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Factors associated with academic motivation in nursing students: A cross-sectional study

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Abstract

Academic motivation encourages people to participate in learning activities and directs, maintains, and determines the intensity of learning behaviors. Therefore, nursing students require high-quality academic motivation to continuously and effectively improve their medical knowledge and skills continuously and effectively. This study measures nursing students' academic motivation and identifies the associated factors. A cross-sectional study design was used for this research method. The total sample included 237 undergraduate nursing students. The data were collected from October to November 2022 in a public university located in Southwestern Vietnam. The level of academic motivation was measured using the Vietnamese version of the Academic Motivation Scale. The data were analyzed using the independent Student's t-tests, ANOVA, Pearson's correlation, and regression analysis. The study showed that nursing students had high academic motivation. However, there were still more than one-third of students (39.3%) whose quality of academic motivation was not good. Through simple linear regression analysis, it showed that appropriate training regulations of the school; getting support/questions answers or good examples in learning from lecturers/medical staff at the clinical practice site; joining a club about learning; intending to teach in the field of nursing, ability to deal with difficulties were the factors that affect nursing students' academic motivation. Many associated factors influence the academic motivation of nursing students. Further effective interventions are needed to address this issue.

Keywords: academic motivation; nursing education; nursing students; vietnames

1. Introduction

Nurses' care techniques and services directly affect people's health and lives. Nursing knowledge and practice must be based on a solid scientific basis and kept up to date (Abu-Baker et al., 2021; Dagne & Beshah, 2021). The field of medicine has an enormous amount of knowledge. It is constantly changing, updating, and expanding at an increasingly rapid rate. In 2020, the estimated time for medical knowledge to double was only 73 days (Densen, 2011). Thus, to keep up with the development of medical knowledge, nurses must strive to accumulate and improve professional knowledge and skills when they study at school and while working. Therefore, right from when nurses are at school, they must have high-quality academic motivation and maintain it throughout their nursing career.

Academic motivation (AM) motivates people to participate in learning activities and directs, maintains, and determines the intensity of learning behaviors (Reeve, 2017). Many factors influence a person's academic motivation and can change over time (Nilsson & Warrén Stomberg, 2008; Rafii et al., 2019; Raza et al., 2022). High-quality academic motivation is less affected by external factors and is maintained for a long time. The quality of academic motivation is assessed by the degree of self-determination of the motivation (Roth, 2019). The groups of academic motivation are arranged in ascending order of self-determination as follows: intrinsic motivation, extrinsic motivation, and

motivation (Vallerand et al., 1992). The lowest level of self-determination is a complete lack of self-determination and motivation to learn. The highest levels of self-determination are self-motivated and self-determined, learning behaviors driven by the interest, enjoyment, and satisfaction inherent in learning (Ryan & Deci, 2000; Vallerand et al., 1992; Vansteenkiste et al., 2006).

In nursing education, academic motivation plays a crucial role in students to encourage them to absorb vast amounts of information, acquire necessary skills, and engage in continuous learning to provide high-quality nursing care (Al-Osaimi & Fawaz, 2022; Saeedi & Parvizy, 2019). Nesje (2015) found that academic motivation and professional commitment among nursing students have a significant correlation. High academic motivation makes learning occupational knowledge and skills easy and internalizing occupational philosophies and values. Thereby, this positively contributes to the professional development of nurses (Taşkın Yılmaz et al., 2016). Additionally, students with elevated motivation levels experience fewer instances of academic depression and exhibit higher levels of self-assurance (Abdolrezapour et al., 2023; Berdida, 2023). Instead, the lack of academic motivation caused the students to have a negative attitude, lose interest in learning or even lead to postponement, poor academic performance, and dropout (Shakurnia et al., 2015; Wang, 2019). More than one-third of medical students, in general, and nursing students, in particular, whose academic motivation was not good enough (An et al., 2021; Tran et al., 2019). The worrying thing was that the academic motivation of nursing students tended to decrease from the first year to the fourth year (Tran et al., 2019).

Although many studies have focused on assessing the academic motivation of nursing students worldwide, to the best of our knowledge, no studies simultaneously evaluated both the quantity and the quality of academic motivation. Besides, many things could be improved in understanding the factors related to this issue. Therefore, this study aimed assured academic motivation and identify the associated factors in undergraduate Vietnamese nursing students.

2. Research Methods

2.1.Study

Design A cross-sectional study design was conducted.

2.2.Setting and Sampling

A convenience sample of nursing students (n=237) was recruited from Can Tho University of Medicine and Pharmacy, Vietnam. Data were collected between October and November 2022. The inclusion criteria were full-time undergraduate nursing students and their willingness to participate in the study. Participants who were absent during data collection were excluded. Participants have been explained the study's aims, benefits, and risks, the procedure for ensuring confidentiality, and the voluntary nature of participation. Written informed consent forms were signed immediately after they agreed to participate in this study. Subsequently, the participants were required to complete the questionnaires within 20 minutes and return them to the data collector.

2.3.Sample Characteristics

Participants responded to questions regarding demographic characteristics, including age, gender, year of the study program, and information related to whether or not they were confident in their learning ability, intended to pursue a postgraduate degree, or teach in the field of nursing, understood that study well in university is a favorable factor/condition for graduate study or being employed in your favorite job.

2.4.Assessment of Academic Motivation

The Academic Motivation Scale (AMS-C28) College version assessed nursing students' academic motivation (Vallerand et al., 1992). The original scale was developed by Vallerand in 1992. This scale has 28 items with a 7-point Likert scale across seven subscales: pleasure and satisfaction when expanding knowledge (IMK), pleasure and satisfaction from accomplishment in learning (IMA), experience stimulation in learning (IMS), experience sense of personal importance and value (EMID), the experience of pressure and guilt from the external environment (EMIN), avoiding negative consequences or achieve rewards (EME), the experience of a lack of motivation (AM). The subscales are divided into three groups of motivation, including intrinsic motivation (IMK, IMA, IMS), extrinsic motivation (EMID, EMIN, EME), and motivation (AM). The mean score of each subscale, group of motivation, or overall scale was calculated by dividing the total score of that subscale or group or the overall scale (items in the AM subscale were recorded) by the number of corresponding items. The higher the mean score on the group of motivation or overall scale, the greater the amount of academic motivation for that group or overall motivation. The original scale in English has a good Cronbach's alpha coefficient for all subscales (0.72). In this study, Cronbach's alpha coefficient for the total scale was 0.77. A generally accepted rule is that Cronbach's alpha of 0.7 - 0.8 indicates good reliability (Ursachi et al., 2015). The self-determination index (SDI) assessed the quality of academic motivation. A score of AMS was converted to SDI using the formula: SDI = 2 x (IMK + IMA + IMS)/3 – EMID – (EMIN + EME)/2 – 2 x AM (Vallerand et al., 1992). The quality of academic motivation was classified as follows: a group of not good academic motivation included very low ($-18.00 \leq SDI \leq -10.80$), low ($-10.79 \leq SDI \leq -3.60$); medium ($-3.59 \leq SDI \leq 3.60$) and a group of good academic motivation include high ($3.61 \leq SDI \leq 10.80$); very high ($10.81 \leq SDI \leq 18.00$) (Giang & Thảo, 2020; Tran et al., 2019).

2.5.Assessment of Ability to Deal With Difficulties and Characteristics of The Learning Environment

The ability to deal with difficulties is the ability to control and solve difficulties; the ability to control the level, extent, and duration of difficulties affecting. This ability is assessed by the adversity quotient (AQ). We use The Adversity Response Profile (AQP) QuickTake version 1.0 by Stoltz. This is a 5-point bipolar scale with 20 items. The score of the overall scale is equal to the sum of the scores of the items multiplied by 2. The higher the score, the better the student's ability to deal with difficulties (Stoltz, 2001). According to the literature review and the recommendations of the research team members, we selected some characteristics to assess the characteristics of the learning environment. We used a 7-point Likert scale to record the students' assessment of the learning environment. The higher the score, the more the students appreciate that characteristic.

2.6.Data Analysis

Each completed questionnaire was given a study identification (ID). The completed questionnaire was then entered into the statistical software by the primary researcher and a research assistant independently. The data were analyzed using SPSS for Windows Version 26.0 (SPSS, Inc., Chicago, IL, USA). First, descriptive statistics were employed to summarize the collected data. The continuous variables were described using the mean and standard deviation (SD). The frequency and percentage (%) were used for the categorical variables. Next, the independent Student's t-tests and Pearson's correlation analysis were conducted to explore the association between the participants' characteristics and academic motivation. Then, to avoid the phenomenon of multicollinearity between the independent variables, which distorts the research results, a multiple regression analysis was performed to identify the predictors of academic motivation. For the regression analysis, the categorical variables were first coded as dummy variables (Pallant, 2020).

2.7. Ethical Considerations

This study conforms to the ethical principles of the Declaration of Helsinki (World Medical Association, 2013), and it was granted a research ethics committee approved by the ethical review board of the Can Tho University of Medicine and Pharmacy and the approval number 22.115.SV/PCT-HĐĐĐ.

3. Results and Discussion

3.1. Characteristics of The Participants And Participants' Assessment of The Learning Environment

Two hundred and thirty-seven nursing students were involved in filling out the questionnaire in this study. The mean age of the student was 19.68 ± 1.43 years. Most of the participants are female (81.4%). About half of the students intended to pursue a postgraduate degree (51.9%) or teach nursing (48.9%). Most nursing students understood that studying well in university is a favorable factor/condition for graduate study (94.5%) or being employed in their favorite job (92.8%) and that nurses have an important role in the care and treatment of patients (99.2%). Most students did not join a study club (78.9%) or were confident in their (71.3%) learning ability. The characteristics of the learning environment were assessed by students with a mean score of 5.27 ± 1.07 to 5.68 ± 1.05. The characteristic with the lowest mean score was that the lecturer's lectures were easy to understand and attractive. The school's facilities were assessed with the highest mean score (Tables 1 & 2).

Table 1. The characteristics of participants and association with their academic motivation (n=237)

Characteristic		n (%)	Mean of AMS (SD)	t/r/F value
Age (Mean of age: 19.68 ± 1.43)				- 0.121^{r}
Gender	Male	44 (18.6)	5.48 (0.66)	0.343^{t}
	Female	193 (81.4)	5.43 (0.86)	
Year of the study program	1st	79 (33.3)	5.58 (0.81)	1.937^{F}
	2rd	43(18.1)	5.35 (0.95)	
	3th	51 (21.6)	5.51 (0.87)	
	4th	64 (27.0)	5.27 (0.70)	
Ability to deal with difficulties (Mean of adversity quotient: 130.66 ± 25.99)				0.277$^{r\,(**)}$
Learning encouragement/support from family	Yes	226 (95.4)	5.45 (0.84)	0.811^{t}
	No	11 (4.6)	5.24 (0.60)	
Orientation/support in learning from family	Yes	192 (81.0)	5.44 (0.85)	0.040^{t}
	No	45 (19.0)	5.43 (0.74)	
A good example of learning from family	Yes	176 (74.3)	5.47 (0.86)	0.941^{t}
	No	61 (25.7)	5.35 (0.73)	
GPA of the last semester (Mean: 2.77 ± 0.47; N= 158)				0.246$^{r\,(*)}$
Cumulative gpa (mean: 2.71 ± 0.43; n=158)				0.273$^{r\,(*)}$
Join a study club	Yes	50 (21.1)	5.66 (0.73)	2.106$^{t\,(*)}$
	No	187 (78.9)	5.38 (0.84)	
Thinking that learning makes your life better	Yes	216 (91.1)	5.50 (0.82)	3.511$^{t\,(*)}$
	No	21 (8.9)	4.85 (0.66)	
Confidence in your learning ability	Yes	169 (71.3)	5.51 (0.79)	2.109$^{t\,(*)}$
	No	68 (28.7)	5.26 (0.90)	
Intending to pursue a postgraduate degree	Yes	123 (51.9)	5.57 (0.74)	2.634$^{t\,(*)}$
	No	114 (48.1)	5.29 (0.89)	
Intending to teach in the field of nursing	Yes	116 (48.9)	5.66 (0.78)	4.174$^{t\,(**)}$

Characteristic		n (%)	Mean of AMS (SD)	t/r/F value
Understanding that studying well in university is a favorable factor/condition for graduate study	No	121 (51.1)	5.22 (0.82)	$2.458^{t(*)}$
	Yes	224 (94.5)	5.47 (0.83)	
Understanding that studying well is a factor/ condition for being employed in your favorite job	No	13 (5.5)	4.90 (0.63)	$2.726^{t(*)}$
	Yes	220 (92.8)	5.48 (0.82)	
Nursing is your favorite profession when taking the university entrance exam	No	17 (7.2)	4.92 (0.73)	$2.197^{t(*)}$
	Yes	137 (57.8)	5.54 (0.86	
Through the process of studying. You still feel loved and suitable for the nursing profession	No	100 (42.2)	5.30 (0.76)	$3.640^{t(**)}$
	Yes	181 (76.4)	5.54 (0.82)	
Understanding that nurses have an important role in the care and treatment of patients	No	56 (23.6)	5.10 (7.66)	1.151^{t}
	Yes	235 (99.2)	5.44 (0.83)	
	No	2 (0.8)	4.77 (0.58)	

Table 2. The assessment of the participants on the characteristics of the learning environment and association with their academic motivation (n = 237)

Characteristic		Mean of assessment point (SD)	Pearson correlation coefficient
Getting support/questions and answers in learning from lecturers/medical staff at the clinical practice site		5.61 (1.05)	0.487^{**}
Lectures by the lecturers are easy to understand and attractive		5.27 (1.07)	0.527^{**}
A good example is learning from lecturers/medical staff		5.33 (1.17)	0.488^{**}
Receiving feedback/support from classmates during the study		5.57 (1.05)	0.529^{**}
Classmates with good achievements/active learning		5.62 (1.02)	0.487^{**}
The school's facilities (library, teaching equipment, ...) meet the learning needs		5.68 (1.05)	0.590^{**}
The school has good policies to support/encourage students to study		5.58 (1.10)	0.580^{**}
The training regulations of the school are appropriate		5.52 (1.02)	0.556^{**}
The school's dissemination of learning information is very good (reward, training regulations, ...)		5.27 (1.09)	0.515^{**}
The organization of study clubs/ its activities to meet the needs of students	About quantity	5.35 (1.15)	0.517^{**}
	About Quality	5.25 (1.29)	0.484^{**}

(*): p≤0.05; (**): p< 0.001

3.2. Academic Motivation

The mean score of the overall scale for all participants was 5.44 ± 0.83. The motivation group with the highest mean score for all participants was extrinsic motivation (5.56 ± 0.84). The mean score of each subscale (types of motivation) for all participants ranged from 3.11 ± 1.57 (Amotivation-experience of lack of motivation) to 5.61 ± 1.07 (Pleasure and satisfaction when expanding knowledge) (Table 3). The mean SDI for all participants was 4.66 ± 4.18. The number of students with good academic motivation was about 60.7% (Table 4).

Table 3. The quantity of academic motivation (AMS)

Characteristic		Mean (SD)	
Intrinsic motivation	Pleasure and satisfaction when expanding knowledge	5.61 (1.07)	5.50 (1.08)
	Pleasure and satisfaction from accomplishment in learning	5.58 (1.05)	
	Experiencing stimulation in learning	5.29 (1.17)	

Characteristic		Mean (SD)	
Extrinsic motivation	Experiencing a sense of personal importance and value	5.50 (0.98)	5.56 (0.84)
	Experiencing pressure and guilt from the external environment	5.60 (0.98)	
	Studying to avoid negative consequences or achieve rewards	5.57 (0.94)	
A motivation	Experiencing a lack of motivation	3.11 (1.57)	4.88 (1.56)
Overall scale			**5.44(0.83)**

Table 4. The quality of academic motivation (Self-determination Index - SDI)

Quality classification of learning motivation		n (%)	
Not good academic motivation	Very low (-18. ≤ SDI ≤ -10.80)	0 (0.0)	93 (39.3)
	Low (-10.79 ≤ SDI ≤ -3.60)	5 (2.1)	
	Medium (-3.59 ≤ SDI ≤ 3.60)	88 (37.2)	
Good academic motivation	High (3.61 ≤ SDI ≤ 10.80)	133 (56.1)	144 (60.7)
	Very high (10.81 ≤ SDI ≤ 18.00)	11 (4.6)	
Mean of SDI: 4.66 ± 4.18			

3.3.Association Between The Participants' Characteristics And Academic Motivation.

Table 1 shows the association between the participants' characteristics and academic motivation. There were no statistically significant associations between academic motivation and family-related factors. Among the personal factors surveyed, only participants' ability to deal with difficulties was statistically significantly associated with academic motivation (r=0.277, p=<0.001). The findings indicated that the higher students' ability to deal with difficulties, the students had more academic motivation.

There were statistically significant associations between academic motivation and some learning-related factors such as cumulative GPA (r=0.273; p=0.001); GPA of the last semester (r=0.246, p=0.002); joining study club (t=2.106, p=0.036); intending to pursue a postgraduate degree (t=2.634, p=0.009) or teach in the field of nursing (t=4.174, p=<0.001) and understanding that studying well in university is a favorable factor/condition for their graduate study (t=2.458, p=0.015) or being employed in their favorite job (t=2.726, p=0.007). The findings indicated that students who joined a study club, intended to pursue a postgraduate degree or teach in nursing, and understood that studying well in university is a favorable factor/condition for their graduate study or being employed in their favorite job had more academic motivation. Besides, students with higher GPAs also had more motivation to study.

There were statistically significant associations between all surveyed environmental-related factors and academic motivation. This includes knowledge transmission (r=0.527, p=<0.001), support/questions answer (r=0.487, p=<0.001), and setting an example of lecturers/medical staff for students in learning (r=0.488, p=<0.001); classmates' suggestions/support on learning (r=0.529, p=<0.001), learning dynamics and academic achievement (r=0.487, p=<0.001); the school's facilities (r=0.590, p=<0.001), training regulations (r=0.556, p=<0.001), support/reward to encourage learning (r=0.580,p=<0.001); the school's dissemination of learning-related information (r=0.515, p=<0.001), quantity information (r=0.517, p=<0.001) and quality information (r=0.484, p=<0.001) of study clubs/its activities. The findings showed that the group of students who received good knowledge transmission, active support/question answering, and a good example from teachers/medical staff; who received feedback/support from classmates and learned with active/high-achieving classmates; who found that the school's facilities, training regulations, support/reward to encourage learning are suitable;

whom students appreciate the school's dissemination of learning-related information, quantity and quality of study clubs/its activities had more academic motivation.

The results of the multiple regression method showed that there were six predictors, namely the variables of the school's good policies to support/ encourage students to study, Getting support/questions answers in learning from lecturers/medical staff at the clinical practice site, a good example in learning from lecturers/medical staff, joining a study club, intending to teach in the field of nursing, ability to deal with difficulties. They accounted for 52.5% of the total variance (F= 27.790; p<0.001). This indicated that students with these predictors had more academic motivation (Table 5).

Table 5. The multiple linear logistic regression analysis (n = 237)

Model	B	Beta	p-value	R square	F-value	p-value
Constant	1.495		<0.001	0.525	27.790	<0.001
The training regulations of the school are appropriate	0.217	0.258	<0.001			
Getting support/questions and answers in learning from lecturers/medical staff at the clinical practice site	0.236	0.287	<0.001			
A good example is learning from lecturers/medical staff	0.105	0.155	0.031			
Joining a group/club about learning	0.323	0.145	0.016			
Intending to teach in the field of nursing	0.334	0.202	0.001			
Ability to deal with difficulties	0.004	0.140	0.024			

4. Discussion

This study showed that all participants' overall academic motivation scale score was 5.44 ± 0.83. This score was higher than the average level of previous studies (Fatima et al., 2021; Javaeed et al., 2019; Tran et al., 2019). These results suggest that nursing students in our study had high academic motivation. There was no significant difference between the mean scores for all participants of extrinsic and intrinsic motivation n this study (5.56 ± 0.84 and 5.50 ± 1.08). Previous studies indicated that over fifty percent of students pursuing nursing selected their field of study based on external motivation to themselves rather than intrinsic motivation (Kim et al., 2016; Yun et al., 2020). Nursing students who are intrinsically motivated exhibit higher levels of satisfaction with their major, university experience, and ability to self-direct their learning compared to students who are extrinsically motivated (Kim et al., 2016). Moreover, intrinsic motivation has been found to decrease anxiety (Khalaila, 2015). Since students who choose their major based on intrinsic motivation are typically more interested in the subject matter, they tend to devote more effort and attention to learning. They also demonstrate greater flexibility in dealing with stressful situations and develop greater resilience, which enables them to overcome perceived challenges during clinical practice (Lim, 2014).

The mean score for all participants with negative motivation-motivation in the present study was higher than in previous studies (Fatima et al., 2021; Tran et al., 2019). There were still more than one-third of nursing students in the current study whose academic motivation quality was not good (Tran et al., 2019). The contribution of intrinsic and extrinsic motivation in creating overall motivation was equivalent. However, their experience of lack of motivation at some times was still more than that of nursing students in previous studies. The most worrying thing was that there were still more than one-third of the students whose motivation quality was not good (39.3). In other words, their academic motivation was easily affected and changed negatively. Thus it is necessary to increase their intrinsic motivation by strengthening the profession's reputation among them, fostering their independence and self-reliance, and paying attention to them to comprehend their circumstances.

The current research results indicated that the more the students appreciate the suitability of the school's training regulations, the higher their academic motivation. Training regulations are general regulations on the organization and management of issues in the training process, such as training programs and study duration; assessment of learning outcomes, and grading of diplomas;... Consistent with our results, other studies proved that subjects in the training program did not attract learners' interest or have a large amount of knowledge reduced learners' academic motivation (Nga & Kiệt, 2016; Nilsson & Warrén Stomberg, 2008). A tendency for academic motivation to decrease with increasing training duration was also observed (Tran et al., 2019). A busy study and clinical practice schedule reduced academic motivation (Nilsson & Warrén Stomberg, 2008; Saeedi & Parvizy, 2019). In addition, unsuitable regulations for assessing academic performance and grading diplomas can lead to the students' competence and achievements being misjudged. The pressure of grades or grading of diplomas at a high level decreases academic motivation (Nilsson & Warrén Stomberg, 2008; Oketch-Oboth & Odiemo, 2018). The above results show that the school should periodically survey students' opinions about the school's training regulations to adjust accordingly.

Our research found that the more the students appreciated the help/question answers of the lecturers/medical staff, the higher their academic motivation. Many other studies indicated that teachers who care and are willing to help the students increase the student's motivation (Hanifi et al., 2013; Rafii et al., 2019; Thao et al., 2021). Autonomy support by teachers is directly associated with students' intrinsic motivation, perceived learning outcomes, and study effort (Torbergsen et al., 2023). In addition, good medical staff-student communication and lecture-student communication directly increased student motivation and vice versa (Hanifi et al., 2013). However, some studies also showed that most students had a negative assessment of nurses in clinical practice sites, which was why their motivation was lower (Thao et al., 2021). Most students said nurses had a poor attitude toward them, and it was difficult for them to communicate well with nurses (Saeedi & Parvizy, 2019). This restricted the students from expressing their difficulties and questions during clinical practice or learning to seek support and answers from nurses. The above indicated that lecturers/medical staff must be properly aware of their role and impact by supporting and answering questions during students' learning process. In addition, creating a friendly and close relationship with students is important to encourage them to express their difficulties or problems.

Research results showed that the more the students appreciate the examples of lecturers or medical staff, the more their academic motivation. Many studies showed that medical students often see lectures and medical staff as role models (Hanifi et al., 2013; Rafii et al., 2019; Saeedi & Parvizy, 2019). Core values, attitudes, and behaviors of students tend to be influenced by the role models of the lectures and the clinical staff with whom students come in contact (Hanifi et al., 2013). The lecturer/nurse's level of knowledge and ability to make patient care decisions indicates their competence and professionalism. This gave students an ideal target for their academic efforts to achieve the same (Hanifi et al., 2013; Rafii et al., 2019). Therefore, lecturers and medical staff must try to become good role models for the students regarding professional competence, ethics, working style, and communication with people.

This study showed that students participating in study clubs had more learning motivation. A study on business students found that study clubs positively affected students' motivation and achievement in the field that the club is in charge of. According to (Thao et al., 2021), 91.9% of students joined study clubs to develop themselves. Study clubs are a great opportunity for medical students to improve their skills and expertise and expand and update their knowledge. Although our study found that nursing students appreciated the quality and quantity of study clubs/its activities, 78.9% of students did not join any club. Nguyen's study also recorded similar results (Thao et al., 2021). This problem may stem from a lack of clubs regarding interest in nursing students or limited time due to busy academic and clinical practice schedules. From there, it showed that in addition to developing the quantity and quality of study

clubs/its activities, the school should also consider the type of clubs that students need to join or the reasons for preventing their participation.

This study showed that the students who intend to teach in the nursing field had higher academic motivation than those who do not intend to. Karabulut's research also had similar results (Karabulut et al., 2021). The Vietnamese Ministry of Education has stipulated that a lecturer must have high professional qualifications, solid professional capacity, good scientific research ability, and the ability to develop social relationships (Ministry of Education and Training, 2020). Therefore, the students who intend to teach in the nursing field in this study could learn about the factors/conditions of becoming a lecturer. They understood that they must study and train themselves to achieve the competency standards of a lecturer. Besides, students identified clear learning goals that positively impacted their academic motivation (Rafii et al., 2019; Wang, 2019). In Nilsson's research, students who were assessed as highly academically motivated said that good job opportunities in the future were an important reason for them to study hard (Nilsson & Warrén Stomberg, 2008). The above results indicated that educators must introduce the students to a good job (such as nursing lecturer, nursing researcher, etc.) and help them define their learning goals to stimulate them to study hard.

We found that the students with a higher ability to deal with difficulties had a high academic motivation. The previous study shows similar results (Abdolrezapour et al., 2023). The ability to be resilient is highly beneficial for teenagers as they confront the pressures and obligations of maturity, particularly in the face of unfavorable situations (Phillips et al., 2019; Schönfeld et al., 2017). Due to the nature of the nursing curriculum and profession, nursing students typically experience higher stress levels and workload than other students (Black Thomas, 2022; Hwang & Kim, 2022; Lavoie-Tremblay et al., 2022; Olabisi et al., 2022). The results of previous systematic reviews and meta-analyses found the prevalence of stress and depression among nursing students reaching 61.97% and 34%, respectively (Tung et al., 2018; Zheng et al., 2022), and female students were at a two-times higher risk of experiencing stress than men (A. Anaman-Torgbor et al., 2021). Academic concerns, clinical concerns, personal issues, and worry about interacting with other nursing students are the four main factors that can stress nursing students (Alghamdi et al., 2019; Nebhinani et al., 2020).

In the field of nursing education, recent research has emphasized the significance of resilience as a beneficial factor that can aid nursing students in coping with challenges. Specifically, studies have shown that resilience can help nursing students overcome difficulties such as negative effects on their quality of life, heightened levels of academic exhaustion, and psychological strain (Berdida, 2023; Berdida & Grande, 2023; Cuartero & Tur, 2021; Dje, 2023; Guillasper et al., 2021); Sweeney, 2021). There have been many investigations into the idea that resilience may be a factor in the development of personal growth as a result of unfavorable experiences and stressful and tough conditions during one's academic journey (Alkaissi et al., 2023; Amsrud et al., 2019; Mcdermott et al., 2020; Yun et al., 2020).

Research's Oketch and Karabulut proved that stress at low and moderate levels promoted students' academic motivation to overcome difficulties that cause them stress. However, when this pressure is too great, academic motivation decreases even if students are delayed or drop out of school (Karabulut et al., 2021; Oketch-Oboth & Odiemo, 2018). When researching the causes of low academic motivation. Nilsson found that having difficulty, overload in the study, or achievement pressure was the decline in students' academic motivation. On the contrary, some students still felt excited or saw this as a stimulus to help them study better (Nilsson & Warrén Stomberg, 2008). Nilsson's results may be due to the difference in the ability to deal with the difficulties of the two groups of students. Indeed, the ability to deal with difficulties was shown to limit stress. By dealing well with difficulties, students can proactively deal with adverse events and turn obstacles into opportunities (Somaratne et al., 2017).

This study has several limitations; First, the information was self-reported. Therefore, recall and supporting bias could have occurred during the data collection. To minimize bias, objective

measurements should be conducted. Second, the association findings from this study may not be causal owing to the study's cross-sectional design. A longitudinal design should be conducted to clarify the causality between academic motivation and its associated factors. Finally, the findings of this study have limited generalizability because the sample included nursing students from only one university using the convenient sampling method. Therefore. Further studies using nationwide systematic sampling and international comparisons are highly recommended.

5. Conclusion

Nursing students had many academic motivations. However, the quality of their academic motivation was not high. Students still had many lacks of academic motivation. The suitable training regulations, good help/question answers of the lecturers/medical staff, good examples of lecturers/medical staff, participation in study clubs, intending to teach in the nursing field, and good ability to deal with difficulties were positive predictors of academic motivation. Therefore, the school should periodically survey students' opinions on the training regulations and consider adjusting accordingly. The teachers and medical staff should actively support, answer questions in learning, and set a good example for students about academic efforts. In addition to improving the quality and quantity of study clubs or their activity, the school should investigate the type of study clubs students need and the reasons for preventing them from joining them. Nursing educators must introduce students to good job opportunities and help them define their academic goals to realize their career intentions. Student counseling rooms and seminars on how to deal with academic difficulties and stress should be set up.

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Conflicts of Interest

The authors declare no conflicts of interest

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Design of BWAT method development in diabetic foot ulcers patients in hospital: Action research

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Abstract
Diabetic foot ulcers (DFU) are one of the complications of diabetes that has a serious impact and requires high treatment costs. However, they can be prevented early through a series of assessments. The most recommended initial assessment method to determine the risk of complications is the BWAT Method. However, nurses' BWAT method is still considered too long and complicated. In addition, the hospital also has a different handling program from the BWAT method, so it is necessary to develop the BWAT method and adjust this method to the SOP, which is expected to be more easily applied by nurses. This study aims to design the development of the Bates-Jensen Wound Assessment Tools (BWAT) method for DFU patients with the development of Hospital SOPs. The research method is qualitative action research, while data collection uses focus group discussion (FGD) on 10 participants determined through purposive sampling techniques, with minimum nurse criteria and a minimum length of work of 5 years. Data analysis using the Collaizi model expert judgment was given to three speakers to design SOPs for the BWAT method of wound assessment. The study results obtained four themes related to wound assessment in DFU patients and a draft SOP for wound assessment by developing the BWAT method for DFU patients who received treatment at the hospital. The SOP development trial found that with the same flow but with shorter language, the SOP is easier to understand and easier for nurses to implement; however, improvements are still needed from this SOP, namely in the form of additional evaluation items in the SOP that are expected to be used to improve communication between health care providers to facilitate the process of providing sustainable nursing services.

Keywords: BWAT; diabetic foot ulcers; diabetes mellitus; wound assesment

1. Introduction

Diabetes mellitus is a public health problem that has a major impact on sufferers and, of course, the health financing system (Khan et al., 2020). In 2021, there will be an estimated 536.6 million diabetics worldwide, and by 2045, it is estimated that the prevalence will increase by 12.2% to 783.2 million (Sun et al., 2022). In Indonesia, an estimated 19.4 million people are living with diabetes, which is expected to increase to 23.3 million by 2030 and 28.5 million by 2045 (IDF, 2021). One of the most common complications of DM that has a serious impact and requires high medical costs is diabetic foot ulcer (DFU) (Lin et al., 2020). The prevalence of DFU worldwide reaches 6.3% (Zhang et al., 2017). This prevalence is lower than DFU in Indonesia, which reaches 12% (Yusuf et al., 2016). The recurrence rate of DFU is also quite high. Some results of previous prospective cohort studies showed that DFU patients who relapsed within one year, three years, and five years after recovery reached 22%–44% and 60%–65%, respectively (Armstrong et al., 2017; Hicks et al., 2020; Petersen et al., 2020). DFU is associated with decreased quality of life (Alosaimi et al., 2019; Perrin et al., 2022), increased morbidity and mortality (Jupiter et al., 2016; Schaper et al., 2016), and increased service burden and health financing burden (Lo et al., 2021; Raghav et al., 2018).

Regarding DFU morbidity, Pemayun and Naibaho (2017) found that the number of lower-extremity amputation cases in Indonesia reached 36.3%, with 24% being major amputations and 7% being multiple amputations. This number is higher when compared to the number of amputations in several countries, such as Ethiopia (30.43%) (Bekele & Chelkeba, 2020), Australia (34.1%) (Rodrigues et al.,

2016), and Germany (31.9%) (Malyar et al., 2016). The risk of death in DFU sufferers increased 2.5-fold compared to those who did not suffer from DFU (Walsh et al., 2016), with mortality reaching 5% within the first year after DFU diagnosis and 40–42% mortality within five years (Jupiter et al., 2016; Walsh et al., 2016).

Indonesia faces a daunting task in managing the prevalence of DFU. In order to achieve optimal cure of complications, a nursing care management strategy is needed through an appropriate and effective approach. This approach requires proper monitoring of wound progress through wound assessment tools (Jais & Pratama, 2023). This assessment tool was used to evaluate the effectiveness of treatments (Jørgensen et al., 2016). Nursing care that is very urgent in carrying out DFU prevention is the availability of accurate tools and methods of wound assessment that nurses can use when conducting initial assessments and monitoring the wound healing process. Improper assessment can cause wound healing to be delayed, cause discomfort in the form of pain, increase the risk of infection, and decrease the quality of life for patients (Yani, 2017). Methods of wound assessment are also expected to detect even the slightest changes in wound size, providing appropriate information to guide and inform treatment strategies. In addition, the assessment method should also be able to assess the size, depth, presentation, and location of the wound, which will help underlie the selection and development of therapies and monitor various patient responses to intervention (Sukmana et al., 2020). In addition to using assessment methods, wound evaluation tools are recommended to improve communication between healthcare providers (Bates-Jensen et al., 2019). Lack of communication is an obstacle to optimal wound care management in hospitals (Walker et al., 2019).

One of the wound assessment measuring tools often used is the Bates-Jensen Wound Assessment Tool (BWAT). BWAT is a wound evaluation tool consisting of 13 unique characteristic parameters of wounds. Specific parameter definitions are described for each parameter. Nine parameters were scored on a scale of 1–5 (a score of 1 indicates the healthiest, while a score of 5 indicates the least healthy attribute), and the other four parameters were rated on a scale of 0-5, in scores on the characteristics that have healed (0 = none). The scores of 13 characteristics are added for a total score of 9–65. A score of 9 and a score of 65 indicate minimal tissue damage and severe tissue degeneration, respectively (Bates-Jensen et al., 2019). BWAT is used to evaluate wound progression comprehensively. Evaluation of wounds using BWAT can be objectively measured, so it is estimated that the information obtained from the patient being evaluated will help determine the factors that influence it. BWAT can also guide patient care planning and positively impact treatment outcomes (Karahan et al., 2018).

However, using BWAT in some hospitals has not been widely practiced. In addition, there are different SOPs in each hospital related to wound assessment, so further studies are needed to find out the form of permanent procedures that have been carried out and how wound assessments have been carried out, and then design the SOPs by adjusting and developing the BWAT Model. It was done to make it easier for nurses to care for diabetic foot ulcer patients. This study aims to design the development of the Bates-Jensen Wound Assessment Tools (BWAT) method for DFU patients with the development of hospital SOPs. SOPs have been tested on nurses in hospitals. The trial of SOP development found that with the same flow but a shorter language, SOPs are easier to understand and easier for nurses to implement. However, improvements are still needed from this SOP, namely the use of additional wound evaluation tools to improve communication between healthcare providers to facilitate continuous nursing service delivery.

2. Research Methods

This research is qualitative with an action research approach at one of the private hospitals in Kudus, Central Java. Qualitative research design is research to understand the phenomenon of what is experienced by research subjects holistically in the form of language, scientific words (Blacius dedi,

2021). Purposive sampling techniques were used to select participants, with the criteria of having worked in a room treating diabetic foot ulcers for at least five years and having a nursing education. Data were collected in two stages: a focus group discussion (FGD) with 10 participants and expert consultation. The FGD was conducted for 60 minutes, divided into two sessions: the first session with 5 participants, namely P1–P5, and the second session with 5 participants, namely P6–P10, with 30 minutes each. The FGD process begins with the participants' informed consent, followed by the discussion process. This FGD aims to identify and obtain needs about the permanent procedure for reviewing patient data by nurses by providing four themes using the same key points of questions to participants according to the research topic. The discussion process is recorded using a camera. The recording of the discussion results in the transcript was then analyzed using the Collaizi model so that the themes of the research results could be identified.

The activity continued with expert consultation conducted with three experts, namely one surgical specialist, one medical and surgical nursing doctor, and one diabetes mellitus wound care practitioner nurse, to obtain input regarding the perfection of the SOP design for wound assessment according to nurses' needs. This research has received approval from the Health Research Ethics Commission (KEPK) of Universitas Muhammadiyah Kudus with number 38/Z-5/KEPK/UMKU/XII/2022.

3. Results and Discussion

3.1.Results

3.1.1. Results of Focus Group Discussion

The participants in this study were all women aged around 27–40 years, all educated Ners, with working tenure between 5–17 years, as seen in Table 1.

Table 1. Characteristics of participants

Participant	Gender	Age (year)	Education	Working Tenure (year)
P1	Female	40	Ners	17
P2	Female	40	Ners	17
P3	Female	32	Ners	9
P4	Female	30	Ners	7
P5	Female	35	Ners	14
P6	Female	28	Ners	5
P7	Female	34	Ners	13
P8	Female	27	Ners	5
P9	Female	34	Ners	14
P10	Female	34	Ners	13

Source: Primary data, 2023

Based on the results of FGD data analysis, four themes were identified, namely:

Theme 1: Wound Assessment in Diabetic Foot Ulcer Patients is Not Specific

Subtheme 1: The Study Focused More on DM than on Diabetic Foot Ulcers

Participants revealed that they have been conducting wound assessments, especially diabetic foot ulcers, not specifically but still in general, including TTV examination, GDS, history of suffering from DM, HbA1c examination, and DM drug consumption.

> "What I do when I study patients with diabetic foot ulcers is determine TTV, GDS, wound location, and degree of injury." (P1)

"When I reviewed patients with DM ulcers, I studied a history of DM, GDS checks, and HbA1c examinations" (P3).

Subtheme 2: Incomplete Assessment

Participants used different methods of assessing wounds, so the assessment became incomplete. One participant examined the cause of the injury. Seven participants examined the location of the wound and the degree of the wound. Six participants examined the shape of the wound, two participants reviewed how the wound was treated at home, and two reviewed the length of suffering from DM wounds.

"The first thing I did was to monitor GDS, wound shape, DM wound degree, and treatment actions to adjust the degree of the wound and the location of the DM wound." (P2)

"I ask the patient when the injury occurred, then do a GDS check, review the history of suffering from DM, ask how the wound is treated at home, determine the current condition of the wound, and change the bandage." (P9)

Theme 2: Nurses do Not Have Yet a Special Wound Assessment Format for Diabetic Foot Ulcers

Subtheme 1: There are No Guidelines for Assessing Diabetic Foot Ulcers

All participants said they did not have specific assessment guidelines for DFU injuries but used a general assessment format.

"There are no guidelines. The assessment is still the same in general, for the assessment of the wound has not been specified" (P7)

Subtheme 2: Assessment Based on The Experience of Each Nurse

The assessment carried out by nurses so far is based on each nurse's experience.

"So far, we are free; for my experience, I am used to it because I have been a surgical assistant, so the knowledge is only from habit; for the SOP, there is no one, and I do not know fully; I just learn from the teachings of the specialist, and over time I get used to it" (P1).

Theme 3: Nurses Need Standard Operating Procedures (SPOs) that are Complete and Easy to Implement

Subtheme 1: The Need for Standard Operating Procedures (SPO)

Participants said they needed a special SPO assessment for diabetic foot ulcers. They argue that if guidelines meet the standards, the assessment will be easier, more efficient, and more effective; there will be uniformity in the assessment, and hospital services will improve.

"In my opinion, it is not as needed, so it needs to be made for SPO (special format) for DM patients because so far it has not been provided." (P2)

Subtheme 2: Selection of Sops For The Checklist Model

Participants revealed that the SOPs they needed should be a checklist to facilitate work and not take long.

"Like a checklist so that it does not take long, just tick according to what is in the patient." (P3)

Theme 4: Nurses Choose the Bates-Jensen Wound Assessment Tools (BWAT) Method Wound Assessment Model as an SOP in Hospitals

Subtheme 1: BWAT Meets 13 Wound Characteristics

Participants thought BWAT was easier to predict wounds, including healthy tissue scores 1-13, wound regeneration scores 14-59, and wound degeneration scores 60-65.

> "In my opinion, using a format that contains 13 characteristics is better because it is more specific and can facilitate study and appropriate handling." (P10)

Subtheme 2: BWAT is More Complete

All participants said that BWAT was more complete and detailed for wound assessment.

> "I think the BWAT format is better because it is more complete and is also more precise in determining the next handling." (P8)

3.1.2. Results of Expert Judgement

After FGD, the second stage of this research is expert consultation or expert judgment with three resource persons, namely one academic field person who is a doctor of medical nursing and surgery, one person in the medical field who is a general surgeon, and one nurse wound care practitioner. Based on the input given by the three experts, the number of wound characteristics assessed is still the same as the previous BWAT method, including 13 characteristics consisting of size, depth, edge, undermining, necrotic tissue type, neoplastic tissue amount, exudate type, exudate amount, skin color surrounding the wound, peripheral tissue edema, peripheral tissue induration, granulation tissue, and epithelialization. The experts considered that these 13 characteristics met all the elements of wound assessment expected from both the medical and nursing sides. However, there were additions to the instructions for using SOPs and scoring tables to assist nurses in conducting assessments and for uniformity in determining wound validation.

Some experts also argue that some sentences of instructions are still too long and confusing, so it is recommended to make the instructions more applicable so that they are easier to understand by the nurse who carries them out. In addition, experts also recommend that in the instructions for use, there be tools and methods used to assess wound characteristics, especially when assessing size, depth, edge, and undermining. Another expert input is related to wound scoring. In addition to containing instructions for use, steps, or procedures in assessing wounds in each characteristic, it is also necessary to add some explanation of the condition of the wound to each score assessed. The addition of explanations in each assessment score is expected to make it easier for nurses to determine scores and add up the total scores obtained so that it is easier to determine the status of patient injuries. The recommendations of the three experts were used as input in the draft SOP for the initial assessment of the resulting wounds. The development of this method has been tested on nurses in hospitals. The SOP development trial found that with the same flow but with a shorter language, the SOP is easier to understand and easier for nurses to implement; however, improvements are still needed from this SOP, namely in the form of additional evaluation items in the SOP that can be used to improve communication between health care providers to facilitate the process of providing sustainable nursing services.

3.2. Discussion

The results of this study show that the assessment of wounds in DFU patients is not optimal because the assessment is still general and not specific to DFU. In addition, the assessment data is incomplete because participants use different assessment methods. Multidisciplinary, systematic, and structured data collection about patients can reveal a person's complex clinical condition to guide decision-making and improve the quality of services provided (Vanneste et al., 2015). DFU treatment requires a multidisciplinary care team; therefore, proper assessment of the wound is very important as information for the care team in finding the causative factors of the wound. Assessing the wound's size, depth,

presentation, and location will help underlie the selection and development of therapies and monitor various patient responses to intervention (Sukmana et al., 2020).

DFU assessment is a very important factor in predicting the length of healing and providing information about the condition of the wound so that it becomes the basis for determining appropriate interventions to prevent the development of DFU. Preventing DFU progression can significantly decrease the frequency of lower limb amputations by 49%–87%. Early identification and proper management of complications associated with DFU can also reduce ulceration rates by 44%–85% (Abdissa et al., 2020). DFU is associated with a significant clinical and economic burden on health services. Previous research showed that annually, each patient in Singapore pays an average of $3368 for an ulcer, $10468 for a minor amputation, and $30131 for a major amputation (Lo et al., 2021). In Indonesia, the cost of amputation with a duration of treatment of approximately 15 days reaches 45.5 million rupiahs. Neuropathy, vasculopathy, and infection wounds are the most common, with infectious wounds requiring a longer duration of treatment (17 8.13 days) and more expensive costs reaching 54 million rupiahs (Zufry, 2018). Based on this, it can be said that conducting a proper and complete DFU assessment can indirectly reduce the high cost of health services for DFU patients.

The results found that the hospital did not yet have a special wound assessment format for DFU. This causes nurses to conduct assessments using their methods according to the experience they gain. Several important factors play a role in the patient assessment process, including the ability of nurses and the availability of appropriate instruments. The nurse's ability is one of the most important factors in implementing assessments for patients with DFU. According to Ousey & Cook (2012), a nurse who can perform accurate foot wound assessments is very important to plan, implement, and evaluate the treatment needed for each patient. It was further explained that holistic patient and wound assessment is useful for accurately diagnosing the cause of injury and identifying factors that may delay wound healing. The ability to perform wound assessment is an important parameter that provides basic information about how wound healing progresses, facilitates effective decision-making, and can help predict patient outcomes (Ousey & Cook, 2012). A factor that is also very important to the success of the initial assessment is the availability of an accurate assessment instrument. The wound assessment instrument involves the assessment of initial and ongoing wounds. It has several objectives, including providing basic information to review wound progression, enabling goal setting and selection of correct dressings, and providing appropriate wound management. If wound assessment is not done properly, wound care will not be appropriate, resulting in delayed wound healing and/or serious complications (Greatrex, White, & Moxey, 2013). Therefore, DFU assessment is very important for good wound management.

Nurses need a complete and easy-to-apply DFU assessment SOP. Nurses hope that with guidelines that are according to standards, the assessment will be easier, there will be uniformity in assessment, and it will be efficient and effective. According to Barbé et al. (2016), SOPs aim to ensure data consistency, accuracy, and quality through step-by-step written instructions on executing procedures correctly. SPO improves health service quality and patient safety (Ausserhofer et al., 2016; Shestopalova & Gololobova, 2018). According to Bates-Jensen et al. (2019), previously, healthcare providers only relied on observation to assess wounds and were inconsistent in using various assessment tools among different providers. Hence, standardized, evidence-based tools allow uniform assessment of wound characteristics, which is useful in tracking and measuring wound healing progress. Clinical practice guidelines recommend using wound assessment tools in healthcare settings to improve communication between healthcare providers and ensure optimal patient care (Bates-Jensen et al., 2019).

The nurses in this study chose the Bates-Jensen Wound Assessment Tools (BWAT) wound assessment model as an SOP at 'Aisyiyah Kudus Hospital because this tool was considered complete

enough to assess DFU. BWAT presents more detailed results for DFU assessment as it has more measured characteristics (Rasyid et al., 2019). The results of this study succeeded in developing the BWAT method by incorporating this method into the SOP to facilitate nurses in conducting initial DFU assessments. BWAT is a reliable, standardized, validated visual wound assessment tool for all chronic wounds. The tool contains 13 items that indicate the uniqueness of wound characteristics. Nine parameters are rated on a scale of 1–5 (a score of 1 indicates the healthiest, while a score of 5 indicates the most unhealthy attribute), and the other four parameters are scored on a scale of 0-5 based on the characteristics that have healed (0=none). The scores of the 13 characters are added up, with a total score of 9–65. A score of 9 and a score of 65 indicate minimal tissue damage and severe tissue degeneration, respectively (Bates-Jensen et al., 2019). The design of the development of this method is to be included in the initial assessment SOP of the wound by modifying narrative sentences into applicable sentence forms so that they are easy to understand and implement by nurses. In addition, according to expert input in the instructions for use, tools, and methods used to assess wound characteristics are included, especially when assessing size, depth, edge, and undermining. Other developments carried out by researchers are related to wound scoring and SOPs. In addition to containing instructions for use, steps, or procedures in assessing wounds in each characteristic, there are also several explanations of the condition of the wound in each score assessed. The addition of explanations to each assessment score is expected to make it easier for nurses to determine scores and add up the total scores obtained so that it is easier to determine the status of patient injuries.

4. Conclusion

Based on the study's results, an assessment design has been developed from BWAT into SOPs commonly used by hospital nurses. Modifications were made by incorporating BWAT instruments into the assessment SOP and changing the instructions into a short and applicable language to facilitate nurses conducting initial assessments. In addition, according to expert input in the instructions for use, tools, and methods used to assess wound characteristics are included, especially when assessing size, depth, edge, and undermining. Other developments carried out by researchers are related to wound scoring and SOPs. In addition to containing instructions for use, steps, or procedures in assessing wounds in each characteristic, there are also several explanations of the condition of the wound in each score assessed. The addition of explanations to each assessment score is expected to make it easier for nurses to determine scores and add up the total scores obtained so that it is easier to determine the status of patient injuries. The SOP development trial found that with the same flow but with a shorter language, the SOP is easier to understand and easier for nurses to implement; however, improvements are still needed from this SOP, namely in the form of additional evaluation items in the SOP that can be used to improve communication between health care providers to facilitate the process of providing sustainable nursing services.

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Health care services need in hemodialysis patients: a qualitative study

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Abstract
Qualified health care is health care that is provided based on the needs of the patient, not on what the provider institution has. Patients with chronic diseases such as kidney failure who undergo hemodialysis need more supportive nursing care, such as physical, psychological, and informational support about their condition. This study is intended to explore and identify the need for health services for patients who get hemodialysis therapy. This research is phenomenological qualitative. Data was collected using semi-structured and in-depth interviews with 17 participants with end-stage renal failure undergoing hemodialysis therapy, selected by purposive sampling. Thematic analysis was used to perform data analysis. The study found three main themes: services to fulfill basic needs during hemodialysis therapy; support received while undergoing hemodialysis therapy; and various health services that have yet to be received while undergoing hemodialysis therapy. It can be concluded that identifying service needs positively impacts service quality as healthcare workers will better understand patient expectations. Hemodialysis patients have basic physical, psychological, and support needs. Unmet needs include inadequate drug therapy, inadequate health workers, and unmet information needs. Healthcare providers should develop strategies to manage these needs, including physical and psychological modifications, improved facilities, infrastructure, human resources, and interdisciplinary approaches.

Keywords: hemodialysis; patient needs; qualitative studies; service

1. Introduction

Chronic diseases are the biggest challenge faced by the healthcare system, which causes huge healthcare costs for society and the government (Cockwell & Fisher, 2020; J. Wang et al., 2018). One of the chronic diseases considered a major health problem worldwide is chronic kidney disease (Ahmadpour et al., 2020). It is predicted that the prevalence of chronic kidney disease reached 850 million worldwide in 2017, higher than the estimated prevalence of diabetes and HIV/AIDS, which reached almost two times and 20 times, respectively (Jager et al., 2019). Globally, CKD ranks as the third fastest-growing cause of death. By 2024, it is expected to rank fifth as a common cause of death (Foreman et al., 2018).

The most common type of Kidney Replacement Therapy (KRT) worldwide is hemodialysis (HD), which accounts for more than 69% of all KRT (Bello et al., 2017) and 89% of all dialysis (Pecoits-Filho et al., 2020). HD outcomes vary globally, with high morbidity and mortality rates. Continued improvement in healthcare quality in HD patients is limited due to limited monitoring, variable outcome definitions, a lack of safety standards, and gaps in renal failure care, including shortages of health workers and healthcare information systems (Bello et al., 2019; Htay et al., 2021; Sautenet et al., 2018; Sola et al., 2020).

Physical, psychological, emotional, spiritual, social, and economic problems are things that are often experienced by patients who undergo HD to have an impact on their quality of life (Dingwall et al., 2021; Fadlalmola & Elkareem, 2020; Knowles et al., 2016). Patients undergoing hemodialysis experience much stress, family and social relationship changes, and sometimes isolation or social

restrictions (Theofilou, 2013). Complications can also occur in hemodialysis patients, among others: fluctuations in blood pressure, abdominal pain, headaches, sleep disorders, dry skin, itching, depression, and back pain (Gerasimoula et al., 2015; Zyoud et al., 2016).

In this case, health workers, especially nurses, are patients' main point of contact and are responsible for providing quality services by ensuring patient needs are met (Liu et al., 2018; Nikkhah et al., 2020). As a result, managing patients' diseases will improve with specific initial assessment strategies and meeting the needs of HD patients because it can help them define, plan, and actualize their goals (Xhulia et al., 2016). According to Ková et al. (2021), unmet nursing needs can threaten safety and management success in the implementation of nursing care, otherwise by providing patient-centered care, and nurses can help create a culture where patient safety is a top priority (Zaitoun et al., 2023). Hall et al. (2020) found that hemodialysis patients mostly do not get mobility, drugs, social support, and communication needs.

Various unmet needs in health services in Indonesia increased from 5.03% in 2021 to 6.09% in 2022, while Central Kalimantan province increased from 4.18% to 5.18% (Badan Pusat Statistik, 2023). The results of a preliminary study at General Hospital X Central Kalimantan (the only referral hospital serving hemodialysis patients) found that the number of visits to hemodialysis patients during the January-August 2022 period was 7697 visits, while the interview results on 7 participants found that the types of unmet needs were physical needs such as oxygen; psychological needs such as decreased adherence in a liquid diet, getting bored and thinking of stopping living HD; The need for education and consultation is mainly about food and its diseases.

It is necessary to identify needs that produce a menu of services to meet the needs of patients. This helps health care providers, especially nursing, to make the best decisions in planning nursing care and effectively as a guide to manage the needs and improve the quality of life of hemodialysis patients. Although many studies have explored the concept of necessity in patients with chronic diseases, most of these studies have focused on cancer patients (Cheung et al., 2022; Evans Webb et al., 2021). Research on the need for health services in hemodialysis patients has not been widely conducted. Based on this, researchers are interested in exploring the healthcare needs of hemodialysis patients. This study aims to explore and identify the needs of hemodialysis patients at X Palangkaraya Hospital so that a nursing model in the form of a menu of needs services can be used to meet patient needs.

2. Research Methods

This qualitative research uses a descriptive phenomenology approach to obtain information related to health service needs in hemodialysis patients based on their experiences. According to Farragher et al. (2022), a key step for healthcare providers to provide effective and person-centered care is understanding the person's experience.

The sample selection used a purposive sampling technique with criteria for end-stage renal failure patients who received hemodialysis therapy at X Palangka Raya Hospital in October-November 2022, and they were willing to be participants. Data was collected with semi-structured in-depth interviews of 17 face-to-face participants, with an average interview duration of 30-40 minutes. Thematic analysis is used for data analysis. There are six stages in thematic analysis: data recognition, identifying code, determining the initial theme, reviewing the theme, defining and naming the theme, and making a report (Braun &; Clarke, 2014). This research has received approval from the Ethics Committee of the University of Muhammadiyah Banjarmasin with a Certificate of Feasibility of Research Ethics number 295/UMB/KE/X/2022.

3. Results and Discussions

3.1. Results

3.1.1.Participant Characteristics

The majority of participants were male (58%). Three-quarters (76%) of participants were in the age range of 46-50 (76%). The majority had a primary education level of 47% and worked as housewives and traders at 35% each, as shown in Table 1.

Table 1. Characteristics of participants

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	10	58
Female	7	42
Age		
40-45 years	4	24
46-50 years	13	76
Education		
Primary School	8	47
Secondary School	4	23
High School	5	30
Occupation		
Housewife	6	35
Trader	1	6
Farmer	1	6
Private Employee	6	35
Civil Servant	3	18

Source: Primary data

Based on the data analysis results, there are three main themes related to health service needs in hemodialysis patients: services to meet basic needs during hemodialysis, support received during hemodialysis, and unmet needs of hemodialysis patients.

Theme 1: Basic Needs Fulfillment Services During Hemodialysis

Subtheme 1: Meeting Physiological Needs (Oxygen Needs, Fatigue Management, and Edema)

Physiological needs in this subtheme refer to the fulfillment of oxygen needs characterized by patient complaints of shortness of breath.

"The shortness of breath made me think between life and death, and then I thought of my wife for dialysis" (P8)

"Cannot breathe ....tightness" (P15)

"Ouch... please, cannot breathe... hard to breath" (P17)

Participants expressed that they felt weak, not energetic. Weakness and lack of energy were symptoms of fatigue in participants.

"My body is weak, there is no energy..., need help" (P3)

"Cannot get up first, no limp" P7)

"Limp all over... cannot get up... take care of it first" (P11)

"Needs to be treated so that it is powerful... after dialysis.. assisted by a new nurse in good body condition" (P17)

Participants also had other needs that must be completed, namely overcoming edema.

"My legs are getting swollen... ask for the medicine" (P1)

"It hurts to walk because my legs are swollen... take care of me first" (P3)
"Please treat me, please... my legs are swelling even more" (P11)

Subtheme 2: Fulfillment of Self-Esteem Needs

Confidence, independence, and involvement of patients in treatment (asking for the patient's opinion regarding the treatment performed) have a positive impact and help them undergo hemodialysis.

"Yes, we were asked, we were asked how much first, what weight, how much pull, first asked as much as we could" (P16)

Subtheme 3: Fulfillment of Spiritual Needs

The spiritual needs of patients in the form of religious activities such as praying, praying have been facilitated by the hospital with religious services, one of which is the availability of a place of worship.

"There is no difficulty because to do worship, I am Muslim, I can do it in the morning, and for Dluhur praying, I can still do it at the hour where the average work is completed at 12 o'clock, so it does not leave the obligation" (P3)

Subtheme 4: Proximity and Concern of Health Workers to Patients

Some participants expressed that coming to a health facility is to ask for protection through a sense of security and comfort while undergoing treatment. Patients expect the need for communication and closeness with health workers, and during interviews, researchers ask, what is the best need given? Almost all expressed empathy, were full of kinship, and greeted patients.

"So when it comes, it has been served, good, and very good. The nurses are also very friendly, full of brotherhood... So this makes patients feel at home, too, and the kinship is very high. Anyway, the service is good so that it makes the patient feel comfortable in undergoing treatment, sometimes I joke, laugh and I like that" (P6)

Theme 2: Support Received During Hemodialysis

Subtheme 1: Instrumental support

Instrumental support includes money loans, provision of goods and food, administrative services (BPJS), and the availability of medicines. Participants revealed that they received instrumental support in the form of payment of hemodialysis administration costs that had been borne by BPJS and also assistance from family.

"No, we only BPJS for one month 150. The children are the ones who pay" (P5)

Subtheme 2: Informational Support

Informational support includes any material such as providing information, knowledge, instructions, suggestions, and feedback about the situation and condition of hemodialysis patients.

"What the nurse or doctor tells me is applied at home. For example, the water I consume is a maximum of 350ml, I apply it really at home, not exceeding what is said by nurses and doctors. Alhamdulilah so far there is no shortness of breath and no swelling" (P3)

Subtheme 3: Emotional Support

Emotional support involves empathy, a sense of always accompanying the patient, and an atmosphere full of warmth and attention that makes the patient feel cared for and loved, comfortable,

confident, and enthusiastic about life. Patients from family, friends, and neighbors obtain emotional support.

> "Well, it is also concerned that it is comrades in the office. It means they support and encourage. So many friends who provide support are the point. My family really plays a role in supporting me in the spirit of living this life. Neighbors too, ma'am, ask me to stay optimized, that is their response, give sincere and sincere support" (P3)

Subtheme 4: Social Group Support

Social group support includes communication and interaction with groups with similar interests and social activities. The third participant revealed that he often communicated with people who had experience undergoing hemodialysis to get information related to the treatment performed.

> "Yeah, it means communicating with patients, asking for information related to their experiences during dialysis. They did it first, so I dug up much information from my previous patients" (P3)

Theme 3: Unmet Needs of Hemodialysis Patients

Subtheme 1: Health Services That Are Not Received During Hemodialysis Therapy

Participants complained of discomfort due to pain and fever, especially in participants who installed double lumen catheter / CDL (P1, P12, and P15), but treatment from health workers was lacking.

> "Yes, something is not fulfilled... body discomfort as well as pain in the area where the hose is installed" (P1)
>
> "It is a lack of treatment... fever continues. This is what makes me uncomfortable"(P12)
>
> "It hurts. It feels very uncomfortable where the hose is installed, very uncomfortable... but my complaint was ignored" (P15)

Subtheme 2: Lack Of Number And Quality Of Competent Health Workers

The lack of number and quality of competent health workers causes a decrease in patient safety, causes fear and anxiety, and is less than optimal in providing services.

> "Yes, less skilled in needle nusuk, until several times the needle. There are many patients but the medical personnel" (P2)
>
> "Afraid... anxious if you die on dialysis... called the slow response" (P5)
>
> "Less optimal service because the limited work of people... the patient should be monitored during dialysis" (P11)

Subtheme 3: **Unmet information needs optimally**

Participants felt less involved in the treatment, so they felt neglected and lacked information during hemodialysis.

> "No one gives information and consultation about diseases and progress during dialysis"(P3)
>
> "No one says anything, feels neglected" (P7)
>
> "I am not considered... When is it involved?... ooh poor man" (P12)
>
> "I was not given any information about his progress... either heal or die" (P13)
>
> "It is sad...to feel ignored, not involved even though I want to know about myself" (P16)

3.2. Discussions

The serum ureal and creatinine levels in renal failure patients usually increase along with a progressive decline in kidney function (Brisco et al., 2013; Lau & Vaziri, 2017). For those with

kidney failure, dialysis helps them maintain homeostasis or a stable internal environment (Murdeshwar &; Anjum, 2023; Vadakedath &; Kandi, 2017). This study showed the positive impact of hemodialysis in the form of laboratory results of all participants that showed a decrease in ureal and creatinine levels.

Although hemodialysis can help restore the functional ability of the kidneys, hemodialysis can also cause various complications. Some previous research results showed hypoxemia occurred in 10% of kidney failure patients undergoing hemodialysis (Campos et al., 2016; Meyring-Wösten et al., 2016; Palamidas et al., 2014), with a decrease in PaO2 by 10-20 mmHg during hemodialysis (Sonkar et al., 2016). Intradialytic arterial oxygen saturation and low central venous oxygen saturation in hemodialysis patients indicate an imbalance between upper body systemic oxygen supply and demand, which is at risk of increasing mortality (Kooman et al., 2021). HD patients in this study complained of shortness of breath while undergoing hemodialysis. Some factors contributing to hypoxemia during hemodialysis include anemia, the type of dialysate and type of membrane used, and the presence of impaired lung function (Cader et al., 2019). Based on patient complaints, oxygen is a basic need that health services must provide for hemodialysis patients.

Another problem that patients complained about in this research was weakness and lack of energy. Weakness and lack of energy are signs of fatigue (Tsirigotis et al., 2022). Fatigue is a problem often experienced by HD patients, with a prevalence of up to 60% (You et al., 2022). Fatigue is a complex issue with many aspects (Brys et al., 2021). Some factors associated with fatigue in HD patients include old age, depression, comorbidities, lack of information about the disease suffered, marital status, education level, and insomnia (Bipin Kumar et al., 2021; Gerogianni, Kouzoupis, et al., 2018; Tsirigotis et al., 2022). Statistically high levels of physical and mental fatigue were found in patients with primary education and those who were less or uninformed about their health problems (Tsirigotis et al., 2022). The patient's ability to understand information is associated with the level of education. This is similar to our findings that most study participants had low education levels and were poorly informed about their health. Knowledgeable patients can better understand their condition and adhere to their treatment restrictions, so patient knowledge is important to manage their disease (Gerogianni, Lianos, et al., 2018). Conversely, the lack of understanding of patients with low levels of education may be due to the absence of access to health services and health information.

Fatigue can cause social, cognitive, and physical health problems and decrease the patient's quality of life (Burdelis & Cruz, 2023; Ju et al., 2020). However, fatigue is often ignored and not treated properly (van der Borg et al., 2021) because fatigue symptoms are subjective and difficult to identify (S.-Y. Wang et al., 2016). The importance of education by health workers regarding the symptoms of fatigue and how to overcome them can help patients improve their physical, mental, and social health.

Decreased kidney function in HD patients causes them to be more susceptible to hypervolemia, which leads to edema (Canaud et al., 2019; Kim et al., 2022). Hypervolemia is associated with malnutrition and inflammation that indirectly impact the heart (Dekker et al., 2018). Health professionals should consider various factors that affect hypervolemia in hemodialysis patients. It takes targeted programs that teach how to limit fluids, control thirst, and improve patients' ability to manage their health conditions.

Hemodialysis patients experience problems such as depression, anxiety, and poor quality of life (Um-e-Kalsoom et al., 2020). Practicing religious beliefs and practices in the context of spirituality and/or religiosity as coping mechanisms, especially as a source of calm, peace, comfort, strength, and support, can help improve hope, mental health, and quality of life for patients (Abu et al., 2018; Bravin et al., 2019; Santos et al., 2017; Tavassoli et al., 2019). Religious services, including spiritual

intelligence training, can be done to serve the spiritual needs of hemodialysis patients (Hosseinpour et al., 2020).

Low self-esteem may reduce HD patients' adherence to treatment (Poorgholami et al., 2016). Social support, family, friends, and others positively affect self-esteem (Mehrabi et al., 2022). Self-esteem is defined as psychological well-being, where patients feel satisfied with their lives, which can be seen from acceptance of themselves / positive self-image and can adapt well to the change process when undergoing HD (Poorgholami et al., 2016). Often, patients' beliefs and desires are not met or respected. They feel rejected because they are not included in the treatment. HD patients' involvement in treatment has a positive impact on patients, which helps them undergo hemodialysis. Some participants in the study felt confident because they were involved in care. The nurse always discusses the action to be performed with the patient. Patient involvement in care can improve patient satisfaction and health outcomes (Krist et al., 2017). Årestedt et al. (2019) found that patient involvement in care includes receiving advice from health workers, expressing opinions and decision-making, and sharing feelings and information. Although some informants felt that they had received information and support related to their condition, others felt that they did not get enough information regarding the development of their condition.

The professional closeness between patients and health workers is also a major factor in the success of therapeutic treatments (Antonytheva et al., 2021). Establishing communication can create good relationships and foster empathy and mutual trust between health workers and hemodialysis patients. Without going beyond professional boundaries, such proximity can be a source of coping (Xhulia et al., 2016), resulting in quality care, increasing health worker satisfaction, and improving patient outcomes (Antonytheva et al., 2021).

The research found that hemodialysis patients receive a range of support: instrumental support, informational support, emotional support, and social group support from family, friends, neighbors, and health workers. Instrumental support is mostly obtained from the family. The family manages medical funds, looks after and cares for participants in the hospital, helps with daily activities while being treated at home, and provides comfortable rest facilities. According to Made et al. (2020), this instrumental support is by the economic function, where the family is a source of financial, material, and time allocation to meet the needs of family members. The higher the family support HD patients receive, the better their quality of life (Isdiarti &; Ardian, 2020).

The main target of HD patient management is to improve the quality of life (Bakarman et al., 2019). Several previous research results showed that education programs about HD significantly increased the knowledge and quality of life of HD patients (Bakarman et al., 2019; Fadlalmola &; Elkareem, 2020). Education is a form of informational support for HD patients. Early education about the patient's situation and condition is the basis for deciding to undergo hemodialysis (Rao et al., 2021). Educational program interventions improve patient understanding of hemodialysis, vascular access management, potential complications, dietary and fluid restrictions, treatment regimens, and strategies for coping with disease and hemodialysis (Fadlalmola &; Elkareem, 2020).

Information for patient families related to informal access to caregivers and the provision of knowledge resources to assist in the management of patient symptoms at the initiation of hemodialysis treatment and general information about caring for hemodialysis patients can generally be provided by doctors, supported by several nurses (Matthews et al., 2022). Family support is the most important thing because, at the beginning of hemodialysis, patients consider it the biggest problem because they feel between life and death. Support from children, wives, and husbands made most participants want to routinely and enthusiastically undergo hemodialysis. Increasing family involvement in therapeutic regimens is an important issue in applying effective holistic treatment to

hemodialysis patients. Integrating the patient's family into a multidisciplinary group of health professionals is one of the most effective ways to improve treatment adherence (Xhulia et al., 2016).

Uncompleted needs of individuals with chronic diseases refer to needs not met by their region's chronic care system. These needs pertain to prevention, medical care, rehabilitation, and health care and are based on the difference between their current state of health and their perceived optimal state of health (X.-T. Ke et al., 2021). The results of this study show that the comfort needs of hemodialysis patients related to pain and fever have not been met. Patients complain of unresolved low back pain that sometimes appears during HD. Pain and fatigue are common symptoms in chronic renal failure patients (Almutary et al., 2016). The prevalence of pain was higher in hemodialysis patients (63%) than in patients undergoing kidney transplantation (46%), with musculoskeletal pain being the most common pain (45%) (Lambourg et al., 2021). Previous studies have shown similar cases and severity of chronic pain in HD patients ranging between 33% and 82%, while for acute pain, it was 21% and 92%, respectively (Brkovic et al., 2016). Pain is an aspect that should not be underestimated, so pain management in services is a very important aspect that must be met.

Some patients in the study also developed a fever while undergoing HD after double-lumen catheter (CDL) insertion or at home. Patients undergoing hemodialysis (HD) are at risk for infection, which usually originates from the cannula or CDL (Fysaraki et al., 2013). Villalon et al. (2018) found that 53.6% of HD patients had a fever, most of whom had high levels of bacteremia, especially in patients who used catheters. When viewed from the wounds of HD patients in this study, there were no symptoms that pointed to infection, but some patients had a fever that persisted from the beginning of CDL insertion until now. This caused some participants to want to stop undergoing HD. According to Pateinakis et al. (2014), it is important to include periodic febrile syndrome in the list of possible causes of fever of unknown origin in patients of all ages since some variants can appear later in life.

Services cannot be done immediately, so hemodialysis patients with positive Hbs Ag in this study also complained about making patients wait a long time. Health workers serve these patients last to avoid contamination with non-HBS Ag-positive patients. Participants also wanted the treatment room to be sealed with glass walls so that health workers would be more free to monitor and patients would feel calm during HD. Other complaints patients submit include machine errors during HD and some outdated devices. The results of this study are in line with the results of research (Biniaz et al., 2018), which showed that the lack of timely and accurate monitoring of the dialysis process in the form of less application of dialysis standards, accelerated hemodialysis time accuracy, and efficiency of dialysis devices is lacking. Error and obsolete hemodialysis machine equipment are obstacles to high-quality dialysis services.

The unmet needs of HD patients are further related to insufficient human resources in quantity and quality. This is one of the obstacles to HD services (Nobahar &; Tamadon, 2016). The quantity and quality of human resources of health workers affect the satisfaction of the needs of chronic disease patients, especially hemodialysis patients (X. T. Ke et al., 2021). Competent nurses play an important role in maintaining safe and effective healthcare by combining knowledge, skills, and attitudes to enable healthcare workers to adapt to the ever-changing healthcare environment (Fukada, 2018). The lack of competent health workers causes the non-fulfillment of patients' rights to optimal service and reduces patient safety.

In contrast to the findings of this study (Culp et al., 2016), the authors identified three main unmet needs of HD patients: bereavement support, spiritual support, and end-of-life care discussions. The lack of provider training on communicating prognostic data may contribute to the limited number of end-of-life care discussions with this chronically ill population (Eneanya et al., 2015). Patients complain of short visits with their nephrologists, and nephrologists also complain of similar things in the form of limited time with patients and a lack of privacy in communication (Hall et al., 2020).

4. Conclusion

This process of identifying service needs produces a menu of services that positively impact service quality so that health workers know what the patient's expectations are in determining the type and quality of service desired. The needs of hemodialysis patients include basic needs (physiological, self-esteem, spiritual, closeness, and care of health workers) and support (instrumental, informational, emotional, and social groups). Unmet needs of HD patients include not being given treatment therapy when needed, a lack of competent health workers, and information needs that have not been optimally met. Healthcare providers have a major challenge in developing strategies to improve HD services by managing the various needs of HD patients, including physical and psychological modifications; improvement of facilities and infrastructure; improvement of service quality, including improvement of human resources; increased support for patients and families; and the application of interdisciplinary approaches.

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Integration of foot massage and diabetic foot gymnastic on peripheral perfusion in patients with diabetes mellitus 2

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Abstract
The prevalence of type 2 diabetes mellitus (DMT2) shows that it is increasing every year. Peripheral neuropathy of the foot is a complication that often appears in people with DM. Neuropathy disorders that are not treated properly can risk causing diabetic ulcers, even to the point of undergoing amputation. Complementary therapies that can be done to overcome this include foot massage and diabetic foot exercises. This study aims to determine the effect of foot massage integration and diabetic foot gymnastics on overcoming complaints of peripheral tissue perfusion in the feet of DMT2 patients at the Polyclinic of Panti Nugroho Hospital. The study used a quasi-experimental method with a pretest-posttest control group design. The intervention and control groups each consisted of 15 respondents. The intervention group was given foot massage treatment and diabetic foot exercises for three consecutive days for 15 minutes. The independent t-test and the Mann-Whitney test were used to analyze the data obtained. There were significant differences in ABI scores, oxygen saturation, and monofilament scores in the intervention group's left and right legs compared to the control group (p-value < 0.05). There is also a significant effect of the integration of foot massage and diabetic foot gymnastics on peripheral tissue perfusion in both the left and right feet of T2DM patients. The contribution of this study prompted the need for further research with larger numbers of respondents and a longer time to ascertain its effectiveness before it was used as part of local nursing intervention standards.

Keywords: ankle-brachial index; diabetic foot gymnastics; diabetes mellitus type 2; foot massage; peripheral tissue perfusion

1. Introduction

Diabetes mellitus (DM) is one of the non-communicable diseases (NCDs). However, the number of cases continues to increase yearly. Globally, the prevalence of people with diabetes aged 20–70 years from 2015–2021 reached 1.84 billion, with more than 90% having type 2 diabetes (DMT2) (International Diabetes Federation, 2021). Indonesia ranks fifth in the number of people with diabetes in the world (19.47 million), after China (140.87 million), India (74.19 million), Pakistan (32.96 million), and the United States (32.22 million) (International Diabetes Federation, 2021). The prevalence of people with DM in Yogyakarta based on doctors' diagnoses at all ages reached 14,602 people, making Yogyakarta the third highest number of people with diabetes mellitus (DM) in Indonesia (Kemenkes, 2019).

Based on information obtained from the medical records of Panti Nugroho Hospital (RSPN), during the 2021–2022 period, there was an increase in the number of outpatient visits with DM from 1474 visits to 1587 visits. In January–April 2022, DM patient visits reached 1420. Almost 50% of patients who come to RSPN's internal medicine clinic are DM patients, with or without complications. The results of a preliminary study in March 2022 found that 9 out of 10 patients who visited the internal medicine clinic were DM patients. Six out of 10 DM patients often experience tingling and stiffness in the hands and soles of the feet. The results of interviews conducted by researchers found that patients do not routinely report to the doctor that they do not consume routine sugar drugs, do not comply with diet arrangements, and lack exercise associated with neuropathy conditions.

Neuropathy is one of the complications of DM and is estimated to occur in 50%–90% of DM sufferers (Schreiber et al., 2015; Zhou & Zhang, 2019). Diabetic peripheral neuropathy (DPN) is a condition where clinical and subclinical abnormalities are obtained that are characterized by somatic manifestations of the peripheral nervous system in patients with diabetes mellitus without any other cause of peripheral neuropathy (Dogiparthi et al., 2017; Pop-Busui et al., 2017). Symptoms of DPN that are often reported include severe pain such as stabbing, burning, needle pricking, and electric shock sensation, especially in the legs and calves (Ray et al., 2021; Tesfaye et al., 2023). The pain usually increases at night. There can even be numbness or loss of sensation in the affected area (Balhara et al., 2020; Sloan et al., 2018).

Diabetic peripheral neuropathy is associated with sleep disturbances, mood instability, decreased concentration, mental health disorders, decreased daily activities and exercise, reduced work productivity, and decreased quality of life (Davoudi et al., 2021; Degu et al., 2019; Tesfaye et al., 2023) as well as an increased risk of diabetic ulcers, infections, and amputations (Baltzis et al., 2014; Boulton, 2014). However, treatment in most cases of peripheral neuropathy cannot be done entirely because the cause is unknown or incurable, so improving and managing disturbing symptoms is the main goal of DPN treatment (Nathan & DCCT/EDIC Research Group, 2014). Foot care carried out consistently can minimize foot disorders in DM patients by 50–60% (Black & Hawks, 2019). Exercise and foot massage can increase the number of metabolic components that affect nerve health (Nimmo et al., 2013; Sunarmi et al., 2023).

Black & Hawks (2019) found that diabetic foot gymnastics can improve vascularity through some foot movements. Smooth blood circulation will help supply oxygen and nutrients to nerve cells, allowing nerves to work properly and reducing the number of complaints of peripheral neuropathy and diabetes. Increased peripheral blood flow can be measured by an ankle-brachial index (ABI) examination, a circulation examination, and a monofilament score (Aminuddin, 2020). Some research results of peripheral perfusion enhancement interventions are more dominated by single interventions such as foot exercise (Ren et al., 2021; Sukartini et al., 2019) and foot massage (Agustini et al., 2020; Chatchawan et al., 2015; Cicek et al., 2021).

Yusnanda et al. (2019) stated that evaluating whether combination interventions are more effective than other approaches in improving peripheral perfusion in patients with T2DM is important. More in-depth research is needed to evaluate the extent to which such interventions can improve blood flow to the lower extremities, as studies investigating the direct effects of the integration of foot massage and foot gymnastics on the peripheral perfusion of T2DM patients involving representative samples with adequate sample sizes are lacking. Based on the background above, researchers wanted to know the effect of foot massage integration and diabetic foot gymnastics on peripheral tissue perfusion in the feet of DMT2 patients at the Polyclinic of Panti Nugroho Hospital. This study aims to determine the effect of foot massage integration and diabetic foot gymnastics on the complaints of peripheral tissue perfusion in the feet of DMT2 patients at the Polyclinic of Panti Nugroho Hospital.

2. Research Methods

This study used a quasi-experimental method with a pretest-posttest control group design. The study population of all DMT2 patients who visited the internal medicine polyclinic of Panti Nugroho Hospital on July 29–August 14, 2022, amounted to 263 people. Sampling using the accidental sampling technique. The sample was 30, comprising 15 intervention group patients and 15 control group patients.

Researchers gave an integration of foot massage and diabetic foot gymnastics to 15 people in the intervention group. The intervention was carried out for three consecutive days, with the duration of each intervention lasting 15 minutes. As for the control group, as many as 15 respondents were not given treatment. Researchers measured ABI values, oxygen saturation, and leg sensitivity. Measuring

foot sensitivity using monofilament (10 g) aims to find out earlier the symptoms of neuropathy in the feet of people with DM. In addition to monofilament (10 g), other tools used in this study are digital tension to measure ABI values and oxymetry to measure oxygen saturation. The tools used have been tested and checked by electromedical engineering officers at Panti Nugroho Hospital, and the results show that these tools are suitable for use.

Following the Shapiro-Wilks test, only the right foot ABI value data is normally distributed, so the data analysis uses an independent t-test. While the ABI value data of the left leg, oxygen saturation, and monofilament are not normally distributed, they use the Mann-Whitney U test. This study has received ethical approval from the Health Research Ethics Commission (STIKES BETHESDA YAKKUM), ethical feasibility information No.133/KEPK.02.01/VII/2022.

3. Results and Discussion

3.1.Results

3.1.1.Characteristics of Respondents

Almost all respondents were female (90.0%), the majority of whom were aged ≥ 60 years (60%). There was only one respondent aged ≤ 45 years in the control group. Most respondents had type 2 DM ≤10 years (70%), and four in the control group had type 2 DM ≥ 20 years. More than half of respondents had controlled sugar levels (53.3%), but when viewed per group, respondents in the intervention group had the majority of uncontrolled blood sugar levels (60%). Blood sugar levels are controlled if the GDS test results are <180 mg/dl, while blood sugar levels are not controlled if the GDS test results are >180 mg/dl. The characteristics of the respondents can be seen in Table 1.

Table 1. Characteristics of respondents

Characteristics	Intervention Group		Control Group		Total	
	n	%	%	%	n	%
Gender						
Male	1	6.7	2	13.3	3	10
Female	14	93.3	13	86.7	27	90
Age						
≤ 45 years			1	6.7	1	3.3
46–59 years	5	33.3	6	40	11	36.7
≥ 60 years	10	66.7	8	53.3	18	60
Duration diagnosed with DM.						
≤ 10 years	11	73.3	10	66.7	21	70
11–19 years	4	26.7	1	6.7	5	16.7
≥ 20 years			4	26.6	4	13.3
Blood Sugar Levels						
Controlled	6	40	10	66.7	16	53.3
Uncontrolled	9	60	5	33.3	14	46.7

Source: Primary data, 2022

3.1.2.Differences in Right-Leg Ankle Brachial Index Value

The results of the independent t-test sample showed a calculated t-result of 3,811 with a sig. A value of 0.00 indicates a significant difference in right-leg ABI values between the intervention and control groups. The mean difference in right-leg ABI values in the intervention and control groups was 0.0867 and -0.0180, respectively, as presented in Table 2.

Table 2. The Difference of right-leg ABI values in the intervention group and Control Group

Right-Leg ABI Values Group	n	Mean-SD	95-CI	P Value
ABI Intervention Value	15	0.0867 ± 0.05972	0.10467±	0.001
ABI Control Value	15	-0.0180 ± 0.8801	(0.04841- 0.16092	

Source: Primary data, 2022

3.1.3. Difference in Left-Leg Ankle Brachial Index Value

Table 3. The Difference of Left-Leg ABI Values in the intervention group and Control Group

Left-Leg ABI Values Group	n	Median (Min-Max)	P Value
ABI Intervention Value	15	0.1200 (0.03-0.8)	0.000
ABI Control Value	15	-0.0100(-0.13- 0.21)	

Source: Primary data, 2022

Table 3 above describes that the *Mann-Whitney U test* value on the difference in left foot ABI values obtained a sig.2-tailed value of the difference in left foot ABI values of 0.000 ($p<0.05$), which showed there was a significant difference in the results of the difference in left foot ABI values between the intervention group and the control group. The mean difference in left foot ABI scores in the intervention group was 0.1540, and in the control group was -0.0173.

3.1.4. Differences in Right and Left Leg Oxygen Saturation in The Intervention Group and Control Group

Based on Table 4, the results of the *Mann-Whitney U test* showed a significant difference in the oxygen saturation of the right leg. The left foot is between the intervention and control groups ($p<0.05$). The difference in the mean value of right leg oxygen saturation in the intervention group and the control group was 2.4667 and 0.7333, respectively. While the difference in the average left leg oxygen saturation value in the intervention group was 2.0667, and in the control group was 0.4667.

Table 4. The difference in Oxygen Saturation of the Right and Left Foot between the Intervention Group and the Control Group

Oxygen Saturation	N	Median (Min-Max)	P Value
Right Leg			
Intervention Group	15	2.000(1.00-4.00)	0.000
Control Group		0.000(-1.00-200)	
Left Leg			
Intervention Group	15	2.00(1.00-4.00)	0.000
Control Group	15	0.00(-1.00-2.00)	

Source: Primary data, 2022

3.1.5. Differences in Right and Left Foot Monofilament Scores in the Intervention Group and Control Group

Table 5. Differences in right and left foot monofilament scores in the intervention group and control group

Monofilament Scores	n	Median (Min-Max)	P Value
Right Leg			
Intervention Group	**15**	0.500(0.500- 2.00)	0.000
Control Group	**15**	0.000(-0.50- 0.50)	
Left Leg			

Intervention Group	**15**	0.500(0.500- 2.00)	0. 002
Control Group	**15**	0.000(-0,50- 0.50)	

Source: Primary data, 2022

The results of the *Mann-Whitney U test* showed a difference in the right foot and left foot monofilament scores between the intervention group and the control group ($p<0.05$). The difference in the mean value of the right foot monofilament score in the intervention group was 0.8000 and in the control group was 0.0333, while the difference in the mean value of the left foot monofilament score in the intervention group and the control group was 0.4667 and -0.0667, respectively, as seen in Table 5.

3.2.Discussion

In this study, the respondents were almost entirely female (90%). Several research results showed similar results (Akhtar et al., 2022; Ghassab-Abdollahi et al., 2023; Yan et al., 2022; Zhang et al., 2019). The high prevalence of type 2 diabetes in women is associated with a higher body mass index (BMI), high triglyceride levels, a history of gestational diabetes mellitus (GDM), and menopause (Ciarambino et al., 2022; Kautzky-Willer et al., 2016; Zhang et al., 2019). Higher BMI is a major risk factor for diabetes (Chen et al., 2018; Gray et al., 2015; Gupta & Bansal, 2020; Medhi et al., 2021; Tang et al., 2021). Medhi et al. (2021) found that, compared to people who have a normal weight, obese people have an 8-fold higher risk of suffering from diabetes. Obesity is more experienced by women than men (Cooper et al., 2021).

In addition to a higher BMI, GDM is associated with a high prevalence of type 2 DM in women. Several previous research results showed that women with GDM had up to 10 times the risk of developing type 2 DM after 6.5–10 years of being diagnosed with GDM compared to those who were non-GDM, with a prevalence ranging from 16.64%–61.3% (Chamberlain et al., 2013; Eades et al., 2015; Herath et al., 2017; Vounzoulaki et al., 2020). Optimal prevention and treatment of GDM, including follow-up screening in women with a history of GDM, is an important part that must be done to reduce the prevalence of type 2 DM in the future.

Contrary to this study's results, previous studies showed that the prevalence of type 2 DM was higher in men (Muilwijk et al., 2022). Differences in sex dominance in the prevalence of type 2 DM are influenced by age. Type 2 DM in males is more prevalent at a younger age, especially before puberty, with a lower BMI (Ciarambino et al., 2022; Kautzky-Willer et al., 2016; Tramunt et al., 2020), while the prevalence of type 2 DM in women is more common in old age and after menopause (Ciarambino et al., 2022). Menopause results in estrogen deficiency, which contributes to the development of type 2 DM through several mechanisms, including changes in insulin secretion from pancreatic β cells, decreased insulin sensitivity in target organs and tissues, and increased glucose sensitivity in major organs related to diabetes (Mauvais-Jarvis et al., 2017).

It was found in the research that 70% of respondents had DM for ≤10 years, and 13.3% had had type 2 DM for ≥ 20 years. The duration of diabetes >5 years is associated with an increased risk of decreased bone mineral density (Jang et al., 2018), macrovascular and microvascular complications, and death (Zoungas et al., 2014). Uncontrolled diabetes can occur due to poor glycemic control, which is also associated with many complications of diabetes. Uncontrolled blood sugar levels in this study were high, reaching 46.7%; even in the intervention group, uncontrolled blood sugar levels reached 60%. Uncontrolled diabetes can occur due to poor glycemic control, which is also associated with many complications of diabetes. Optimal glycemic control is important in diabetes management to prevent and reduce the risk of complications, increase life expectancy, and improve the quality of life of DM patients (Abdissa & Hirpa, 2022; Yigazu & Desse, 2017). Unfortunately, previous studies have shown a high prevalence of poor glycemic control ranging from 45.2%–93% (Bin Rakhis et al., 2022; Traoré et al., 2021; YimamAhmed et al., 2020).

Achieving optimal glycemic level control over the long term is challenging in clinical practice due to the complex causes of poor glycemic control in T2DM. Comorbidities, lack of social support and physical activity, use of multiple medications, lack of self-monitoring of blood sugar, living in rural areas, less education, and longer duration of diabetes are factors associated with poor glycemic control (Dawite et al., 2023; Fiseha et al., 2018; Mamo et al., 2019). Mamo et al. (2019) found that using a combination of metformin and insulin, lack of physical activity, using insulin, and duration of diabetes for more than seven years increased the risk by 9.22, 4.79, 4.48, and 3.08-fold, respectively, of poor glycemic control in DM patients. Glycemic control is also significantly associated with decreased peripheral vascularization in DM patients (Janitra & Sandika, 2018).

Foot massage and foot gymnastics can affect endorphins, which have the effect of reducing pain, increasing excitement, and causing vasodilation of blood vessels so that blood circulation becomes smooth (Affiani, 2017). Participants in the intervention group felt the same way. They felt comfortable and achy—leg aches were reduced. There was a significant difference in the values of right-footed ABI and left-footed ABI in the intervention group and control group ($p<0.05$). The mean difference in right-leg ABI values in the intervention and control groups was 0.0987 and -0.0180, respectively. The difference in the ABI value of the left leg of the intervention group was 0.1540, and the control group was -0.0173. The results of this study showed a higher average difference in ABI values compared to previous studies by Hijriana & Miniharianti (2021) about foot massage and lower extremity joint movement against ABI values in Type 2 DM patients, with a difference in ABI values before and after the intervention of 0.08.

Related to oxygen saturation, we found there was a significant difference in the difference in oxygen saturation of the right and left legs between the intervention group and the control group ($p<0.05$). The mean difference in right leg oxygen saturation values in the intervention group was 2.4667; in the control group, it was 0.7933. While the difference in the mean oxygen saturation of the left leg of the intervention group and the control group was 2.6667 and 0.4667, respectively, Previous research has shown that foot massage has a positive impact on vital signs such as lowering blood pressure, heart rate, breathing, and increasing oxygen saturation (Jing et al., 2022).

There was a significant difference in the monofilament scores of the right and left foot in the intervention group against the control group ($p<0.05$). The difference in the right leg monofilament score of the intervention group was 0.800, and the control group was 0.333, while the difference in the average value of the left foot monofilament score in the intervention group and the control group was 0.4667 and –0.0667, respectively. The integration of foot massage and diabetic foot exercises can improve the vascularity of blood vessels can help increase foot sensitivity. Research conducted by (Sukarja, 2018) showed an average post-foot gymnastics score of 8.45 and an average post-foot spa score of 9.52, so the group that got a foot spa got better foot sensitivity.

Foot massage and exercise can also improve blood circulation and endothelial tissue function in people with DPN (Chatchawan et al., 2020; Liao et al., 2019; Mueller et al., 2013). Diabetic foot gymnastics move joints and leg muscles to improve blood circulation, strengthen small muscles, prevent foot deformities, increase calf and thigh muscle strength, and overcome joint motion limitations (Ferreira et al., 2019). The sensitivity of contracting muscle cells to insulin will increase so muscles can use high blood glucose levels in blood vessels as an energy source (Colberg et al., 2010). With a decrease in blood glucose levels, sorbitol and fructose will be deposited inside the nerve cells less, thereby improving circulation and nerve cell function, increasing nerve sensitivity in the legs, and reducing the risk of developing diabetic foot ulcers (Pang et al., 2020; Papachristoforou et al., 2020).

4. Conclusion

The integration of foot massage and diabetic foot gymnastics is effective in improving blood circulation, increasing oxygen saturation, and increasing foot sensitivity. There is a significant effect of the integration of foot massage and diabetic foot gymnastics on peripheral tissue perfusion in both the left leg and right foot of T2DM patients. The contribution of this study requires further research with a larger number of respondents and a longer time to ascertain its effectiveness before it is used as part of standard local nursing interventions.

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Slow stroke back massage (SSBM) therapy with lavender essential oil effectively lowers blood pressure

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Abstract
Hypertension is a global health problem that is a major factor causing cardiovascular disease and premature death. While pharmacological therapy is still the main choice, non-pharmacological therapies with minimal side effects, such as a combination of slow-stroke back massage (SSBM) and aromatherapy, are expected to increase relaxation to increase the effectiveness of lowering blood pressure in hypertensive patients. This study aimed to test the effectiveness of SSBM therapy with lavender essential oil in lowering blood pressure in patients with primary hypertension. The research used a quasi-experiment method with a pretest-posttest design with a control group. In this study, the samples used were hospitalized patients with primary hypertension who met the inclusion and exclusion criteria, with as many as 40 respondents using purposive sampling techniques. Slow stroke back massage (SSBM) therapy with lavender essential oil significantly lowers blood pressure values in primary hypertensive patients compared to SSBM therapy with baby oil (P value 0.05). The mean difference in systolic and diastolic blood pressure in the intervention and control groups was 6.25 and 2.65, respectively. This therapy has been proven effective in lowering blood pressure in primary hypertensive patients. Therefore, hospital management may consider applying this nonpharmacological therapy to manage primary hypertension patients.

Keywords: blood pressure; essential lavender; primary hypertension; slow stroke back massage

1. Introduction

Hypertension globally affects more than 1.28 billion people aged 30-79 (WHO, 2023) and is a leading cause of cardiovascular disease and premature death (Roth et al., 2018; Stanaway et al., 2018). According to the World Health Organization (WHO), approximately 46% of adults suffering from hypertension are unaware that they have the disease (WHO, 2023), While the prevalence of hypertension in Indonesia itself reaches 34.1% (Kementerian Kesehatan RI, 2019). This is because hypertension often appears without symptoms, so patients are not aware of their condition and only find out after complications appear. Therefore, hypertension is known as "the silent killer". Hypertension increases mortality and morbidity (Martín-Fernández et al., 2023).

Many long-term high blood pressure patients can experience hypertension-mediated organ damage (HMOD). HMOD describes changes in blood vessels or ends organs (eyes, heart, kidneys, brain, and blood vessels) both in structure and function (Kyada et al., 2018). Initially, they did not show any symptoms, such as microalbuminuria, dystolic dysfunction, coronary calcification, and left ventricular hypertrophy (LVH) (Kyada et al., 2018; Oh et al., 2020; Suvila et al., 2019; Wang et al., 2022), where these symptoms are usually clinical markers of cardiovascular disease (CVD). The results of Kyada et al. (2018) showed that patients with end-organ damage experienced CV complications (54.6%), increased creatinine (25.9%), cerebrovascular accident complications (CVA = 19.4%), increased proteinuria (18.51%), and hypertensive retinopathy (15.7%).

Hypertension is a major contributor to CVD, such as ischemic heart disease, hemorrhagic stroke, and ischemic stroke (Forouzanfar et al., 2017; Rapsomaniki et al., 2014; Zhou et al., 2018). Cardiovascular disease is also a major cause of increased mortality associated with hypertension

(O'Brien, 2017; Peck et al., 2013; Shah et al., 2020). Number of deaths from coronary heart disease (40.1%), ischemic stroke (38.1%), and hemorrhagic stroke (42.5%) (Mills et al., 2020). During 1990–2015, the estimated number of deaths due to hypertension and cardiovascular disease (CVD) increased significantly, in line with the prevailing trend of hypertension prevalence (Mills et al., 2020).

In the period 2010–2030, there was a decrease in the prevalence of hypertension by 33%, which is one of the global targets for non-communicable diseases (WHO, 2023). One of the potential efforts that can be made to support this target is through effective prevention and management of hypertension (Tahkola et al., 2021). Management of hypertension can be done with pharmacological and nonpharmacological therapies (Carey et al., 2021). Pharmacological therapy uses drugs to keep blood pressure within normal limits. Unfortunately, some research results show side effects of hypertension treatment, including dizziness, erectile dysfunction, cough, palpitations, trembling, muscle pain, frequent urge to urinate, decreased libido, continuous hunger, insomnia, and physical fatigue (Gebreyohannes et al., 2019; Kretchy et al., 2015; Olowofela & Isah, 2017). These side effects increase the risk of stress, anxiety, and depression (Kretchy et al., 2015) and increase treatment non-adherence in hypertensive patients (Gebreyohannes et al., 2019). The application of treatment modification approaches by utilizing non-pharmacological therapies (lifestyle modification, complementary and alternative therapies) is a way that can be done to minimize the side effects of hypertension treatment (Dhungana et al., 2022; Fu et al., 2020; Kretchy et al., 2015).

The application of non-pharmacological approaches should begin in the early stages of the disease and continue simultaneously with medical interventions (Verma et al., 2021). One of the non-pharmacological treatments for hypertension is massage therapy. Massage therapy is the most widely used and quite effective complementary therapy (Field, 2014). Slow Stroke Back Massage (SSBM) was first introduced in 1996 by Elizabeth as a gentle and light massaging motion on the back and shoulders. Movements are carried out gently, rhythmically, and constantly, with approximately 60 movements per minute and 3–10 minutes (Atashi et al., 2014; Ghaderi et al., 2013). SSBM is known to relax muscles and stimulate parasympathetic nerve activity, thereby increasing the production of the neurotransmitter acetylcholine. This inhibits sympathetic nerve activity, resulting in systemic vasodilation and decreased heart muscle contractility, ultimately leading to decreased blood pressure (Suwaryo et al., 2022). SSBM therapy can also help reduce stress and improve sleep quality, an important factor in controlling hypertension (Septiari & Restuning, 2017). Some research results also show a significant relationship between SSBM and reduced blood pressure (Mobalen et al., 2020; Mohebbi et al., 2014; Putra et al., 2022; Septiari & Restuning, 2017). The majority of those studies provided only a single intervention. At the same time, combining intervention with aromatherapy massage is expected to increase the effectiveness of therapy to lower blood pressure in hypertensive patients.

One of the most popular aromatherapy oils today is a lavender essential oil containing linalool, which can be used through inhalation or massage on the skin. Previous research results showed the positive effects of lavender oil used in aromatherapy, among others: helps relax tense nerves and muscles (Sayorwan et al., 2012), improves sleep quality (Cho et al., 2013; Karadag et al., 2017), lowering heart rate and body temperature (Jalalodini et al., 2016; Salamati et al., 2017; Sayorwan et al., 2012), lowering blood pressure (Jalalodini et al., 2016; N et al., 2016; Salamati et al., 2017; Sayorwan et al., 2012), reducing anxiety (Cho et al., 2013; Donelli et al., 2019; Karadag et al., 2017; Karan, 2019). Sayorwan et al. (2012) found that lavender aromatherapy can increase alpha brain waves (8-13 Hz) associated with decreased stress and theta waves (4-8Hz), thereby improving sleep quality. Overcoming stress and improving sleep quality are important components of hypertension control (Bautista et al., 2019; Birhanu et al., 2021; Gou et al., 2023).

Research combining SSBM intervention with lavender essential oil to lower blood pressure is rarely done. This study can determine the effectiveness of a combination of very important interventions. This

study aimed to test the effectiveness of SSBM therapy using lavender essential oil in lowering blood pressure in patients with primary hypertension.

2. Research Methods

This is a quasi-experimental study with a non-randomized design and a control group pre-test and post-test design. The population in this study comprised patients undergoing treatment at PKU Muhammadiyah Mayong Jepara Hospital diagnosed with primary hypertension. Sampling was carried out using purposive sampling techniques, with inclusion criteria: patients diagnosed with hypertension (systolic blood pressure ≥ 140 mmHg and diastolic ≥ 90 mmHg, normal pulse 60 – 100 x/min), no injury to the back region, compostive consciousness, no impaired function of the sense of smell, and willingness to be a respondent. Exclusion criteria: patients with emergency hypertension using medical aids such as syringe pumps, hypertensive patients with contraindications to back massage or restriction of mobilization; and patients allergic to the scent of lavender. The sample comprised 40 respondents, with 20 respondents for the intervention group and 20 for the control group.

The instruments used are lavender essential oil, observation sheets, and digital sphygmomanometers. The study lasted three weeks (February 27 – March 16, 2023). In the intervention group, slow stroke back massage (SSBM) with lavender essential oil was given. In contrast, SSBM with baby oil was given in the control group, each done daily for 5–10 minutes for two consecutive days. The blood pressure measurement is done four times (2 times before and two times after the procedure). Statistical tests using paired-samples t-tests and independent-samples t-tests This research has received approval from the research ethics committee of Universitas Karya Husada Semarang with Ethical Approval Number: 156/KEP/UNKAHA/SLE/II/2023.

3. Results and Discussion

3.1.Results

3.1.1.Characteristics of Respondent

Respondents in the intervention and control groups were mostly male (75% and 80%) with secondary education levels (SMK/SMA/MA) (50% and 40%). The intervention group was dominated by 55–65 years (50%), while the control group was 45–54 years (55%). Most respondents in the intervention and control groups were employed (90% each), and most earned less than Rp. 2,272,626 (25% each). The characteristics of the respondents are summarized in Table 1.

Table 1. Characteristics of respondents (n = 40)

	Intervention		Control	
	F	**%**	**F**	**%**
Gender				
Female	5	25	4	20
Male	15	75	16	80
Age				
45-54 years	8	40	11	55
55-65 years	10	50	7	35
66-74 years	2	10	2	10
Education				
Primary (SD/MI/SMP)	5	25	5	25
Secondary (SMK/SMA/MA)	10	50	8	40
University (D1/D3/S1/S2)	5	25	7	35
Occupation				

	Intervention		Control	
	F	%	F	%
Unemployed	2	10	2	10
Employed	18	90	18	90
Income				
No Income	1	5	2	10
< Rp. 2.272.626,-	5	25	5	25
Rp. 2.272.626,-	4	20	4	20
> Rp. 2.272.626,-	10	50	9	45

Source: Primary Data, 2023

3.1.2. Differences in Average Systolic and Diastolic Blood Pressure Values Before and After Slow Stroke Back Massage (SSBM) Therapy with Lavender Essential Oil in the Intervention Group

Before the intervention, the mean systolic and diastolic blood pressure values were 156.80 mmHg and 145.25 mmHg, respectively. After SSBM therapy with lavender essential oil, the average systolic and diastolic pressure values decreased by 11.55 mmHg and 4.05 mmHg, respectively, to 145.25 mmHg and 98.10 mmHg. The statistical Paired-Samples T-Test results showed a significant difference between systolic and diastolic values before and after SSBM therapy with lavender essential oil in the intervention group (P Value < 0.05), as seen in Table 2.

Table 2. Differences in Average Systolic and Diastolic Blood Pressure Values in the Intervention Group (n=20)

Intervention Group Blood Pressure Value	Mean	Standard Deviation	95% CI		P-Value
			Lower	Upper	
Pre and Post Systolic Test	11.550	6.573	8.474	14.626	0.000
Pre and Post Diastolic Test	4.050	2.373	2.940	5.160	0.000

Source: Primary Data, 2023

3.1.3. Differences in Average Systolic and Diastolic Blood Pressure Values Before and After Slow Stroke Back Massage (SSBM) Therapy with Baby Oil in the Control Group

The average systolic blood pressure value in the control group before SSBM therapy with baby oil was 153.60 mmHg. After therapy, the average blood pressure was 148.3 mmHg. The average diastolic blood pressure value was 97.60 mmHg before and 96.20 mmHg after therapy. The decrease in mean systolic and diastolic blood pressure values in the control group was 5.30 mmHg and 1.40 mmHg, respectively. The statistical Paired-Samples T Test found a significant difference in systolic and diastolic values before and after SSBM therapy with baby oil in the control group (P Value < 0.05), as shown in Table 3.

Table 3. The difference in Average Systolic and Diastolic Blood Pressure Values in the Control Group (n=20)

Control Group Blood Pressure Value	Mean	Standard Deviation	95% CI		P-Value
			Lower	Upper	
Pre and Post Systolic Test	5.300	5.243	2.846	7.754	0.000
Pre and Post Diastolic Test	1.400	1.273	0.804	1.996	0.000

Source: Primary Data, 2023

3.1.4. Differences in Average Systolic and Diastolic Blood Pressure Values in The Intervention Group with the Control Group

The difference in mean systolic blood pressure values in the intervention group and the control group before and after therapy was 11.55 and 5.30, respectively, with a difference in mean systolic values in both groups of 6,250. While the difference in the average diastolic values of the intervention group and the control group was 4.05 and 1.40, respectively, the difference in the average diastolic values of the two groups was 2,650. The results of the independent-sample T-test showed a significant difference in the average systolic and diastolic blood pressure values in the group given SSBM therapy with lavender essential oil compared to the group given only SSBM therapy with baby oil (P-value 0.000 < 0.05), as seen in Table 4.

Table 4. Differences in Averages Systolic and Diastolic Blood Pressure Values in The Intervention and Control Groups (n = 40)

Blood Pressure Value	Group	Mean	Standard Deviation	Mean Difference	P-Value
Systolic	Intervention	11.55	6.573	6.250	0.002
	Control	5.30	5.243		
Diastolic	Intervention	4.05	2.373	2.650	0.000
	Control	1.40	1.273		

Source: Primary Data, 2023

3.2. Discussion

Most of the respondents in this study were male. The high prevalence of hypertension in men is associated with lifestyles at risk of increasing blood pressure, such as smoking and alcohol consumption (Olack et al., 2015; Yu et al., 2020). The results of this study contradict some previous research results where hypertension sufferers are dominated by women (Hussain et al., 2016; Katulanda et al., 2014; Mirahmadizadeh et al., 2022; Peltzer & Pengpid, 2018). The World Health Organization (WHO) estimates that almost 50% of people with hypertension are unaware that they have hypertension (WHO, 2023). Previous research has also shown similar things. Patients with undiagnosed hypertension reach almost 70%, and only 25% of those undergoing treatment have blood pressure that can be controlled (Hussain et al., 2016). Hussain added that men and younger people are at higher risk of suffering from undiagnosed and untreated hypertension. This can cause many cases of hypertension in men that may not be recorded. In addition to the many cases of undiagnosed hypertension in men, the dominance of women in cases of hypertension can also be caused by exposure to estrogen and aging. Estrogen exposure and aging also play a role in the influence of the renin-angiotensin-aldosterone system (RAAS) antihypertensive pathway on blood pressure modulation, which may be critical for the development of hypertension in postmenopausal women (Connelly et al., 2022). Hormonal changes after menopause, such as decreased estrogen and decreased activation of nitric oxide and prostacyclin, cause a decrease in vasodilation ability, resulting in increased blood pressure (Kusumawardani et al., 2020).

The majority of respondents in this study were employed. The complexity of job demands (workload, work deadlines, and work conflicts) makes them vulnerable to work stress. Previous research shows that job stress is associated with hypertension (Adjobimey et al., 2022; Gamage & De Alwis Seneviratne, 2016; Rengganis et al., 2020). Stress causes the adrenal glands to secrete more

cortisol. Long-term stress causes a build-up of cortisol, leading to hypertension. (Bautista et al., 2019) Compared to individuals with normal cortisol levels, individuals with high cortisol levels were at up to 3.23 times higher risk of developing hypertension. Bosu (2015) revealed a high susceptibility to hypertension among individuals with sedentary occupations, such as shopkeepers, bank clerks, and civil servants.

This study found a significant difference between systolic and diastolic values in the intervention group before and after SSBM therapy with lavender essential oil (P Value < 0.05) with decreases of 11.55 mmHg and 4.05 mmHg, respectively. In the control group, although there was a significant difference in systolic and diastolic values before and after SSBM therapy with baby oil (P Value < 0.05), the decrease in systolic and diastolic blood pressure values was not as large as in the intervention group, respectively by 5.30 mmHg for systolic pressure and 1.40 mmHg for diastolic pressure. SSBM performs gentle and light-pressure massages on the back and shoulders. This movement is done gently, rhythmically, and constantly, with approximately 60 movements per minute and 3–10 minutes (Atashi et al., 2014; Ghaderi et al., 2013). Gentle massage improves the parasympathetic response, while low pressure from massage can decrease the sympathetic system response (Babajani-Vafsi et al., 2014).

According to Ranjan & Gulati (2023), when the sympathetic nervous system is activated, there will be an increase in the contraction of heart muscle fibers caused by selective vasoconstriction in peripheral organs. The sympathetic nervous system can respond to nerve impulses from the hypothalamus and activate organs and smooth muscles under its control. One effect of this activation is to increase the speed of the heart. In addition, the sympathetic nervous system also stimulates the adrenal medulla to release epinephrine and norepinephrine into the bloodstream. This stimulation of sympathetic nervous system activation increases peripheral vascular resistance and the volume of blood pumped by the heart, ultimately affecting irregular blood pressure increases. SSBM exerts a relaxing effect on muscles and stimulates parasympathetic nerve activity by increasing the production of the neurotransmitter acetylcholine. This then inhibits sympathetic nerve activity, resulting in systemic vasodilation and decreased contractility of the heart muscle, which causes a decrease in blood pressure (Suwaryo et al., 2022). This study's reduction of systolic and diastolic blood pressure was higher than in previous studies. Mohebbi et al. (2014) found that in the intervention group, there was a decrease in systolic blood pressure by 6.44 mmHg and diastolic by 4.77 mmHg after therapy. In the control group, systolic and diastolic blood pressure reduction was 2.31 mmHg and 1.51 mmHg, respectively.

This study also explained a significant difference in the intervention group's average systolic and diastolic blood pressure values after SSBM therapy with lavender essential oil compared with the control group given SSBM therapy with baby oil (P value < 0.05). The mean difference in systolic and diastolic values between the two groups was 6.25 mmHg and 2.65 mmHg, respectively. SSBM improves blood and lymph node circulation, stimulates nerve responses, and increases parasympathetic nervous system activity (Mobalen et al., 2020). The parasympathetic nervous system secretes acetylcholine, which inhibits the SA node and AV node depolarization caused by sympathetic nervous system activity, thereby secreting the neurotransmitter norepinephrine (Gordan et al., 2015). This leads to systemic vasodilation, decreased contractility, and decreased heart rate, cardiac output, and cup volume, resulting in decreased blood pressure. Massage also has the potential to increase serotonin and endorphins, which can help reduce anxiety, pain, and depression (Cheraghbeigi et al., 2019).

Meanwhile, the content of lavender essential oils such as linalool and linalyl acetate, which are applied to the skin during massage, is more quickly absorbed, resulting in central nervous system depression (Ali et al., 2015; Batiha et al., 2023; Koulivand et al., 2013), affects the olfactory nervous system, affecting the production of serotonin and dopamine, which regulate mood and feelings (Fung et al., 2021). The Lavender essential oil also affects the autonomic and parasympathetic nervous systems, which regulate bodily functions such as blood pressure and heart rate. When stressed and

anxious, the sympathetic nervous system responsible for stimulating the "attack" or "leave" response in our body will become more active (Ranjan & Gulati, 2023). However, as we relax, the parasympathetic nervous system becomes more active, causing a decrease in heart rate and blood pressure and thereby increasing relaxation in the body.

The combination of slow-stroke back massage and aromatherapy can provide patients with a more thorough and enjoyable relaxation experience, lowering blood pressure and providing additional benefits in relieving stress and improving overall well-being. Some previous studies have shown that consistent application of massage therapy and aromatherapy can effectively decrease the presence of cortisol, a hormone associated with stress. In addition, this combination has been shown to increase relaxation response activity, induce muscle relaxation, and enhance the effects of sedation and feelings of euphoria (Jalalodini et al., 2016; Mehrabian et al., 2022; Rafii et al., 2020).

4. Conclusion

The therapy of slow stroke back massage (SSBM) with lavender essential oil had a more significant effect on lowering blood pressure values in primary hypertensive patients compared to SSBM therapy with baby oil (P value < 0.05). The mean difference in systolic blood pressure in the intervention group was 11.55 and 5.30 in the control group. The mean difference in systolic values between the two groups was 6.25. Likewise, the intervention group's average diastolic blood pressure value decreased by 4.05 and the control group by 1.40, with a difference in the average diastolic value between the two groups of 2.65. The results of this study are expected to be a reference source for future researchers in research on non-pharmacological therapy of slow stroke back massage with lavender essential oil in patients with primary hypertension. Hospital management is expected to consider applying this nonpharmacological therapy to handle primary hypertension patients. Researchers are then expected to be able to do blood tests after giving therapy to determine whether the increase in serotonin and dopamine is due to the effects of the therapy that has been given or to other factors.

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