strategies to deal with confounding factors stated? 7. Were the outcomes measured in a valid and reliable way? 8. Was appropriate statistical analysis used?

a study and to assess the extent to which the review has addressed possible biases in its design, intervention, and analysis.

Data extraction and synthesis

Two authors (RP and SI) independently extracted data from all of the included studies into Excel spreadsheets. Any disagreements during the data extraction process were resolved through un-blinded discussion. The authors extracted data into five main categories: (a) study information including the author(s), year of publication, and study country; (b) populations; (c) research design; (d) measurements; and (e) findings. Narrative synthesis was applied to analyze and explain the findings in this study (Popay et al., 2006). The process included listing data for the included studies, identifying the type of study being performed, and displaying the sensitivity results of the wireless stethoscope.

Results

Characteristics of included studies

The number of participants in those studies ranged from 30 to 60. Two of the studies were conducted in the United States of America (Gottlieb et al., 2018; Kalinauskienė et al., 2019), one in Japan (Hirosawa et al., 2021), one in China (Zhang et al., 2021), and one in Bangladesh (Islam et al., 2019). Four of the studies collected their data using randomized controlled trial design (Gottlieb et al., 2018; Hirosawa et al., 2021; Islam et al., 2019; Kalinauskienė et al., 2019), and one used a cross-sectional design (Zhang et al., 2021). All studies compared wireless stethoscopes to the gold standard for sensitivity (Gottlieb et al., 2018; Hirosawa et al., 2021; Islam et al., 2019; Kalinauskienė et al., 2019; Zhang et al., 2021)

Type of wireless stethoscope sensitivity

Table 3 Summary of articles included in the systematic review

Authors, year, country	Population	Research Design	Type of wireless stethoscopes	Findings
Kalinauskienė et al. (2019) USA	Patients with body mass index >30 kg/m ² (obese), were older than 18 years, were referred for an echocardiogram, and agreed to participate in the study.	Randomized Controlled Trial (RCT)	Compare the 3M Littmann 3200 Electronic Stethoscope and 3M Littman Cardiology III Mechanical Stethoscope	Wireless stethoscopes have a higher sensitivity value than acoustic stethoscopes, namely 60.1% vs 45.7%, p<0.0001.
Zhang et al. (2021) China	Patients with SARS-CoV-2 Pneumonia.	Cross-sectional	Assessing a wireless stethoscope in critically ill patients with SARS-CoV-2 pneumonia	There was no significant difference between the traditional acoustic stethoscope and the stethoscope for lung and heart auscultation. However, the stethoscope used in this study is easy and comfortable to use.
Hirosawa et al. (2021) Japan	Senior residents and faculty in the department of general internal medicine of a university hospital.	Randomized Controlled Trial (RCT)	Compare the electronic stethoscope wireless and traditional stethoscope	A listening system using a Bluetooth-connected electronic stethoscope has comparable results to listening with a traditional stethoscope; other than that the total combined test score was 80/110 (72.7%) in the intervention group and 71/90 (78.9%) in the control group, with no differences between the groups (P=.32).
Gottlieb et al. (2018) USA	Internal medicine resident participants were randomly selected to hear either the analog or electronic lung sounds.	Randomized Controlled Trial (RCT)	Compare the electronic stethoscope wireless and analog stethoscope	There was no significant difference in overall auscultation scores of lung sounds using analog and electronic stethoscopes.
Islam et al. (2019) Bangladesh	Pediatric patients who have abnormal and normal heart sounds.	Randomized Controlled Trial (RCT)	Assessing pediatric patients with abnormal and normal heart sounds using the Wireless Electronic Stethoscope	There is an increase in the sensitivity of the wireless stethoscope and has high accuracy. Stethoscopes have a sensitivity value of 95 (12%).

All data collection techniques were performed by comparing the wireless stethoscope auscultation results with the gold standard. Several types of stethoscopes were found that had been designed using a wireless network (Gottlieb et al., [2018](#); Hirosawa et al., [2021](#); Islam et al., [2019](#); Zhang et al., [2021](#)), while another study used a 3M Littmann 3200 Electronic Stethoscope connected wirelessly (Kalinauskienė et al., [2019](#)). All studies were tested by experts, namely: internal medicine (Gottlieb et al., [2018](#); Hirosawa et al., [2021](#); Zhang et al., [2021](#)), cardiologist (Kalinauskienė et al., [2019](#)), and pediatrician Islam et al., [2019](#)).

Outcomes

Three out of five studies stated that auscultation of the heart and lungs using a wireless stethoscope was more sensitive, this is because wireless stethoscopes are very sensitive to sound waves and have features that can amplify sound volume compared to acoustic stethoscopes (Hirosawa et al., [2021](#); Islam et al., [2019](#); Kalinauskienė et al., [2019](#)), whereas two other studies suggested that wireless stethoscopes have the same sensitivity as acoustic stethoscopes (Gottlieb et al., [2018](#); Zhang et al., [2021](#)).

Wireless stethoscopes have a higher sensitivity value than acoustic stethoscopes, namely (60.1% vs 45.7% , $p < 0.0001$) (Kalinauskienė et al., [2019](#)), while other studies state that wireless stethoscopes have a sensitivity value of 95.12% (Islam et al., [2019](#)), other than that the total combined test score was 80/110 (72.7%) in the intervention group and 71/90 (78.9%) in the control group, with no differences between the groups ($P = .32$) on wireless stethoscope testing (Hirosawa et al., [2021](#)). Two other studies state that wireless stethoscopes and acoustic stethoscopes do not have a significant difference in value for listening to heart and lung sounds (Gottlieb et al., [2018](#); Zhang et al., [2021](#)).

Advantages associated with wireless stethoscopes

This overview found that wireless stethoscopes are more flexible in their use because wireless stethoscopes do not have dangling tubing, besides which wireless stethoscopes can amplify the auscultation of the sound produced so that they are more sensitive in their use (Hirosawa et al., [2021](#); Islam et al., [2019](#); Kalinauskienė et al., [2019](#)). Another study stated that wireless stethoscopes have drawbacks, namely they are very sensitive to sound waves from very noisy environments, so they can affect the auscultation results (Gottlieb et al., [2018](#); Zhang et al., [2021](#)).

Discussions

This literature review analyzed the findings of five articles featuring digital stethoscope testing that met inclusion criteria in various populations. Although the results of this review are not representative of the healthcare profession as a whole, they can provide an overview of digital stethoscope testing. We analyzed research papers on the sensitivity and specificity results of digital stethoscopes.

This systematic review found that wireless stethoscopes may have increased sensitivity concerning auscultation in the heart and lung compared with manual acoustic stethoscopes. This may be because digital stethoscopes can improve the quality of the sound produced during auscultation. Visualizing sonograms during auscultation may facilitate discrimination between different types of heart and lung sounds (Hirosawa et al., [2021b](#)), and may improve sound quality (Tavel, [1996](#)), which may contribute to improved auscultatory performance. Adjustments can also be made (Høyte et al., [2005](#)).

Additionally, findings regarding wireless stethoscopes and manual acoustic stethoscopes show they have the same sensitivity. This is obtained because the development of manual acoustic stethoscopes that have tubing has often been carried out so that the auscultation results produced have high sensitivity. In addition, another study on a Bluetooth-based wireless stethoscope found that the measurement results were comparable to direct auscultation (Hirosawa et al., [2021](#)), can eliminate external noise by using a bandpass filter and adaptive line enhancement techniques (Lakhe et al., [2016](#)), use can be made using data transmission using Bluetooth with a distance of 3 meters 17 and a Bluetooth-based wireless stethoscope has the same function as an acoustic stethoscope (Sumartono, [2021](#)).

More and more evidence shows that wireless stethoscopes have advantages over manual acoustic stethoscopes, including wireless stethoscopes that are considered more flexible in their use (Zhang et al., [2021](#)). The wireless stethoscope positively impacts healthcare providers, particularly nurses, while taking care of patients during pandemic sessions (Hidayat et al., [2021](#)). A study showed that the development of a programmed wireless stethoscope based on an efficient net would give accurate information to detect heartbeat sounds (Haq et al., [2021](#)). In development of a wireless stethoscope with no modifications, the tube can be carried easily and flexibly because this device only consists of two parts, namely a modified diaphragm chest piece and for listening to it through a headset.

This device is suitable for use by nurses in critical areas because of its high mobility without disturbing the function of the stethoscope, namely to assist nurses in performing auscultation of the heart and lungs. In addition, several other studies on Bluetooth-based wireless stethoscopes explain that the design of wireless electronic stethoscopes eliminates the cable connecting conventional stethoscopes, which offers ease of use and mobility, makes them easy to carry everywhere, minimizes the spread of infection and facilitates auscultation training for health practitioners where it can be used simultaneously for evaluation (Mills et al., [2012](#)).

Based on studies that found that wireless stethoscopes have a suggestion of increased sensitivity of auscultation heart and lungs compared with manual acoustic stethoscopes, the increased sensitivity makes wireless stethoscopes to be considered for use, particularly in critical patients with heart and lung problems (Hirosawa et al., [2021b](#); Islam et al., [2019](#); Kalinauskienė et al., [2019](#)). Additionally, wireless stethoscopes can be used in auscultated obese patients, wherein they can hear a smaller sound, while wireless stethoscopes that use digital products can amplify the sound produced (Chowdhury et al., [2019](#)).

The resulting sound enhancement is because the wireless stethoscope has a special feature, namely filter settings. Previous research explained that the filter setting can produce low and strong heart and lung signal frequencies and is quite sensitive (Jusak et al., [2020](#)). With this, wireless stethoscopes have better auscultation results and can become assistive technologies from existing manual systems. In addition, a wireless-based stethoscope can reduce noise and improve listening to heart or lung sounds to minimize errors. Previous research has reported that a digital stethoscope with a condenser mic feature connected to a Pre-Amplifier can amplify voice signals up to 28.2 times; this can make a solution to the current stethoscope problem (Kurniawan, [2017](#)).

The use of a wireless stethoscope still has problems, namely that it can be influenced by other signals around the environment so that it disrupts the sound transmission process. Besides that, a noisy environment can affect the quality of auscultation results, this is because wireless stethoscopes are very sensitive to sound waves from the surrounding environment. This wireless stethoscope problem should continue to be addressed to produce a higher quality stethoscope (McLane et al., [2021](#)).

Conclusions

A wireless stethoscope to assist patients in a physical examination can be recommended for further research. The usefulness and ease of a wireless stethoscope in the practical patient assessment can be used by the patients and their families too. We agree that a wireless stethoscope for auscultation of the heart and lungs in critically ill patients can facilitate professional healthcare for the assessment of the patients without any obstacles.

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Conflict of Interest

There is no conflict of interest.

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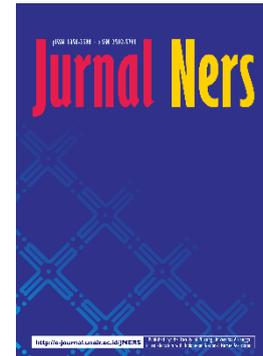
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Jurnal Ners provides a forum for original research and scholarships relevant to nursing and other health-related professions. Jurnal Ners is a scientific peer-reviewed nursing journal that is published biannually (April and October) by the Faculty of Nursing Universitas Airlangga, Indonesia, in collaboration with the Central Board of the Indonesian National Nurses Association.

The journal particularly welcomes studies that aim to evaluate and understand the complex nursing care interventions which employ the most rigorous designs and methods appropriate for the research question of interest. The journal has been publishing original peer-reviewed articles of interest to the international nursing community since 2006, making it one of the longest standing repositories of scholarship in this field.

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Table 1. Effects of plant growth regulator types and concentrations on embryogenic callus induction from leaf tip explants of *D. lowii* cultured in 1/2 MS medium supplemented with 2.0 % (w/v) sucrose under continuous darkness at temperature of 25 ± 2 °C after 60 days of culture

Table 3. Maternal and child health care-seeking behaviour for the last pregnancy in women aged 15 – 45 years old

Type of care	Age Groups (Years)							
	<30		30 - 39		40 - 45		All Age	
	n	%	n	%	n	%	n	%
Place for antenatal care								
Village level service (Posyandu, Polindes or Poskesdes)	1	9.1	1	4.6	1	3.5	3	4.8
District Level service (Puskesmas/Pustu)	2	18.2	7	31.8	1	3.5	10	16.1
Hospital, Clinics, Private Doctor or OBGYN	1	9.1	4	18.2	2	6.9	7	11.3
Private Midwife	7	63.6	10	45.5	25	86.2	42	67.7
Place of Birth								
Hospital	5	50.0	5	22.7	4	13.8	14	23.0
Birth Clinic/Clinic/Private health professional	5	50.0	15	68.2	21	72.4	41	67.2
Puskesmas or Pustu	0	0.0	2	9.1	0	0	2	3.3
Home or other place	0	0.0	0	0	4	13.8	4	6.6
Ever breastmilk								
No	1	9.1	1	4.6	1	3.5	3	4.8
Yes	10	90.9	21	95.5	28	96.6	59	95.2
Exclusive breastfeeding								
No	4	36.4	10	45.5	18	62.1	32	51.6
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de Virgilio, C. & Grigorian, A. 2019, 'Surgery: A case based clinical review' in *Surgery: A Case Based Clinical Review*, pp. 1-689.

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