



Jurnal Keperawatan Soedirman

Jurnal terbitan berkala dikelola oleh Jurusan Keperawatan Fakultas Ilmu-Ilmu Kesehatan Universitas Jenderal Soedirman



- ✚ THE EFFECTS OF CORE STABILITY EXERCISE IN IMPROVING BACK MUSCLE STRENGTH, LIMB MUSCLES AND DYNAMIC BALANCE IN THE ELDERLY IN SINGARAJA, INDONESIA
- ✚ THE EFFECTIVENESS OF KATUK LEAF EXTRACT (SAUROPUS ANDROGYNUS) ON BREASTMILK PRODUCTION
- ✚ FACTORS THAT INFLUENCE THE RESILIENCE OF MUHAMMADIYAH MEMBER'S FAMILIES DURING THE COVID-19 PANDEMIC IN SURABAYA, INDONESIA
- ✚ THE EXPERIENCE OF FAMILIES WHO CARE FOR RELATIVES WITH MENTAL DISORDERS POST ARBITRARY COERCION: A QUALITATIVE STUDY
- ✚ MINDFULNESS, SPIRITUALITY, AND QUALITY OF LIFE AMONG CANCER SURVIVORS UNDERGOING CHEMOTHERAPY: THREE-MONTH OBSERVATIONAL STUDIES IN INDONESIA
- ✚ NURSE MANAGERS' PERCEPTION AND PRACTICE STATUS ON THE THEORY OF TECHNOLOGICAL COMPETENCY AS CARING IN NURSING (TCCN) IN A PSYCHIATRIC HOSPITAL: A PRELIMINARY STUDY
- ✚ THE EFFECT OF YOGA ON REDUCING STRESS AND IMPROVING CD4 COUNTS AMONG PEOPLE WITH HIV: A SYSTEMATIC REVIEW AND META-ANALYSIS
- ✚ THE USE OF DOMINANCE, INFLUENCE, STEADINESS, AND COMPLIANCE (DISC) PERSONALITY TEST IN THE ASSESSMENT OF NURSES' PERSONAL CHARACTERISTICS

Jurnal Keperawatan Soedirman
A scientific journal

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or

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Several studies (Jones & Powell, 1993; Peterson, 1995, 1998; Smith, 1990) suggest that ...

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Journal without DOI (DOI not available):

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Hamfi, A. G. (1981). The funny nature of dogs. *E-journal of Applied Psychology*, 2(2), 38 - 48. Retrieved from <http://ojs.lib.swin.edu.au/index.php/fdo>

Conference

Zusfahair, Ningsih, D. R., & Kartika, D. (2015). *The potency of Amylase Producing Bacteria in the Liquid Waste of Tapioca Factory*. Paper presented at the 1st Pharmacy International Conference, Purwokerto, Indonesia.

Online Newspaper:

Becker, E. (2001, August 27). Prairie farmers reap conservation's rewards. *The New York Times*. Retrieved from <http://www.nytimes.com>

Encyclopedia:

Brislin, R. W. (1984). Cross-cultural psychology. In R. J. Corsini (Ed.), *Encyclopedia of psychology* (Vol. 1, pp. 319-327). New York, NY: Wiley.

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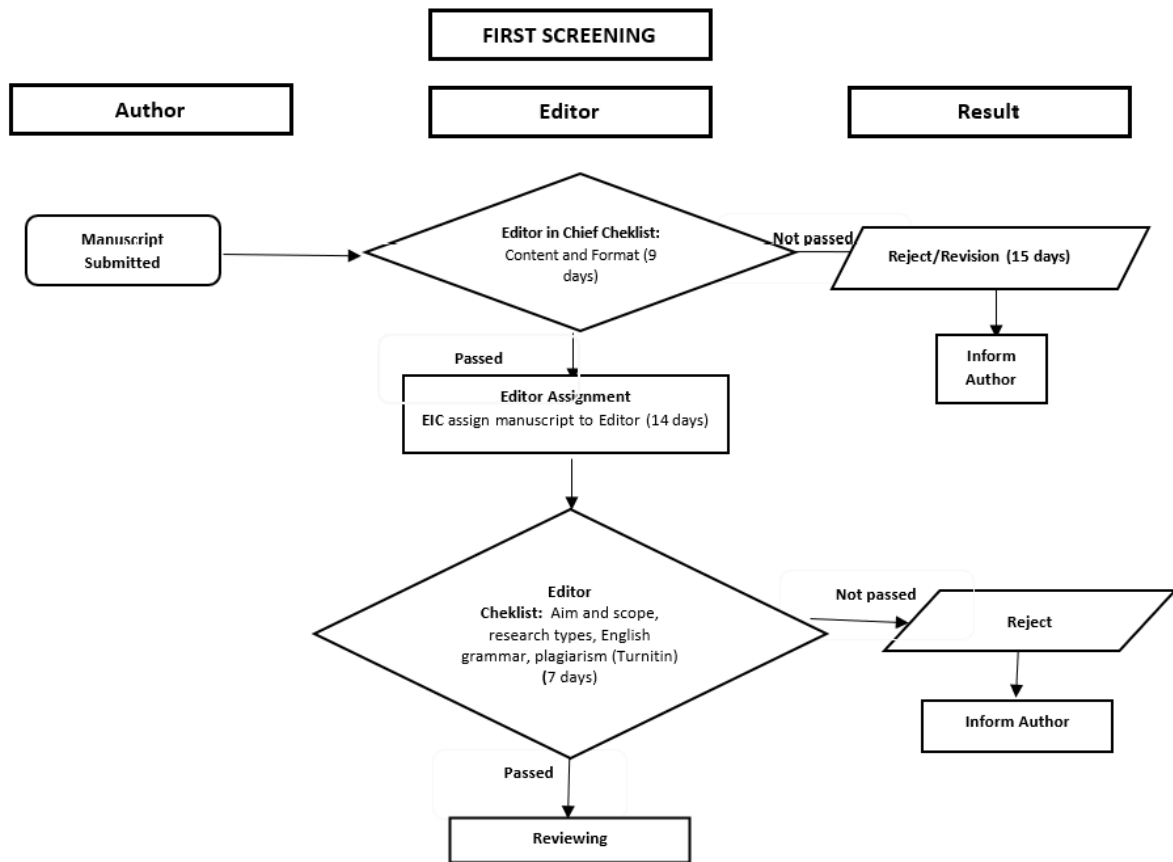
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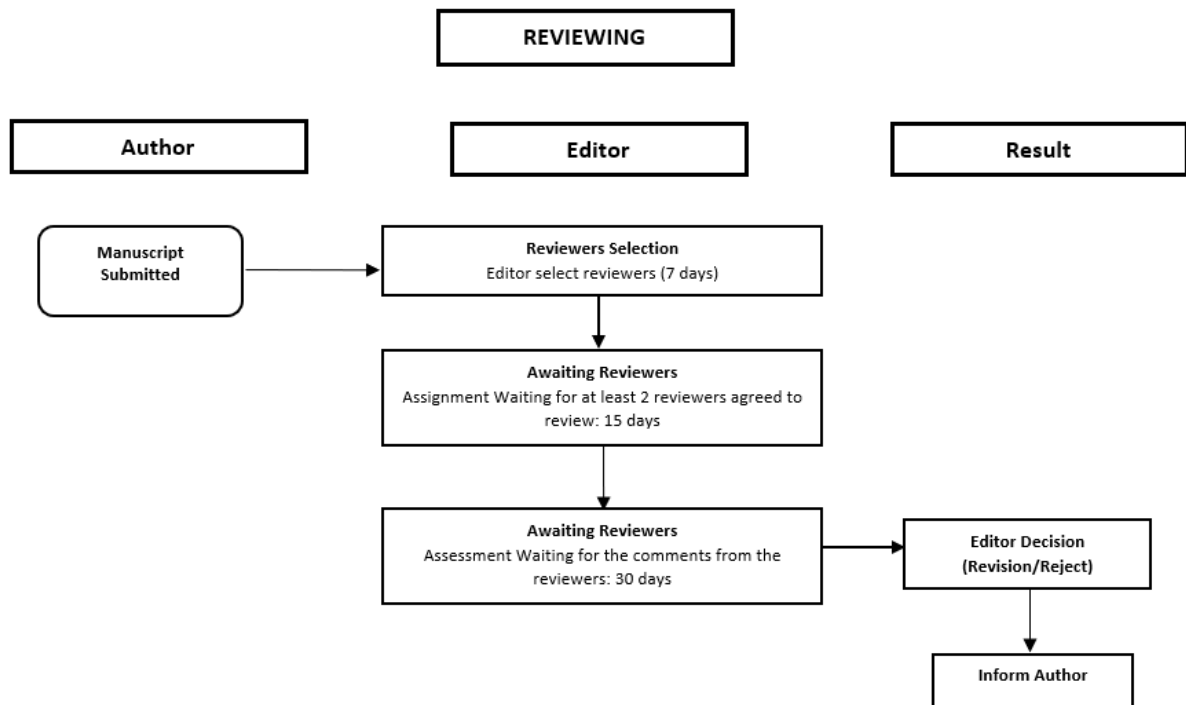
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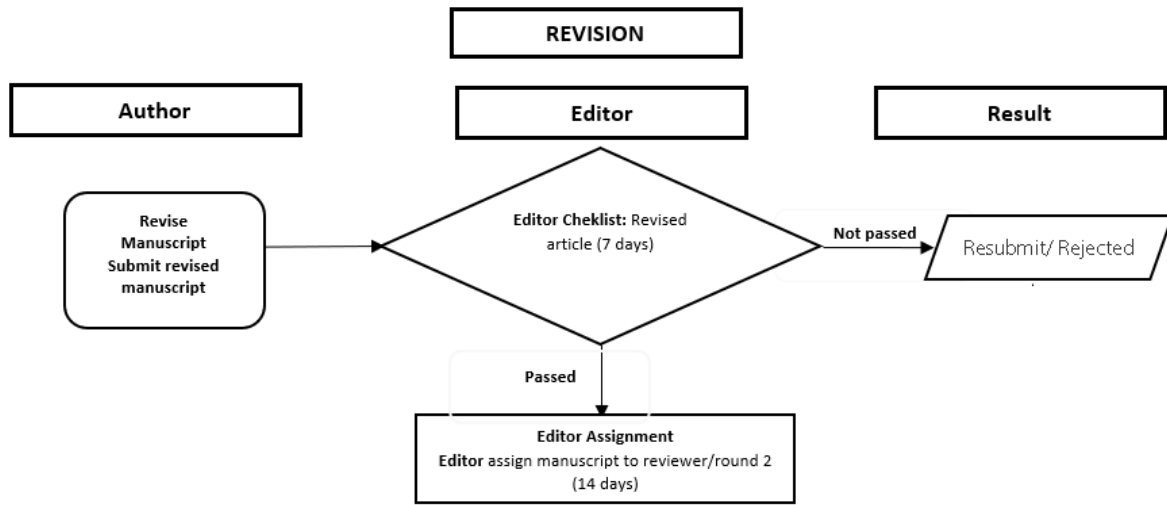
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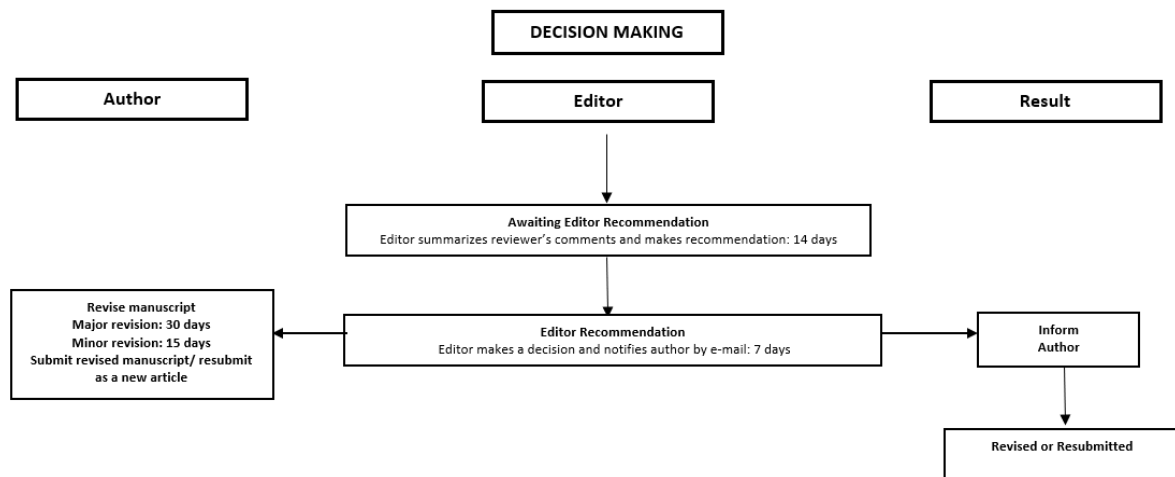
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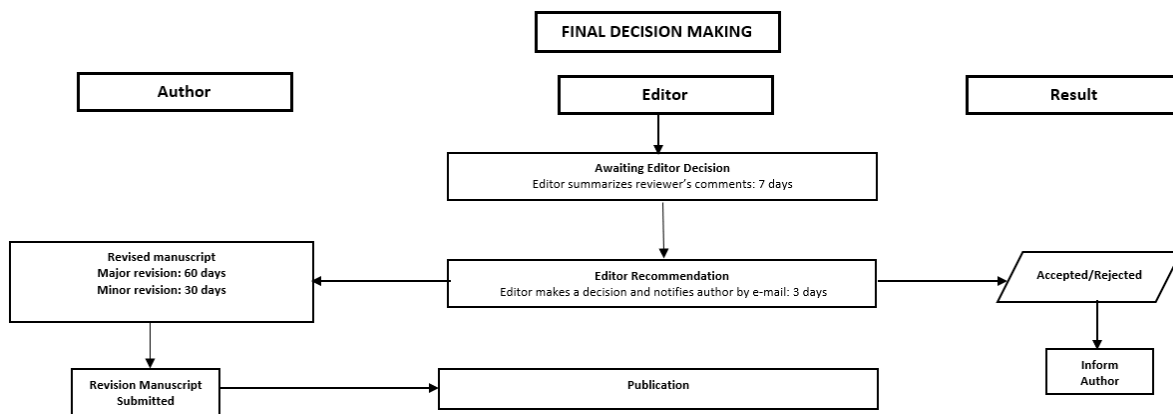
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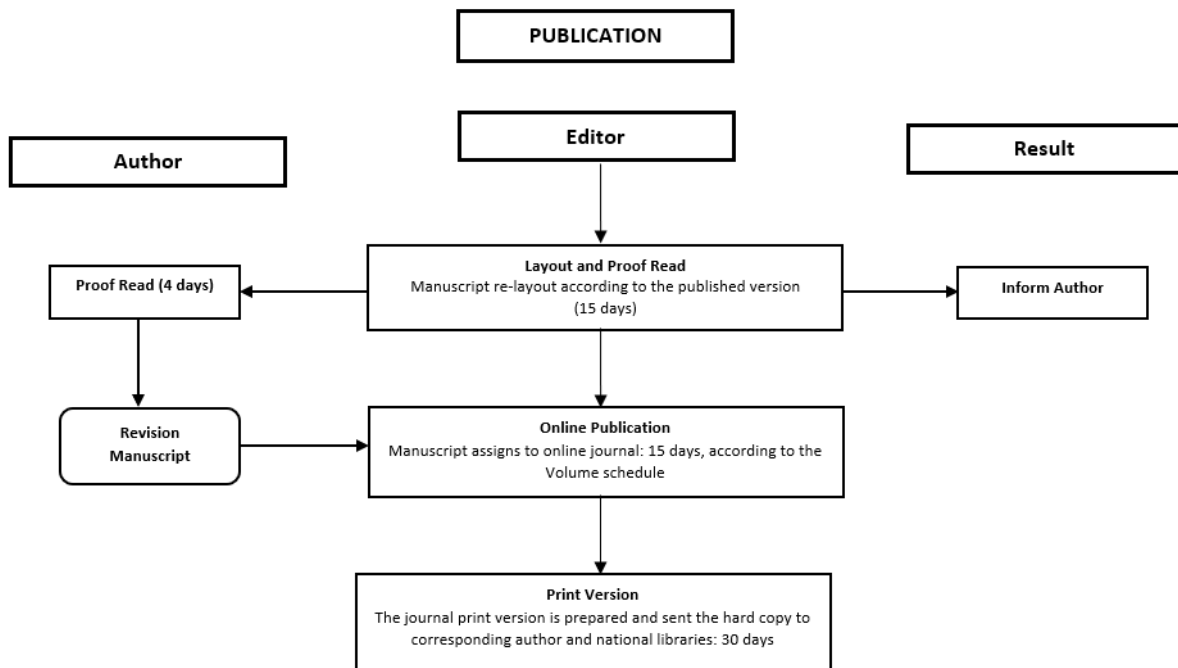
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THE EFFECTS OF CORE STABILITY EXERCISE IN IMPROVING BACK MUSCLE STRENGTH, LIMB MUSCLES AND DYNAMIC BALANCE IN THE ELDERLY IN SINGARAJA, INDONESIA

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ABSTRACT

Balance disorders are a severe problem for the elderly. Exercise that can increase the power of the back muscles, leg muscles and dynamic balance is physical exercise in core stability exercise (CSE). This study aimed to analyse core stability exercise's effect on increasing back muscle strength, leg muscles, and dynamic balance in the elderly. Fifty-six elderly people aged 60-70 years were selected by simple random sampling as the sample in this study. The exercise program was given CSE (n: 28) for four weeks as the intervention group. The back and leg muscle strength were measured using the Back-leg dynamometer and balance measurement using the Time Up Go Test (TUGT). *T-test* and *Mann-Whitney* analyses were used to compare the results before and after the intervention. The different tests between the intervention and the control group obtained a p-value of 0.001, meaning an effect of CSE to increase the strength of the back muscles, leg muscles, and dynamic balance in the elderly existed. This study proved that CSE effectively increased back muscle strength, leg muscles and dynamic balance in the elderly. It is suggested to analyze the effectiveness of CSE based on the characteristics of the respondents.

Keywords: *Balance; core stability exercise; elderly; muscle strength*



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INTRODUCTION

Balance disorders are a severe problem for the elderly (Dhargave, Sendhilkumar, and James 2020; Kruschke and Butcher 2017; Qi et al. 2018). One of the causes of balance disorders is a decrease in the strength of the core muscles in the back and legs (Jamini and Lousiana, 2018; Murlasits and Reed, 2020; Nicholson et al., 2019). Good muscle strength training will increase the power of the core muscles, affecting dynamic balance (Amarya, Singh, and Sabharwal 2018; Murlasits and Reed 2020). Core stability exercise is a core muscle exercise that focuses on the ability to control body position and movement through the core muscles of the back, abdomen, pelvis and legs to optimize flexion and extension movements and muscle elasticity (Arnold et al. 2015; Cabanas-Valdés et al. 2016).

Core stability is a strength exercise that utilizes maximum muscle tension in the muscles by using three types of muscle training classifications: isokinetic, isometric and isotonic (Akhtar, Karimi, and Gilani 2017; Aly, ElMohsen, and Hafez 2017; Cabanas-Valdés et al. 2017; Clifford et al. 2019; Coudeyre et al. 2016; Kakade and Kanase 2020). An increase in the activation of core stability will increase the strength and endurance of the back and leg muscles that work synergistically to maintain balance in the elderly (Kanik et al., 2017). Some older adults carry out challenging core stability exercises (Haruyama, Kawakami, and Otsuka 2017; Kakade and Kanase 2020). Therefore, the researchers made some adjustments by classifying it into several difficulty levels, making it easier to achieve the training goals, maximize the beneficial effects and practice compliance.

Compared with other muscle strengthening exercises, core stability exercise does not use weight, so it is safer to apply to the elderly. This exercise focuses on training maximum pressure on the core muscles to increase muscle strength (Akhtar et al., 2017). An increased risk of falling due to balance disorders due to decreased back and leg muscle strength is a major problem in the elderly. In this study, the researchers investigated the effect of core stability exercise on increasing back muscle strength, leg muscles and elderly dynamic balance.

METHOD

Study design

This research is quasi-experimental with pre and post with control group design. Respondents received baseline measurements and were followed up for four weeks to obtain the short-term effect of core stability exercise and then re-measured as a post-test. All respondents sent back their written informed consent.

Respondents

Researchers used simple random sampling to recruit 56 respondents at the Main Clinic Cortex Singaraja, as shown in Figure 1. The number of samples in this study was determined using a calculation formula against the average of two independent populations (Sastroasmoro and Ismael 2014) using the study's mean and standard deviation (Chen et al. 2020). Researchers also consider the number of samples with the possibility of dropout in specific subjects. The researchers randomized the sample using a web-based lottery application <https://wheelofnames.com/id/>. Respondents whose names came out on odd numbers will include in the intervention group (n=28), and respondents whose names came out on even numbers in the control group (n=28). All respondents involved were in the medical rehabilitation program at the clinic. Respondents in the intervention group follow the core stability exercise program twice weekly for 30 minutes (5 minutes warm-up, 20 minutes exercise, and 5 minutes cool down) for four weeks. Respondents in the control group did not get core stability exercise and dropped out during the study for the reasons listed in Figure 1. The intervention and control groups give A post-intervention for evaluation of the program.

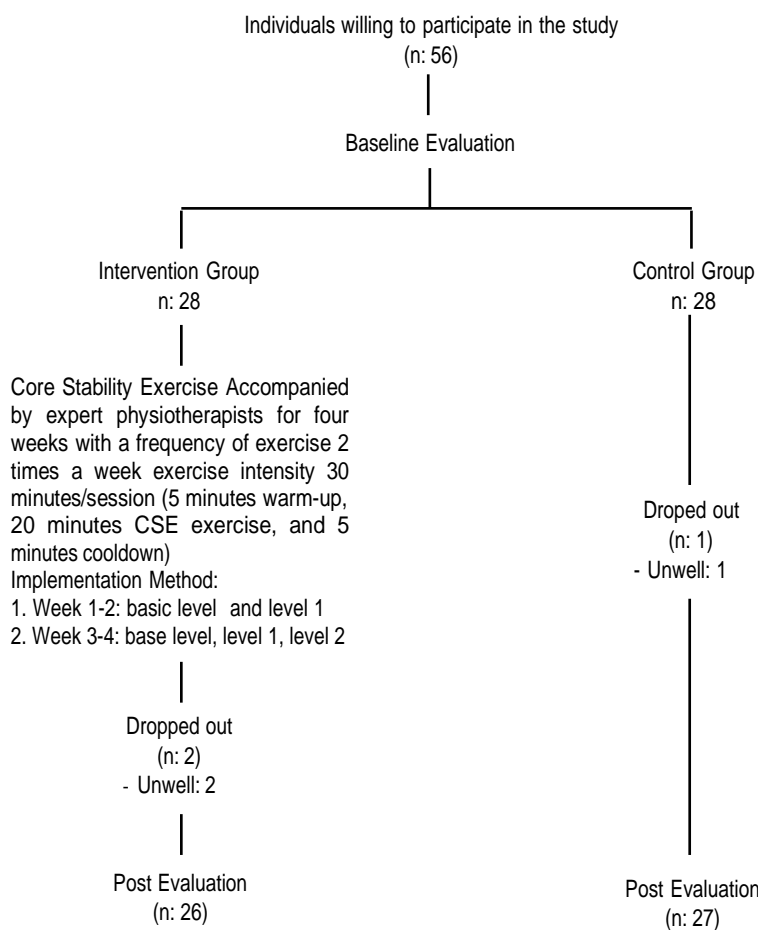


Figure 1. Flowchart explaining assignment of the participant to the study and control group

Inclusion criteria

The inclusion criteria in this study included: (a) having aged 60-70 years old; (b) being able to understand and follow simple verbal instructions to perform the exercises; (c) not having balance disorders; (d) being able to operate independently; (e) having good posture; (f) do not have spinal abnormalities; (g) being able to stand up from a chair

independently. The researchers conducted the evaluation, and a certified physical therapist accompanied the process.

Exclusion criteria

Exclusion criteria in this study included: (a) having osteoarthritis/severe arthritis; (b) experiencing mental disorders; (c) having orthopaedic or cardiovascular disorders

that impair ambulation and ability to stand; (d) having a significant stroke; (e) having a disability/disability; (f) having a visual impairment.

Core stability exercise group

Researchers used a back-leg dynamometer to measure the strength of the back muscles in the intervention group. The time up and test (TUGT) measured leg muscles and dynamic balance. Furthermore, the intervention group was given a core stability exercise program two times in 1 week with a duration of 5 minutes of warm-up, 20 minutes of exercise and 5 minutes of cooling for four weeks. This study summarized the movement of core stability exercise in an exercise module and video. The researchers adjusted the core stability exercise so that the around 60-75 years old range can do it. The core stability exercise movement is adjusted based on the level of difficulty, divided into several training levels: base level, level one and level two. The base level is a fundamental movement technique for core stability exercises so respondents can maintain the spine position in a neutral position. Levels one and two are adjustments to the types of movements core stability exercise.

The control group

Participants in the control group first took initial back and leg muscle strength measurements using a back-leg dynamometer and dynamic balance measurements using the time up and go-test (TUGT). After the initial measurements, the researchers did not give the control group an exercise program and performed the final assessment four weeks later. Respondents who did not attend the last measure from the study were excluded (Figure 1).

Outcome measurements

The main results of this study were back muscle strength, leg muscle strength and dynamic balance. The researchers used a Back-leg dynamometer (Micro FET@3, Hoggan Health Industries) and the time up and go-test to measure the strength and emotional balance of the back and leg muscles. The researcher and a certified physical therapist measured the strength dan balance of the back and leg muscles at baseline and four weeks after the intervention. A measure of back muscle strength and leg muscles have different measurement methods. Therefore, this measurement procedure had been defined at the beginning. To obtain good data, the researchers measured each respondent twice, the most considerable value to input because of the measurement. The time up and go-test (TUGT) is a simple measurement that assesses a person's mobility and requires static and dynamic balance. This test measured the time it takes for the respondent to stand up from a chair, walk 3

meters forward at a comfortable pace, turn back into the chair and sit back in it. Three repetitions aimed to get the best results when measuring. Therefore, the researchers gave a lag time of approximately 1 minute for each repetition and analyzed the best results.

Data analysis

This study used paired t-test to compare the measurement results before and after treatment in each group and an independent sample T-test to see the difference between the initial and final measurements of the back-leg dynamometer and the time up and go-test (TUGT) in the intervention and control groups. This study used Statistical Product and Service Solution (SPSS) version 25 to analyze the outcome.

Ethics consideration

Stikes Buleleng approved this research with ethical clearance number: 087/EC-KEPK-SB/XI/2021, dated November 11th, 2021.

RESULTS

Demographic characteristics of participants in the two groups

The sample size was determined using a hypothesis sample calculation formula for the mean of two independent populations (Sastroasmoro and Ismael 2014) based on the study results (Penn et al. 2019). From the formula calculation, the researchers obtained 50 respondents. Sample size correction is needed to anticipate the possibility of Drop Out (DO) in selected subjects because they do not comply with the research program. The sample size is corrected by adding several respondents to fulfil the sample size (Sastroasmoro and Ismael 2014). The total number of respondents included in the study was 56 respondents. Figure 1 presents a flowchart.

The intervention group completed 8 exercise sessions (30 minutes each) conducted twice in 1 week for four weeks. A certified physical therapist administers the exercise program. In the control group, there was no intervention, but they were still following the medical exercise therapy program at the clinic. A total of 3 respondents dropped out due to illness, two respondents in the intervention group and one respondent in the control group. Finally, as many as 53 respondents underwent a post-intervention evaluation. The demographic characteristics of the respondents who completed the study are presented in Table 1. The homogeneity test results found no difference between the control and intervention groups based on the characteristics of the respondents.

Table 1. Demographic characteristics of participants

Characteristics	Intervention (n: 26) n (%)	Control (n: 27) n (%)	p*
Age			
60-65	17(65,4)	9(33,3)	0,127 ^b
66-70	5(19,2)	15(55,6)	
71-75	4 (15,4)	3(11,1)	
Sex			
Male	14(53,8)	13(48,1)	0,678 ^a
Female	12(46,2)	14(51,9)	
Occupation			
Unemployed	5(19,2)	2(7,4)	0,286 ^a
Farmer	1(3,8)	2(7,4)	
Trader	5(19,2)	7(25,9)	
Entrepreneur	3(11,5)	8(29,6)	
Retired	12(46,2)	8(29,6)	

Table 1. Demographic characteristics of participants (Continue)

Characteristics	Intervention (n: 26) n (%)	Control (n: 27) n (%)	p*
Education			
Elementary school	2(7,7)	2(7,4)	0,917 ^a
Junior high school	4(15,4)	5(18,5)	
Senior high school	7(26,9)	9(33,3)	
University	13(50)	11(40,7)	

*p <0,05 based on chi square^a, independent t test^b

Differences in back muscle strength, leg muscles and dynamic balance of respondents in the intervention group

Table 2 presents the differences in the variable of back muscle strength, leg muscle strength and dynamic balance

before and after being given core stability exercise in the intervention group. The analysis obtained p-values on the three variables (0.001) <0.05, meaning a significant difference in the mean change between before and after in the intervention group with a 95% confidence level.

Table 2. Differences in the results of pre-test and post-test in the intervention group

Research variable	Before Intervention (n: 26)		After Intervention (n: 26)		P*
	Min-Max	Mean±SD	Min-Max	Mean±SD	
Back Muscle Strength (Kg)	39,6-48,3	44,50±2,65	45,4-54,8	50,05±2,60	0,001
Limb Muscle Strength (Kg)	52,2-61,3	56,43±2,62	53,3-64,7	60,11±3,04	0,001
Dynamic balance (seconds)	11,87-16,47	13,97±1,32	10,57-14,76	12,62±1,34	0,001

*p<0.05 based on dependent T-test

Differences in back muscle strength, leg muscles and dynamic balance of respondents in the control group

Table 3 presents the differences in the measurements of back muscle strength, leg muscles and dynamic balance at the initial size and measurement after the fourth week. The

analysis showed a significant difference between before and after the intervention with a p-value (0.001) <0.05. Habits of activity, exercise and work can cause a reasonably significant bias because there are no restrictions on activities for the respondents of this study.

Table 3. Differences in the results of pre-test and post-test in the control group

Research variable	Before Intervention (n: 27)		After Intervention (n: 27)		P*
	Min-Max	Mean±SD	Min-Max	Mean±SD	
Back Muscle Strength (Kg)	39,3-48,3	43,78±2,50	41,9-52,5	45,62±2,52	0,001
Limb Muscle Strength (Kg)	52,8-62,8	57,065±2,87	53,7-63,3	57,59±2,57	0,001
Dynamic balance (seconds)	12,89-16,96	14,61±1,13	12,41-16,48	14,19±1,05	0,001

*p<0.05 based on dependent t-test

Effect of core stability exercise to improve back muscle strength, leg muscles and dynamic balance

The results for the correlation test in each group showed a significant change in the intervention group and the control

group, so for further analysis, the researchers analyzed the value of delta (Δ) on each variable. Table 4 shows significant results on the variables of back muscle strength, leg muscle strength and dynamic balance p-value 0.001 (p<0.05).

Table 4. Differences resulted in the intervention group and the control group after the intervention

Research variable	Intervention Group (n: 27)		Control Group (n: 27)		P*
	Min-Max	Mean±SD	Min-Max	Mean±SD	
Value of delta (Δ) Back Muscle Strength (Kg)	3,40-7,90	5,55±1,20	-1,40-5,40	1,84±1,39	0,001 ^a
Value of delta (Δ) Limb Muscle Strength (Kg)	0,50-6,90	3,67±2,042	-1,80-2,20	0,52±0,98	0,001 ^b
Value of delta (Δ) Dynamic balance (seconds)	-2,50-(-0,20)	12,62±1,34	-1,86-0,57	-0,49±0,68	0,001 ^b

*p<0.05 based on independent t-test^a, Mann Whitney^b

DISCUSSION

Core stability exercise is the ability to control movement, position and pressure through the torso, pelvis, and lower extremities. These exercises focused on improving body balance to allow optimal force production and transfer and control forces in an integrated kinetic chain from the torso, hips to knees to the lower extremities. Increasing the activation level of core stability will result in good balance and improvements in postural function (Haruyama et al., 2017). Giving core stability exercises will increase flexibility and strength in the limbs from the back to the lower extremities to

improve balance and increase the range of motion in the extremities, especially in the legs. Core stability exercise helps increase back and leg muscle strength, affecting balance and reducing the risk of falling in the elderly (Kim and Yim 2020; Pristanto and Farid 2018).

One previous study focused on the beneficial effect of providing core stability exercise on back muscle strength and leg muscles in the elderly (Jamini and Lousiana 2018). Meanwhile, other studies have reported the development of core stability exercises on dynamic balance in the elderly (Arnold et al., 2015; Cabanas-Valdés et al., 2016, 2017; Dello

lacono, Padulo, and Ayalon, 2016). Thus, different results have been reported regarding core stability exercise movements, benefits, duration of the training and other assessment methods.

In this study, core stability exercise for four weeks compared to the control group increased back muscle strength, leg muscles and dynamic balance in the elderly. The researchers also found a significant improvement in the control group. These results may indicate one of the following. (a) no restrictions on the respondent's activities during the research; (b) exercise and work habits; (c) medical rehabilitation therapy which all respondents still accept. In this study, respondents in the intervention group often forgot to position their spine neutral. This condition can reduce the maximum tension in the core muscles so that the beneficial effect on core stability training is not fully obtained. Therefore, elderly participants may need some considerations to develop a core stability exercise program for them (Abdurachman et al., 2017; Coudeyre et al., 2016).

This study showed that the beneficial effect of the core stability exercise program was superior to that of the control group. Respondents in the control group were asked to do 10-15 repetitions of each movement in each training session. The repetition of each movement allows the respondent to perform the action well and feel the beneficial effects of a series of exercises (Martha and Djoar 2020). The core stability exercise is determined and tested on the elderly with an age range of 60-75 years, divided into several levels of movement. The training program is designed to be progressive and challenging. Respondents were given basic exercises level 1 in weeks 1 and 2 and a complete schedule (base level, level 1 and 2) at weeks 3 and 4. The previous study has not reported this exercise method. Therefore, the superior results observed in the intervention group may be due to the adjusted movements, graded intensity, and complexity modes of practice.

The results agreed with other studies that reported significant improvements in back muscle strength, leg muscles and balance. However, these results contradict those reported in the survey conducted by Woo et al. (Jamini and Louisiana 2018), suggesting that Tai-Chi training alone is insufficient to improve balance. This difference may be due to the intensity and duration of the core stability training program and the fact that muscle strength affects balance. Most previous studies reported that the elderly must exercise frequently and for relatively long periods, usually from 8 to 48 weeks, to benefit from various types of exercise, including core stability exercise (Arnold et al., 2015; Panchal et al., 2017; Toprak Çelenay and Özer Kaya, 2017). This study proved that short-term core stability exercise could increase back muscle strength, leg muscles and dynamic balance. If the elderly are given the practice with an intensity and complexity that suits them, they can perform a sequence of movements designed to improve muscle strength and balance.

The main limitation of this study is its quasi-experimental design. The researchers did not limit all respondents' activity and acceptance of medical rehabilitation therapy to control the risk of bias. The analysis was limited to determining the effect of core stability exercise on increasing the back muscles, leg muscles and dynamic balance. Hence, further researchers can analyze the impact of back muscle strength and leg muscles on improving dynamic balance in the elderly. In addition, an analysis to increase muscle strength and dynamic balance on the characteristics of the respondents also needs to be done.

CONCLUSION AND RECOMMENDATION

This study proved that core stability exercise for four weeks effectively increased back muscle strength, leg muscles and dynamic balance in the elderly compared to controls. Core stability exercises can be performed at home to maintain and improve back muscle strength, leg muscle strength, and dynamic balance.

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THE EFFECTIVENESS OF KATUK LEAF EXTRACT (*SAUROPUS ANDROGYNUS*) ON BREASTMILK PRODUCTION

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ABSTRACT

The *katuk* leaf (*Sauropus androgynus*) is believed by many Indonesian people as a traditional food that can increase breastmilk production. This leaf is rich in vitamin K, pro-vitamin A (beta-carotene), B, C, and calcium. This study investigated the effectiveness of *katuk* leaf extract on breastmilk production in experimental rabbits. The phytochemical and extraction process of the *katuk* leaves was conducted in the laboratory, USK. The experimental samples were divided into three groups: six rabbits in the control group, six in the 15 mg dose group, and six in the 30 mg dose group. An evaluation was performed by measuring the rabbit's breastmilk on days 1, 7, and 14. The ANOVA test on the results showed a p-value of 0.001 for the three groups. There was a difference in the amount of breastmilk produced between the groups, 0.04 (0.002-0.084) on the 1st day, 0.05 (0.020-0.090) on the 7th day, and 0.12 (0.065-0.175) on the 14th day. Further research can focus on investigating the *katuk* leaf extract in the clinical trial stage for its suitability in humans.

Keywords: *Breastmilk; katuk leaf extract (sauropus androgynus); milk production*



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INTRODUCTION

Breastmilk is a nutrient source that is loaded with various bioactive factors. It is needed for the optimal growth and development of babies. Infants can easily absorb and metabolize breast milk. Breastmilk can help form the infants' intestinal microbiome (Cacho & Lawrence, 2017).

The *katuk* leaf (*Sauropus androgynus*) is commonly used by breastfeeding Indonesian women to increase their breastmilk supply (Soka et al., 2010). The lactation process is stimulated by increased levels of prolactin and oxytocin hormones (H. Hayati et al., 2010). *Katuk* leaf contains almost 7% protein and up to 19% crude fiber. The leaf is rich in vitamin K, pro-vitamin A (beta-carotene), vitamin B, and vitamin C. The minerals contained are calcium (up to 2.8%), iron, potassium, phosphorus, and magnesium. The leaves are dark green due to their high chlorophyll content. *Katuk* leaves can be processed like kale or spinach. However, *katuk* leaves contain papaverine, which is an alkaloid that is also found in opium. Therefore, excessive consumption can cause side effects such as papaverine poisoning (Khoora et al., 2015).

The leaf is used in traditional medicine to treat a variety of illnesses. Additionally, it assists in weight loss and is often served as a vegetable side dish during meals. The *katuk* leaf has adequate macronutrient content, and many useful micronutrients are present. These micronutrients include minerals, carotenoids, antioxidant vitamins, and phenolic compounds. The majority of the necessary minerals, including sodium, potassium, calcium, phosphorus, iron, magnesium, copper, zinc, manganese, and cobalt, are also present in the leaf.

Katuk leaves in the Aceh Besar are known to have good durability, this is because the air temperature and weather in Aceh Besar are extreme. For that reason, it is predicted to increase breastmilk production.

Fresh *katuk* leaves typically have a moisture content of 70-90%, 3-8% protein, 1-4% fat, 1-2% fiber, and roughly 2% ash. Carbohydrates make up the remaining portion of the leaf. The types and concentrations of phenolic compounds,

carotenoids, antioxidant vitamins, and minerals are discussed in this paper.

Carotenoids from *katuk* leaf extract are a source of vitamin A. Fatty acids and vitamin A, which produce retinol, interact to cause prolactin release (H. Hayati et al., 2010). When prolactin is present, the intralobular ducts' secretory glands will grow. Mammary glands can also be prepared for breastfeeding by increasing the activity of lipid-secreting and unilocular fat-containing glands (Marwah et al., 2010).

In Indonesia, it has been strongly believed for decades that the *katuk* leaf can increase breastmilk supply. Therefore, this study investigated the phytochemical content of *katuk* leaf extract and analyzed the ethanolic extract of *katuk* leaf extract on breastmilk production in experimental animals (rabbits).

METHOD

Sample

This research was conducted in three laboratories. The extraction was done at the Pharmacology Laboratory, Faculty of Veterinary Medicine, Syiah Kuala University. *Katuk* leaf extracts were administered to experimental animals at the Experimental Animal Laboratory of Syiah Kuala University. The phytochemical process was conducted at the Research Laboratory of the Chemistry Department, Faculty of Mathematics and Natural Sciences, Syiah Kuala University.

This research was conducted from April to November 2021 on 18 female rabbits aged 4-5 months and weighing approximately 2500-3000 grams. The healthy condition of the rabbits was characterized by their active movements and not being disabled. The rabbits were kept for three months from pregnancy to birth. They were given carrots, kale, and other green vegetables every day and kept in special cages that two breeders cleaned. When the rabbits gave birth, their children remained in the same cage as them, and the researchers monitored the amount of milk the rabbits produced daily.

The extracts of young *katuk* leaves that have passed the selection process were used in this study. The leaves were taken from plants in the Indrapuri, Samahani, and Seulimum regions of the Greater Aceh District, Aceh Province, Indonesia. This is a rural area not far from the foot of the Seulawah Mountains. The topography of the Greater Aceh District consists primarily of lowland hills and a coastline between 0-1500 mdpl on the earth meridian between 5.20-5.80 north latitude and 95.00-95.80 on the equator with high rainfall and air temperatures ranging from 21°C-33°C. These conditions allow *katuk* plants to thrive and have good quality.

Instrument

The *Katuk* leaves were washed using running water and drained. After that, the dry sample was put into a drying oven and left for two days to remove the sample's water content. Next, the sample was blended into a powder, weighed, then placed into a maceration vessel soaked with 6000 mL of 96% ethanol. The maceration vessel was then closed and stored for five days away from sunlight and stirred occasionally. Furthermore, the immersion was filtered, and the macerate was evaporated using a rotary evaporator. The extraction results were then evaporated with a vacuum rotary evaporator at a temperature of 50°C-60°C until a thick extract was obtained.

Intervention

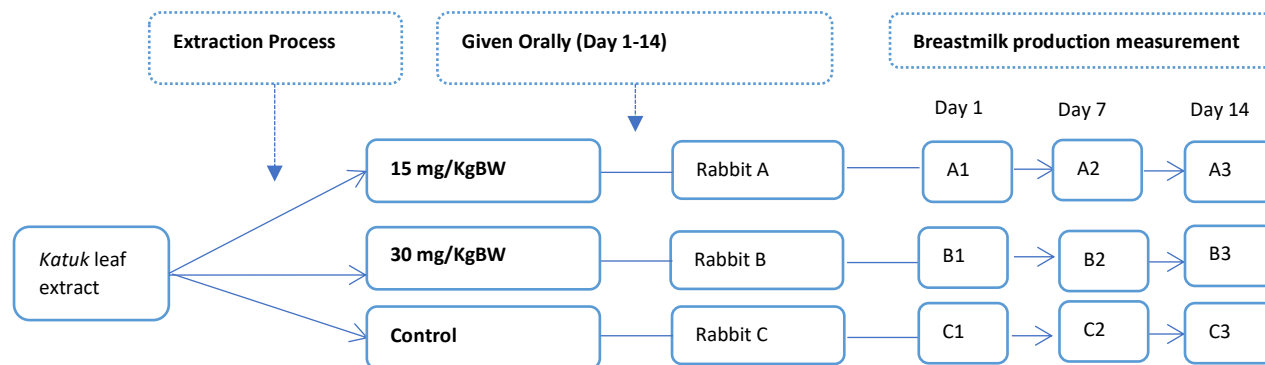
In this study, the 90% ethanol extract of *katuk* leaves underwent phytochemical screening. It was performed to provide an overview of the class of compounds contained in the plant under study. The material used for phytochemical screening was the content of alkaloid metabolites with Mayer, Wagner, and Dragendorff reagents, steroids with Liebermann-Buchard test reagents, Liebermann-Buchard test reagent terpenoids, Shaking reagent saponins, Flavonoid reagent CL, Metal Mg, Phenolic reagent FeCl₃, and Tannins with Gelatin + H₂SO₄ reagent.

Data collection

The extract was tested on female rabbits that had just given birth (breastfeeding) by oral administration from day 1 to day 14 with the following steps: The *Katuk* leaf extract was measured per the rabbit's body weight in the intervention group at a dose of 15 mg/KgBW and 30 mg/KgBW. The dose used in this study refers to previous research conducted by Susilowati (2014). Then, the *katuk* leaf extract with the appropriate dose was inserted into a 3cc syringe once a day at 10 a.m. and put into the rabbit's mouth from day 1 to day 14. The amount of milk the rabbits expressed and produced was measured three times: on days 1, 7, and 14 at 5 p.m. (Scheme 1).

Data analysis

The Generalized Linear Analysis Model (Repeated ANOVA Post-hoc Bonferroni Test) was used to process the results of giving *katuk* leaf extract to three groups (two intervention groups and one control group). The same approach was applied to measure the differences in breastmilk amount between the control group and the intervention group at a dose of 15mg/KgBW, the control group with an intervention group at a dose of 30mg/KgBW, and the differences in breastmilk amount in the intervention group at a dose of 15mg/KgBW and the intervention group at a dose of 30mg/KgBW.



Scheme 1. Research design (treatment on experimental animals)

Ethical consideration

The research activity received the Ethical Clearance for Using Animals ethical permit from the Faculty of Veterinary Medicine, Universitas Syiah Kuala, with the number: 106/KEPH/V/2021.

RESULTS

Table 1 exhibits the results of the phytochemical tests on *katuk* leaf extract in experimental animals conducted at the Research Laboratory of the Chemistry Department, Faculty of Mathematics and Natural Sciences, Syiah Kuala University.

Table 1. Phytochemical test results

Metabolic Content	Reagent	Test results	Observation result
Alkaloid	Mayer	+	A white precipitate was formed
	Wagner	+	A brown precipitate was formed
	Dragendorff	+	A red precipitate was formed
Steroid	Liebermann-Burchard test	-	No green color formed
Terpenoid	Liebermann-Burchard test	+	A red color formed
Saponin	Shuffling	-	Did not foam
Flavonoid	HCl and Mg metal	+	Changed to red
Phenolic	FeCl ₃	+	Changed to green
Tannin	Gelatin + H ₂ SO ₄	+	A white precipitate was formed

Note: Description (+) indicated a positive result and (-) indicated a negative result

The amount of breastmilk produced by rabbits over 14 days after giving birth was measured on days 1, 7, and 14. The amount of extract administered followed the set dose per group. Table 2 exhibits the difference in the amount of rabbit breastmilk in the control group, the intervention group at a dose of 15 mg/kg, and the intervention group at 30 mg/kg.

The Generalized Linear Model (Repeated ANOVA Post-hoc Bonferroni Test) test results show that the *p*-value for the analysis of the breastmilk amount in the three groups was 0.001. Thus, there were differences in the amount of breastmilk produced between groups in all measurements (Table 2).

Table 2. Results of differences in the amount of breastmilk in the control group, the intervention group with a dose of 15 mg/kg BW, and the intervention group with a dose of 30 mg/kgBW

Breastmilk (ml)	Control group (n = 6) Mean (SD)	Dose of 15 mg/kg BW (n = 6) Mean (SD)	Dose of 30 mg/kg BW (n = 6) Mean (SD)	<i>p</i> -value
Day 1	0.04 (0.03)	0.08 (0.03)	-	0.040
Day 7	0.07 (0.03)	0.13 (0.02)	-	0.005
Day 14	0.09 (0.04)	0.21 (0.04)	-	0.001
Day 1	0.04 (0.03)	-	0.06 (0.04)	0.277
Day 7	0.07 (0.03)	-	0.15 (0.03)	0.001
Day 14	0.09 (0.04)	-	0.27 (0.06)	0.001
Day 1	-	0.08 (0.03)	0.06 (0.04)	0.293
Day 7	-	0.13 (0.02)	0.15 (0.03)	0.284
Day 14	-	0.21 (0.04)	0.27 (0.06)	0.064
Day 1	0.04 (0.03)	0.08 (0.03)	0.06 (0.04)	
Day 7	0.07 (0.03)	0.13 (0.02)	0.15 (0.03)	0.001
Day 14	0.09 (0.04)	0.21 (0.04)	0.27 (0.06)	

Primary data source 2021

The results were analyzed using the Generalized Linear Model (Repeated ANOVA Post-hoc Bonferroni Test). The test found that the *p*-value for the amount of breastmilk in the control group and the group where 15 mg of *katuk* leaf extract was administered was *p* < 0.05. The confidence interval value of the mean difference of each measurement also did not exceed the number zero. Thus, there was a difference in the amount of breastmilk produced between the groups on days 1, 7, and 14 (Table 2).

Next, the Generalized Linear Model (Repeated ANOVA Post-hoc Bonferroni Test) showed that the *p*-value of the breastmilk amount in the control group and the group given 30mg/KgBW of the *katuk* leaf extract on the 1st day of breastfeeding measurement were *p* > 0.05. The confidence interval value of the difference in the mean exceeded zero. Thus, there was no difference in the amount of breastmilk between groups on day 1. Meanwhile, on days 7 and 14, there was a difference in the amount of breastmilk in the

control group and the intervention group that was administered 30 mg/Kg BW of the *katuk* leaf extract with a *p*-value of <0.05. The confidence interval value of the mean difference also did not exceed zero (Table 2).

Furthermore, the Generalized Linear Model (Repeated ANOVA Post-hoc Bonferroni Test) found that the *p*-value for the breastmilk amount in the intervention groups given 15mg/KgBW and 30mg/KgBW was *p* > 0.05. The confidence interval value of the mean difference also exceeded zero. Thus, there was no difference in the amount of breastmilk produced between the intervention groups with two different doses on days 1, 7, and 14 (Table 2).

DISCUSSION

This study's result indicates that there are significant differences in the amount of breastmilk production in rabbits before and after they were administered the *katuk* leaf extract (*Sauropus androgynus*). It was proven that the intervention

group given *Sauropus androgynus* (SA) extract produced more breastmilk than the control group. This finding is supported by a study conducted by Awaludin et al. (2020), which also proved that SA plants were used to increase milk production for lactating mammals because of their high sterol content. Phytosterols are plant sterols that improve progesterone synthesis and secretion and estradiol hormones. They are involved in controlling the reproduction process and the growth of mammary glands (Thambirajah et al., 2022). Another study conducted by Akbar et al. (2013) also found that the supplementation of *katuk* leaf meal increased milk production during a 3-week experiment ($p < 0.05$).

The results also showed that there was a more significant increase in breastmilk volume in the intervention group, especially at a dose of 30mg/KgBW, compared to the other two groups with a value of 0.04 (0.002-0.084) (CI 95%) on the 1st day, 0.05 (0.020)-0.090) on the 7th day, and 0.12 (0.065-0.175) on the 14th day. The analysis also revealed a difference in breastmilk volume between the intervention 30 mg/KgBW and 15 mg/KgBW intervention groups, with a difference value (CI95%) of 0.02 (-0.022-0.065) on the 1st day, 0.02 (-0.054-0.018) on the 7th day, and 0.06 (-0.121-0.004) on the 14th day. These findings align with the results of a previous study which stated that SA could increase the synthesis and production of breastmilk (Khoora et al., 2015), especially if consumed as an extract (Andarwulan et al., 2010).

The results of this study were supported by another study that conducted the experimental feeding intervention process for 12 days in two groups of lactating mice. The intervention group of mice was given SA leaf extract, and the control group was fed without SA leaves. They found that SA leaf extract supplementation increased prolactin and oxytocin gene expression in lactating mice by 9.04 and 2.25 times, respectively. Meanwhile, the administration of adult SA leaf extract inhibited the expression of both genes 15.75 and 25.77 times, respectively, compared to the control group. This was thought to be related to the papaverine content only detected in mature SA leaves (Soka et al., 2010).

In this study, the phytochemical extraction process of SA extract was conducted to ensure the quality of the resultant extract. The community has confidence in SA as a galactagogue or booster of milk production. The herbaceous plant known as *katuk* leaf (*Sauropus androgynus*) is a member of the Euphorbiaceae family. *Katuk* leaves contain nutrients and several advantageous chemicals that induce the synthesis and production of breastmilk. It enhances glucose metabolism for lactose synthesis (Nuampa & Payakkaraung, 2020).

Additionally, breastmilk production is influenced by the prolactin hormone, which plays an essential role in the lactation process. The prolactin hormone is needed to establish and maintain lactation. This hormone primarily promotes DNA synthesis, epithelial cell proliferation, milk proteins (casein, lactalbumin), free fatty acids, and lactose synthesis in the mammary glands. The level of milk protein gene transcription is stimulated explicitly by the prolactin hormone (Hall, J., 2010). Additionally, breastmilk production is strongly influenced by demand (Lactation Education Accreditation and Approval Review Committee, 2022) and the stress level of nursing mothers (Murdhiono & Okinarum, 2022).

Katuk leaves are plants with high antioxidant properties (Endrawati et al., 2022). This leaf has traditionally been used to treat certain diseases (Khoora et al., 2015) and is believed to increase breastmilk (Amalia et al., 2021; Selviana, 2022). A study by Handayani et al. (2020) found that the ideal dose of *katuk* leaf extract for increasing prolactin and oxytocin hormone expression is 900 mg/day. However, if consumed in excess in the form of fresh leaves, it can negatively impact health, such as heavy metal toxicity and lung injury (Khoora et al., 2015). Hayati et al. (2016) also stated that most traditional Indonesian communities from East Java consume *Sauropus androgynus* Merr leaves as a vegetable to increase breastmilk. The results of other studies also showed various other benefits of *katuk* leaves, such as their use as natural dyes, nutrition for goats, medicine for fever, and cough medicine (A. Hayati et al., 2016).

The limitations of this study were related to the difficulties in obtaining experimental animals that met the criteria due to the absence of special rabbit breeders. Therefore, the experimental animals were brought from other provinces, which caused the animals to undergo a long journey to the research location. Moreover, several pregnant experimental animals could not survive because of environmental disturbances that caused miscarriages.

CONCLUSION AND RECOMMENDATION

Katuk leaves contain sufficient amounts of macronutrients and essential micronutrients and minerals. It increased the breastmilk production of rabbits, as the experimental animals in this study. In this research, two doses of the *katuk* leaf extract increased breastmilk production. Between the two doses, a more significant breastmilk production was obtained from a dose of 30 mg/KgBW compared to 15 mg/KgBW. The results of this study can be used as a reference source for future clinical studies, which may be helpful for postpartum mothers. In addition, future researchers can use other experimental animals with low stress levels and check the animal's blood prolactin levels as an indicator.

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FACTORS THAT INFLUENCE THE RESILIENCE OF MUHAMMADIYAH MEMBER'S FAMILIES DURING THE COVID-19 PANDEMIC IN SURABAYA, INDONESIA

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ABSTRACT

COVID-19 has created uncertainty, and its impacts will undoubtedly be severe, long-lasting, and challenging from socioeconomic and psychological perspectives, particularly for families worldwide. This research identified the resilience level of Muhammadiyah members' families in Surabaya during the COVID-19 pandemic and explained the factors related to their family resilience. This research used a cross-sectional method. The samples were 289 respondents, with the inclusion criteria of either the husband or wife being a Muhammadiyah member in Surabaya. The sampling technique used stratified multistage random sampling. The research location was divided into 5 regions: Central Surabaya, North Surabaya, West Surabaya, South Surabaya, and East Surabaya. Descriptive analysis and Chi-Square statistical test were used. The results of this study indicate that the family resilience of Muhammadiyah members obtained a high score during the pandemic. The factor that influenced family resilience was the location of residence, which obtained a p-value of 0.00, which is less than 0.05. Meanwhile, gender, location of residence, age, occupation, income, and education did not affect the level of family resilience. Further research is needed to develop a family resilience intervention model to improve family resilience.

Keywords: *COVID-19, family resilience, muhammadiyah*



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INTRODUCTION

For many people, the COVID-19 epidemic has impacted every part of life (Indriasari, 2022). The COVID-19 pandemic has created uncertainty, and its socioeconomic and psychosocially stress impacts will likely be profound and long-lasting, particularly for families around the world (Murdhiono & Okinarum, 2022; Xiang et al., 2020; Liu & Doan, 2020). Governments worldwide, including in Indonesia, have taken preventive measures, such as social distancing and having school and work be conducted from home. These measures have greatly affected the lives of individuals, especially families (Marzilli et al., 2021).

A survey conducted by Sunarti (2020) on family resilience in Indonesia showed that the COVID-19 resulted in food

insecurity, economic demand, stress, and a decline in family welfare. Uncertain of when the pandemic will end, families are faced with several family welfare issues, including learning how to optimally do work from home while caring for and educating their children at home and preventing disease transmission, which has led to an increase in mental health problems in affected areas (Golberstein et al., 2020; Liu & Doan, 2020; Xie et al., 2020). Other factors include fear of job loss, food and housing insecurity, and concerns about children's learning and mental health (Sprunt, 2020).

Some researchers predicted that COVID-19's impact was significantly associated with family resilience and pandemic-related stressors, with higher symptoms of depression, anxiety, and stress (Chan et al., 2021; Eales et al., 2021).

However, the measurable impact of the pandemic on family resilience is currently unknown with certainty, especially for Muhammadiyah members in Surabaya.

Due to the tremendous problems households face throughout the COVID-19 pandemic, a sturdy circle of relationship management needs to be characterized using nurturing, guidance, and safety guidelines through the family resilience process (Prime et al., 2020). The family resilience approach seeks to understand how all family members, in their differences, can survive and regenerate even under stressful conditions. This approach affirms the family's potential for self-improvement and growth from crises and challenges (Walsh, 2016).

The uniqueness of this study is that the sample used is Muhammadiyah members, one of the major Islamic organizations in Indonesia. Since the beginning of the pandemic, Muhammadiyah, through the Muhammadiyah COVID-19 Command Center (MCCC), has initiated the Family Resilience Movement to provide food and economic aid (Humaidi et al, 2022). This is a form of commitment to help the community. Muhammadiyah has launched many programs to maintain family resilience during the pandemic. Thus, the researchers are interested in examining the resilience of Muhammadiyah families.

This research aims to identify the level of family resilience of Muhammadiyah members in Surabaya during the COVID-19 pandemic and to explain the factors related to the family resilience of Muhammadiyah members.

METHOD

Study Design

This research used a cross-sectional design with 289 respondents. The stratified multistage random sampling technique was used. As the Muhammadiyah members sampled live in the Surabaya, the city was divided into 5 regions: Central Surabaya, North Surabaya, West Surabaya, South Surabaya, and East Surabaya. Then, samples from the 5 areas were taken proportionally using multistage random sampling. The inclusion criteria consisted of a family (husband and wife), Muhammadiyah membership, domiciled in Surabaya, and could understand Indonesian well.

Instruments

The instrument used was the Family Resilience Questionnaire (Wahls, 2016). A Likert scale ranging from 1 to 5 (never to always) was applied to the questionnaire. A validity test on the 32 questions was performed using the Pearson product-moment correlation. An r count value of one and r count $>$ r table was also obtained, supporting the instrument's validity. A Cronbach's alpha value of 0.895 was also obtained, showing good reliability.

Measurement indicator

Family belief systems domain

There were 13 questions to assess the families' ability to interpret crises and their choices, to encourage each other and build their resilience, and to find inspiration to renew or revise life dreams; positive future vision. The assessment uses a 5-point Likert scale from 1 = rarely/never to 5 = almost always.

Family organizational processes domain

There were nine questions to assess family flexibility in adapting to new challenges. The family should respect the needs and differences of each individual. Families can rely on support from friends, neighbors, and the community. The assessment uses a 5-point Likert scale from 1 = rarely/never to 5 = almost always.

Communication processes domain

There were 10 questions to assess whether the families were clear and consistent in what they said and did. The questions assessed whether the family can express several emotions and focus on goals and take steps to achieve them. The assessment uses a 5-point Likert scale from "1 = rarely/never", to "5 = almost always".

Data collection

The procedures for data collection are described as follows. At first, the researcher of this study contacts the prospective respondent. The researcher provided research information, informed consent, and sent the questionnaire links. Questionnaires were given to 289 families of Muhammadiyah residents in Surabaya. The researcher visited the house of each family when filling out the questionnaire.

Data analysis

The data were entered into Microsoft Excel and analyzed in SPSS version 21. Descriptive analysis was used to show demographic characteristics, family resilience, and domains of family resilience. The non-parametric Chi-Square statistical test was applied to test for differences between demographic characteristics to family resilience, with $p = 0.05$ taken as the cut-off point for statistical significance.

Ethical consideration

The Health Research Ethics Committee of the Muhammadiyah University of Surabaya granted ethical approval to conduct this study with the number No.021/KET/II.3/AU/F/2022.

RESULTS

Respondent Demographics

Table 1 shows that this study consisted of 213 men (73.7%) and 76 women (26.3%). Most lived in East Surabaya (25.3%), and most were aged 46-55 (34.9%). Most of the respondents were employed as teachers at 21%. Most respondents' income amounted to $>$ Rp. 2.000.000 (105 people or 36.3%), and most have earned bachelor's degrees (158 people or 54.7%).

Table 1. Characteristics of respondents (n = 289)

Characteristics	n (%)
Gender	
Man	213 (73.7)
Woman	76 (26.3)
Location of residence	
Central Surabaya	48 (16.6)
East Surabaya	73 (25.3)
West Surabaya	72 (24.9)
North Surabaya	24 (8.3)

Table 1. Characteristics of respondents (n = 289) (continue)

Characteristics	n (%)
South Surabaya	72 (24.9)
Age (years)	
17-25	11 (3.8)
26-35	34 (11.8)
36-45	53 (18.3)
46-55	101 (34.9)
56-65	70 (24.2)
>65	20 (6.9)
Occupation	
Government employees	8 (2.8)
State apparatus	1 (0.3)
Entrepreneur	5 (1.7)
Trader	31 (10.7)
Private employee	133 (46)
Farmer	2 (0.7)
Informal sector	6 (2.1)
Housewife	34 (11.8)
Teacher	62 (21.5)
Retiree	7 (2.4)
Income (Rp)	
<500.000	31 (10.7)
500.000 - <1.000.000	29 (10)
1.000.000 - < 1.500.000	62 (21.5)
1.500.000 - < 2.000.000	62 (21.5)
> 2.000.000	105 (36.3)
Education	
Primary school	2 (0.7)
Junior high school	6 (2.1)
Senior high school	116 (40.1)
Bachelor's degree	158 (54.7)
Master's degree	7 (2.4)
Family resilience category	
Low	19 (6.6)
Moderate	105 (36.3)
High	165 (57.1)

Overview of Family Resilience

This section will present data on Family Resilience based on gender, age, occupation, location, income, and educational status. Table 1 showed that 165 respondents (57.1%) had high family resilience. Of 213 male respondents (73.7%), as many as 121 (41%) of them had high family resilience. Meanwhile, of the 76 or 26.3% of female respondents, 5 had low family resilience (1.7%), 27 had moderate family resilience (9.3%), and 44 had high family resilience (15.2%).

As exhibited in Table 2, most of the respondents were aged 46-55 years (34.9%), from this data, about 32 (11.1%)

respondents had high family resilience. Most respondents were private employees at 133 people (46%), 76 (26.3%) of them had high family resilience. Based on location status, most respondents lived in East Surabaya at 73 people (25.3%) and as many as 33 of them (11.4%) had high family resilience. Next, the majority of respondents had an income of > Rp. 2.000.000 at 105 people (36%), 65 (22.5%) of them had high family resilience. The family resilience by education status shows that most respondents with undergraduate education was 158 people (54.7%) and 82 (28.4%) of them had high family resilience.

Table 2. The influence of respondents' characteristics on family resilience

		n (%)	Family resilience			Total	Chi-Square tests
			Low	Moderate	High		
Gender	Man	n (%)	14 (4.8)	78 (27.0)	121 (41.9)	213 (73.7)	0.98
	Woman	n (%)	5 (1.7)	27 (9.3)	44 (15.2)		
Age	17-25	n (%)	0 (0.0)	5 (1.7)	6 (2.1)	11 (3.8)	0.45
	26-35	n (%)	3 (1.0)	12 (4.2)	19 (6.6)	34 (11.8)	
	36-45	n (%)	2 (0.7)	17 (5.9)	34 (11.8)	53 (18.3)	
	46-55	n (%)	7 (2.4)	31 (10.7)	63 (21.8)	101 (34.9)	
	56-65	n (%)	7 (2.4)	31 (10.7)	32 (11.1)	70 (24.2)	
	>65	n (%)	0 (0.0)	9 (3.1)	11 (3.8)	20 (6.9)	

Table 2. The influence of respondents' characteristics on family resilience (continue)

		n (%)	Family resilience			Total	Chi-Square tests
			Low	Moderate	High		
Occupation	Government employee	n (%)	0 (0.0)	4 (1.4)	4 (1.4)	8 (2.8)	0.63
	State apparatus	n (%)	0 (0.0)	1 (0.3)	0 (0.0)	1 (0.3)	
	Entrepreneur	n (%)	1 (0.3)	1 (0.3)	3 (1.0)	5 (1.7)	
	Trader	n (%)	3 (1.0)	7 (2.4)	21 (7.3)	31 (10.7)	
	Private employee	n (%)	7 (2.4)	50 (17.3)	76 (26.3)	133 (46.0)	
	Farmer	n (%)	0 (0.0)	1 (0.3)	1 (0.3)	2 (0.7)	
	Informal sector	n (%)	0 (0.0)	0 (0.0)	6 (2.1)	6 (2.1)	
	Housewife	n (%)	3 (1.0)	13 (4.5)	18 (6.2)	34 (11.8)	
	Teacher	n (%)	4 (1.4)	24 (8.3)	34 (11.8)	62 (21.5)	
Retiree	n (%)	1 (0.3)	4 (1.4)	2 (0.7)	7 (2.4)		
Location	Central Surabaya	n (%)	10 (3.5)	14 (4.8)	24 (8.3)	48 (16.6)	0.000
	East Surabaya	n (%)	2 (0.7)	38 (13.1)	33 (11.4)	73 (25.3)	
	West Surabaya	n (%)	3 (1.0)	22 (7.6)	47 (16.3)	72 (24.9)	
	North Surabaya	n (%)	0 (0.0)	15 (5.2)	9 (3.1)	24 (8.3)	
	South Surabaya	n (%)	4 (1.4)	16 (5.5)	52 (18.0)	72 (24.9)	
Income	<500.000	n (%)	2 (0.7)	12 (4.2)	17 (5.9)	31 (10.7)	0.31
	500.000 - <1.000.000	n (%)	0 (0.0)	9 (3.1)	20 (6.9)	29 (10.0)	
	1.000.000 - <1.500.000	n (%)	7 (2.4)	22 (7.6)	33 (11.4)	62 (21.5)	
	1.500.000 - <2.000.000	n (%)	3 (1.0)	29 (10.0)	30 (10.4)	62 (21.5)	
	> 2.000.000	n (%)	7 (2.4)	33 (11.4)	65 (22.5)	105 (36.3)	
Education	Primary school	n (%)	0 (0.0)	0 (0.0)	2 (0.7)	2 (0.7)	0.44
	Junior high school	n (%)	1 (0.3)	2 (0.7)	3 (1.0)	6 (2.1)	
	Senior high school	n (%)	7 (2.4)	37 (12.8)	72 (24.9)	116 (40.1)	
	Bachelor's degree	n (%)	11 (3.8)	65 (22.5)	82 (28.4)	158 (54.7)	
	Master's degree	n (%)	0 (0.0)	1 (0.3)	6 (2.1)	7 (2.4)	

Family resilience domain

In this section, data regarding the family resilience domain are presented to provide a descriptive overview of the data distribution. As shown in Table 3, from a total of 289 respondents, 10 (3.5%) of them are classified in the low category for family belief systems. Meanwhile, those who had high family belief systems were 163 people (56.4%). Next, as

many as 12 respondents (4.2%) were in the low-category for organizational processes and 102 people (35.3%) fell into the medium organizational processes category. As many as 175 people (60.6%) had high organizational processes. For communication processes, 3 respondents were in the low category, 10 (3.5%) were in the medium category and 276 (95.5%) were in the high category.

Table 3. Description of family resilience

Category	Domain of family resilience		
	Family belief systems	Organizational processes	Communication processes
	n %	n %	n %
Low	10 (3.5)	12 (4.2)	3 (1.0)
Moderate	116 (40.1)	102 (35.3)	10 (3.5)
High	163 (56.4)	175 (60.6)	276 (95.5)
Total	289 (100.0)	289 (100.0)	289 (100.0)

DISCUSSION

Family resilience is the family's ability as a functional system to survive and rise from prolonged crises and difficulties (Walsh, 2016). This concept involves the pathways families follow when adapting to stress, initially and over time (Li et al., 2018). Families can respond positively to adverse conditions depending on the context, developmental phase, interaction of risk and protection factors, and their shared views.

Based on the data, gender did not significantly affect family resilience. This suggests that the relationship and communication patterns in the family and the closeness of the family members were not determined by gender. Some may consider female family members to have closer and better

relationships than men because men tend to be more active outside the home. However, men can have the same relationships and closeness in the family. Thus, gender cannot be said to be one of the factors that had a significant influence on shaping family resilience.

According to Rohmah (2016), middle-aged family couples have the potential to increase high family resilience. Several sources that can be used to build family resilience include establishing good relationships and communication within the family, being responsible and sharing roles, giving freedom by taking into account the agreed limits in the household, and practicing religious values.

Next, a person's work status cannot be used as a factor that influences the formation of family resilience. However, it can

be an intermediary in improving the family's economic status and become one of the sources that strengthen family resilience. However, the findings of this research showed that job status did not affect family resilience. This result is in line with Fergilia et al. (2012), who explained that dual-career families face uniquely challenging situations.

The following characteristic, location of residence, had a significant effect on family resilience. This was closely related to the environmental conditions in which they lived, as many factors played a role in forming family resilience, including social support and a religious environment or a good level of spirituality. This is because spirituality can give meaning to life and provide support when experiencing problems or stress (Fergilia et al., 2012). A good environment can allow people to find serenity, peace, and meaning in life, thus resulting in high family resilience.

The results of this study showed that income status did not have a significant effect on family resilience. This is similar to a person's employment status, where a high income cannot guarantee a person has high family resilience. High income is always supported by one's job status. However, for individuals with high income, the potential for family conflict is quite large due to the division of roles as well as stress and depression due to low family resilience (Song et al., 2021). Several other factors contribute to family resilience for those with high incomes, such as peace, a good support system, and good relationships among family members (Chen et al., 2021).

Next, educational status did not have a significant effect on family resilience. Higher education is almost always accompanied by high knowledge, especially in overcoming various life problems. However, this was not the case in the findings of this study, which showed that educational status did not always guarantee that the family can overcome crises. Nevertheless, higher education is one of the sources that can be used to build family resilience (Sandberg, 2019).

This study found that each family resilience domain has an important role. If one of these domains is problematic, family resilience will be disrupted. People's beliefs are at the core of who they are and how they understand the experiences that occur (Li et al., 2018). Families build shared beliefs about how the world operates and their place in it (Dattilio, 2005). These paradigms or schemas influence how family members view and interpret events and their behavior. Parental demographics affects the behavior of preventing the transmission of Covid-19 in school-aged children (Astuti et al., 2022). Family belief systems provide coherence and help organize experiences to enable family members to understand crises. They provide a meaningful orientation for mutual understanding and new challenges. Shared beliefs develop and are reaffirmed or changed through the family's life cycle and occur throughout the interconnected multigenerational network (Rohmah, 2016).

The belief that we have the potential to succeed can help us unite in times of crisis. In some ways, some beliefs can be more useful than others, depending on our situation. Some beliefs can also be more desirable or socially acceptable in certain cultures. Beliefs are intertwined with the actions we take, and the consequences of that relationship can either strengthen or change our beliefs (Wright & Bell, 2009).

Families need to develop a flexible structure to function optimally in the face of adversity, as change is an inevitable part of the human condition. Families must be able to adapt to changes, developmental demands, and the environment, both normative (expected, predictable) and non-normative (rare, not timely, or unexpected). Flexibility, a dynamic balance between stability (homeostasis) and change (morphogenesis), allows a family to maintain structure while also adapting to face life's challenges (Loriedo & Di Nuovo, 2013)

Adaptive capacity to change is very important for high-functioning couples and families, especially when under pressure (Sabbath, 2013). Studies have observed that in a healthy family, the rules for its members are flexible and change according to the situation. Likewise, a study on couples conducted by Rohmah (2016) found that the capacity for adaptability, flexibility, and change predicts long-term success. Family members must grow together and overcome many internal challenges and external forces. When people hold on to rigid conceptions of marriage as an institution with immutable rules and roles, they tend to be more wary of long-term commitments.

Thirdly, this study has shown that good communication facilitates all aspects of family functioning and resilience. The complex challenges of contemporary family life make it all the more important. There will be a disruptive transition or prolonged stress in times of crisis. During these situations, communication is more likely to break down when it matters the most. Communication involves the transmission of beliefs, information, exchange, emotional expression, and problem-solving processes (Sabbath, 2013).

Many studies on couple and family interactions focused on the key elements of good communication. Olson's Circumplex Model and the FACES-IV Instrument target specific skills, such as speaking and listening, self-disclosure, clarity, continuity tracking, respect, and self-esteem. Speaking skills involve speaking for oneself and not for others. Listening skills include focused attention and empathetic responses, and self-disclosure involves sharing information and feelings about oneself, significant experiences, and relationships. In a parent-child family, parental requests for open communication may be viewed by adolescents as a disturbance (Rolland, 2016).

Therefore, efforts are needed in families who are experiencing difficulties to improve their ability to express and respond to each other's feelings, needs, and concerns. Families can negotiate approaches to solving problems and meeting the demands and needs of family members. Clear and open information and collaborative problem-solving were key processes for building family resilience (Myers-Walls, 2017).

This research has been attempted and conducted following scientific procedures. However, it still has limitations in the data collection process. The information obtained through questionnaires sometimes does not show the true opinion of respondents. This happens because of differences in thoughts, assumptions, and understanding of each respondent. In addition, other factors, such as honesty in filling respondents' opinions in the questionnaire, will affect the data obtained. Moreover, this study only focuses on observational research. Thus, further research is needed to develop a family resilience intervention model.

CONCLUSION AND RECOMMENDATION

This study shows that the location of residence had a significant effect on family resilience. The communication process also occupies the highest domain in family resilience, followed by the family organizational process and family belief system domains.

Further research is needed to develop a family resilience intervention model to improve family well-being or family welfare. The model should be applied to a large number of samples to determine its statistics and clinical effectivity and to produce a good quality study.

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THE EXPERIENCE OF FAMILIES WHO CARE FOR RELATIVES WITH MENTAL DISORDERS POST ARBITRARY COERCION: A QUALITATIVE STUDY

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ABSTRACT

People with mental disorders who experience coercion and are referred to a mental hospital are often shackled after returning from the hospital or re-admitted to the mental hospital. However, some families take care of their family members with mental illness who had previously been coerced. The time taken to care for relatives with mental disorders at home is crucial as caregivers of relatives with schizophrenia and early psychosis experience significant stress and psychosocial burden. Meanwhile, the family members are supposed to maintain their relative's condition to avoid relapse. This study explores the experiences of families who cared for their relatives with mental disorders who experienced coercion to give insight and information to patients, families, and communities. This is a phenomenological qualitative study. The sampling technique used was purposive sampling, with the number of participants being 11 family members who treated their relative suffering from mental illness post-coercion. The descriptive analysis resulted in 5 themes: 1) Heavy burden, 2) Family support, 3) Gratitude, 4) Adjustment, and 5) Improved mental health condition. The results of this study can be used as a reference for helping families with the psychological and physical treatment of their post-coercion relatives.

Keywords: *Family experience; mental disorder; shackled; post-coercion*



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INTRODUCTION

The prevalence of mental disorders has increased in Central Java. In 2018, Central Java rose to the 4th position for the prevalence of mental disorders, which was previously ranked 5th in 2013 (Indonesia Ministry of Health, 2018). The Central Java Provincial Office reported 78,200 patients with severe mental disorders, of which 390 were shackled (Indonesia Ministry of Health, 2018). Repeated coercion was reported to be conducted by family members to create a secure environment for patients with mental health problems (Katuuk et al., 2019).

Shackling leads to limited fulfillment of the basic needs of a decent life, including health, education, and employment (Yusuf et al., 2019). Patients who are shackled for a long time will experience muscle atrophy, issues with walking, and injuries that must be treated when the patient is released from

coercion (Malfasari, E., Keliat, B., & Helena, 2016). Other impacts of shackling include trauma, resentment towards family, feeling discarded, low self-esteem and hopelessness, depression, and symptoms of suicidal intent (Yusuf et al., 2019). To avoid those impacts on the patients, the family should be educated in caring for the patients after being hospitalized because caring for the patients in the home takes a long time and requires full support from the family.

Family support means the family's attitude, action, and acceptance toward the mental illness patient. As supportive family members, they need to always be ready to provide help and assistance if needed (Purba et al., 2020). Thus, the act of shackling is the family's failure in providing support to provide the patients access to health services. The act of shackling only aggravates the condition of the mentally ill person. Saputra's A study mentioned there was a relationship

between family support and adherence to antipsychotic drugs in patients with mental disorders (Karmila, D.R. Lestari, 2016). Family support is needed so that patients can access health services to get regular medical treatment and ensure that they take their medicines. In addition to medicine, it is explained that the higher the family support, the higher the patient's social functioning after treatment at home, and so on (Jessica & Fithriyah, 2021).

Family members experience physical exhaustion, emotional upheaval, and ineffective burden management when caring for post-coercion patients. These factors contribute to their decision to re-shackle their relative. Thus, cases of shackling in mental patients are still high. Post-coercion and free restraint in the community indicate a problem in patients' families and communities (Yusuf et al., 2019).

Families of post-shackled patients experience difficulties in managing burden, manifesting as physical fatigue and emotional upheaval (Rekningsih et al., 2015). Caregivers who treat their mentally ill relatives using repeated coercion typically experience helplessness and prioritized safety (Katuuk et al., 2019). Thus, the experience of coercion patients for 11 years with no recurrence for that same period is a differentiator in this study.

The findings of previous studies provide the background to this study which aims to explore the experiences of caregivers in caring for post-shackling patients. The role of health workers in handling people with mental disorders includes promotion, prevention, education, and evaluation through counseling, screening, home visitation, and monitoring of the mentally ill patient who is under medication (Ariusta et al., 2018). Meanwhile, health workers are not concerned with caring for the family members responsible for the long-term care of the patients. This study explores the experiences of families who cared for their relatives with mental disorders post-coercion to provide insight and information to patients, families, and communities.

METHOD

Study design

The study used a phenomenological approach to explore the family's experience caring for post-coercion patients. This method was chosen to obtain a deep understanding of the caregiver's experiences. The researcher also performed bracketing, a process by which the researcher "suspends" any preconceived beliefs and opinions about the phenomenon being studied. Therefore, the results obtained are from the point of view of the individual studied.

Informants

The informants in this study are family members who are caregivers of patients with a mental disorder post arbitrary coercion. The participant criteria were adults who live at home together with the patient, are close to the patient, and take care of the patient. The number of participants in this study was based on data saturation. Data collection is performed by sampling until a point of saturation where no new information is obtained, and experience has been gained. Therefore, this study had four participants since data saturation was reached at eleven participants.

Data collection

The research site was conducted in Ketep Banyuroto Village, Central Java. Interviews were conducted in stages, starting with orientation, collection of data, and evaluation of the families of mental illness patient post-coercion. At the initial implementation stage, the researcher explained the purpose

and objectives of the interview process. The researcher then determined a contract agreement on the interview timing with the informants.

Data were collected using instruments in the form of interview guides and focus group discussions. The interviews were conducted in the family homes of the mental disorder patient post-coercion. Data collection was conducted in September-November 2022, which was comprehended by data analysis and presentation of research results.

The data collection procedure began with obtaining the ethical clearance letter. After obtaining permission from the authorities, the researcher met the facilitator, namely the "health cadres" appointed to orient the families of mental disorder patient post-coercion to explain the purpose and objectives. Researchers visited the family homes of mental disorder patients and collected information until data saturation were reached. The researchers fostered trust with the informants by validating their identities, introducing themselves, and explaining the research objectives. The researchers then asked about the informants' conditions and obtained informed consent forms from the informants. The researchers started by giving questions according to interview guidelines, ranging from general topics to core questions. The language used was easy to understand. The interview process was conducted until saturation was achieved in each participant. The total interview time was approximately 30-35 minutes. The interview results were analyzed by writing down the interview transcript and recording important information.

Data analysis

This study used Colaizzi's (1978) phenomenological method for the data analysis stage. According to Colaizzi's method, the researchers first had to obtain a clear picture of the phenomenon under study. Thus, the observations and interviews with participants were recorded and transcribed. The transcription process was conducted after every interview. After interviewing all participants, the researchers read the transcripts repeatedly to understand the participants' answers and obtain keywords from each participant's statement. Important statements were underlined so that they could be grouped. Next, the researchers determined the meaning of each important statement from all participants. They then grouped the data into various themes and determined the main themes that arose. After that, the researchers logically integrated the results into a narrative form and returned it to the participants for clarification. This provided an opportunity for the participants to add information or indicate information they did not want to be published in the study. Finally, the researchers concluded the analysis results with the data obtained during the validation process.

Ethical consideration

The researchers guarantee the confidentiality of participant data by not including the participants' names or other identities in the research results. Numbering and codes are used for each participant in the research interview transcripts. This study did not harm the participants or use any form of exploitation. The researchers also protected against the loss and abuse of participants. In this study, the participants were also given rewards as a sign of appreciation for their willingness to participate in the research. All participants received the same treatment in terms of informed consent. The institutional Review Board and Ethics Committee of the Faculty of Nursing, Universitas Sultan Agung Semarang, Indonesia, approved this study (Number: 1086/A.1-KEPK/FIK-SA/XII/2022).

Trustworthiness

The trustworthiness in this study was tested against four criteria: credibility, dependability, confirmability, and transferability (Lincoln & Guba, 1985). To ensure the validity of the data used in this qualitative research, the researchers performed direct validation by conducting offline interviews. The next step was to triangulate or validate the data with various sources to correct the data obtained since the study used source triangulation. Triangulation was performed by collecting data using other methods: interviews, observations, and surveys of caregivers with post-coercion patients. Next, dependability is ensured by having the researchers examine the research process with lecturers and colleagues who used the same research design. This study involved other researchers who have studied shackling patients to review the study results.

The transferability of this study was ensured by describing the themes identified in the research group and the study's context, namely, the family experience with post-coercion. The researcher explained everything in detail so readers could use and apply the study results elsewhere. Confirmability is the neutrality or objectivity of the data, which was conducted by the researcher by writing a report on the results of the data analysis to show the authenticity of all research results, including interview transcripts, data analysis tables containing categorization and formulation of the themes of the study results, as well as attaching the final research report accompanied by articles presented to facilitate understanding of the researcher's train of thought to readers.

RESULTS

Participants' characteristics

There were eleven participants in this study, involving 6 males and 5 females. Most participants are farmers with educational background 63% were junior high school and 37% were high school graduates.

Table 1. Participants characteristics

No	Age	Gender	Occupation	Education
1	57	Male	Farmer	High school
2	55	Female	Farmer	Junior high school
3	35	Male	Breeder	High school
4	24	Female	Farmer	High school
5	28	Male	Farmer	High school
6	65	Male	Farmer	High school
7	60	Female	Farmer	Junior high school
8	57	Male	Farmer	High school
9	57	Female	Farmer	Junior high school
10	55	Female	Farmer	Junior high school
11	55	Male	Farmer	High school

Themes

Based on the results and data analysis, the following five themes that answered the research objectives were found:

Theme 1. Heavy burden

Theme 1 consists of a sub-theme of a heavy burden with shackling actions. The family's biggest feeling with shackling is a sense of unwillingness and resignation to the tough decision. The four participants said they could not bear the condition of shackling but could not do anything else because of their insufficient knowledge. The participants confirmed the following statements:

"As a human being, we can not bear to see people in shackles. At that moment, our father was still alive" (P1, P8)

"Well, about the past, there was a condition like that in the Banyuroto community, maybe in the 80s, it has been cured, but from a medical point of view, there may still be residual symptoms like broken glass. But as a family, facing the decision for an elderly family member is very difficult and considered a burden" (P2, P9)

Theme 2. Family support

Theme 2 is about a sense of belonging between family members after shackling. Family members tend to feel both shame and feelings of belonging and desire to care for the patient because they are concerned of their biological family members. Participants stated the following statements:

"He has some siblings; I am the older brother of seven children in my family. I take care of him because he is my brother" (P2)

"Actually because of humanity, because if you are not a family, who else will take care of you. Besides, maybe my knowledge is a little, but I can do as much as I can to take care of him" (P1)

Theme 3. Gratitude

Theme 3 consists of the sub-theme 'gratitude'. The informants expressed their gratitude for the changes in the patient's condition after being shackled. This feeling helped the family accept their relatives and rejoin them in their family home like new individuals. The participants said:

"There is an instinct for siblings. Something like that creates a very deep emotion (eyes turn red), people look just like that, but how come they are invited to communicate like this, so when they come home from the hospital, they bow down with gratitude, by being treated like someone new, their soul is not like it used to be" (P2)

"Yes, I am quite happy (eyes reddened from crying), yes, like a new hope. Can live in the family again, can join again like that" (P1)

"Yes, I'm grateful, besides that, the hope from my parents when they were still alive, I still remember, they said that it's better to be taking care of the siblings" (P5)

Theme 4. Adjustment

Theme 4 is the adjustment that creates motivation. Family adaptation is the initial process of accepting family members with post-coercion patients at home. The changing condition needs self-adjustment from the patient and the family to accept each other and continue the treatment process. The informants revealed:

"...but thank God the siblings can accept. Although it needs adjustment for my wife to take care of my brother" (P6)

"There is a feeling of shame when caring for people with mental disorders" (P10)

Theme 5. Improved mental health condition

Theme 5 comprises a sub-theme surrounding the post-coercion patient's mental health condition. The changes that become part of the adjustment process include the nature and condition of the post-coercion patients. Being able to perform activities, recitation, and worship is one of the adaptation activities shown by post-coercion patients. Participants confirmed the following statements:

"Actually, I'm proud of him because he always eats the food that we already prepare for him, but he also likes smoking" (P1)

"He goes to the mosque routinely, especially during Friday prayers and Taraweeh prayers. He is always praying in the mosque" (P3)

DISCUSSION

Based on the data analysis results, five themes were found: 1) Heavy burden, 2) Family support, 3) Gratitude, 4) Adjustment, and 5) Improved mental health conditions. Coercion may force uncomfortable feelings onto patients who experience it. Shackling is a tough decision that families make as the result of insufficient knowledge of how to provide care to patients. Some families were found to not want to shackle their relatives because of various reasons. This study found that some families with shackling actions disapproved of the action, did not have the heart to do so, and believed the act should not be done because of humanitarian reasons. However, some participants who still assumed that being shackled would cure the patient's mental illness.

Shackling is a widespread phenomenon and has become a concern in mental health services. The serious effects of shackling on individual autonomy and freedom make shackling morally disturbing and pose ethical challenges and pressures for everyone involved. Shackling exacerbates the mental health problem, affecting the home situation and providing medical and other alternative treatment opportunities. (Norvoll et al., 2018).

Treatment and maintenance of mental health provide significant benefits for patients. However, coercion is still the most debated aspect of contemporary psychiatry (Sashidharan et al., 2019). Implicitly, shackling is considered a virtue or a moral necessity to prevent acts of violence that patients can commit. This is supported by the literature, which states that coercion is in accordance with the best interests of the family and the patients who experience it, as it protects them from detrimental actions and allows them to recover and live life as before (Lorem et al., 2015).

The use of shackling requires open interaction, trust, and ongoing collaboration between health professionals and families (Lorem et al., 2015). Post-coercion conditions present their own challenges for medical personnel and families in accepting and caring for patients. Communicative skills are needed when exploring and exchanging ideas with post-coercion patients (Lorem et al. 2015). When coercion is decided by a family, the main ethical challenge is to assess the balance between the benefits and harms that will arise. Thus, it is important for health workers to develop a strong

awareness of the ethical challenges in managing families with post-coercion patients (Hem et al. 2018).

Any type of shackling is contrary to the main values in modern society, in particular, the right to freedom. The ability to make one's own choices or rules and responsibility for the individual who considers what to do in a given situation determines the essence of humanity (Hem et al. 2018).

Shackling generally has a negative psychological impact that results in anger, fear, humiliation, degradation, helplessness, pressure, shame, and a feeling that the integrity has been violated to the point of causing retraumatization in the patient. This is supported by research results that state that physical shackling causes psychological injuries that can evoke feelings of not being treated as a human being and not having the same value as healthy people. In addition, studies have found that even mentally challenged patients must feel distressed and neglected (Nyttingnes et al., 2016).

Shackling is evaluated as morally wrong because people with mental illness are stigmatized as more dangerous. However, another opinion from this study states that shackling is morally justified in situations where the patient is in a sick condition and unable to take care of themselves (Norvoll & Pedersen, 2018). External encouragement that comes apart from the family, especially from the wider community, is crucial for patients to adapt to new conditions after shackling and continue living with the assistance of their families and related health workers to reduce moral pressure in daily activities (Norvoll, Hem, and Pedersen 2017).

This study discovered that family became the main support system for post-coercion patients because they still needed minimal care assistance to meet daily needs, such as food, hygiene, dressing, worship, and socialization. The role of the family is essential because positive treatments help the recovery process. Additionally, the results showed that families have a positive perception of shackled people.

The family's response to the admission of patients after shackling at home creates a new problem that will affect each family member. However, this study found that the family's responses to the patient's condition were positive, accepting, and they were willing to help with the treatment process. The participants acknowledged that there were many changes that occurred after post-coercion care that was provided by health workers and supported by regular treatment.

The feeling of comfort, being needed, and being cherished makes post-coercion patients start living life again and reactivate their cognitive functions and aspects. These elements enable them to prevent the recurrence of disturbing mental disorders. This study found that the family bonding develops willingness to take care the post-coercion patients. This condition is related to the level of family understanding in performing post-coercion patient care. Therefore, knowledge is needed in the process of family self-adjustment to the situation.

The basic principle of the psychosocial support system is solidarity and respect for one's own destiny. Solidarity means the support of informal and institutional sections of the community aimed at full participation in the treatment of post-shackling patients. Respect involves the freedom to choose regardless of the type of mental disorder experienced. The effective assistance provided will depend on the system's ability to meet the expectations of families of post-shackling patients (Zinkler and von Peter 2019).

The recovery period is a process that mental disorder patients, after being shackled, will experience. This process involves the community, family, and patients. Nevertheless, recovery starts with the patients themselves. Proper and regular care and treatment are important in providing care to post-coercion patients. The results of this study found that there were changes that led to good actions by the patients, such as routine treatment, maintaining hygiene, regular worship, communication, and socializing in the community.

Shackling impacts not only the patient but also the patient's family in daily life as it adds to the burden on the family by creating a stressful environment in family relationships, dilemmas, pressures, and retrospective regrets due to low-quality care. This creates problems in health care and adds to the challenge of maintaining relationships between family members, where families must strike a balance between the needs of patients and other sick relatives and try to negotiate a good work balance between formal and informal care. In addition, families also face special challenges due to changes in the patient's personality and mental capacity post-shackling. Shackling poses a dilemma for family members, where it is considered an easy and usual thing to do and sometimes creates an ambivalent feeling (Norvoll et al. 2018).

Quality of life is an individual's perception of their position and function in society. It is also affected by their family's views and expectations, which cannot be judged by numbers, but can be seen by actions. Mental disorder patients tend to still need post-coercion observation due to a decrease in psychiatric function and require periodic returns due to cognitive conditions related to thought processes, affective conditions related to perception, and psychomotor conditions related to behavior (Yunita, 2017).

The analysis of this study's result shows a relational aspect which is an important reason why mental health, shackling, and good quality of knowledge and care are needed to positively impact patients with mental disorders. A sense of love and commitment could reduce emotional distress (Norvoll et al. 2018).

CONCLUSION AND RECOMMENDATION

In this study, the participants mentioned that their experience caring for post-shackling patients was a high burden for the family. Post-coercion patients need continuous family support and adjustment when returning home. Generally, the patients have an improved mental health condition after shackling. Nevertheless, the families still struggle to provide good quality care for their relatives with mental illness. Therefore, support from healthcare providers is important.

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MINDFULNESS, SPIRITUALITY, AND QUALITY OF LIFE AMONG CANCER SURVIVORS UNDERGOING CHEMOTHERAPY: THREE-MONTH OBSERVATIONAL STUDIES

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ABSTRACT

Cancer survivors' population has continued to increase. However, survivorship remains challenging for most. Further development of new strategies to combat stress during survivorship was in demand. While religious-spiritual aspects were available as potential resources. A prospective study contributed 274 cancer survivors was conducted. Instruments included the Freiberg Mindfulness Inventory, Functional Assessment of Chronic Illness Therapy - Spiritual Well-Being, Perceived Stress Scale, and the Brief World Health Organization Quality of Life. Three-time points data were set, baseline, one month, and three months. Data were analyzed using repeated-measures ANOVA. The results showed that the mean age of the 274 cancer survivors was 48.97 (11.85) years old with a survivorship period of 1.35 years. Series data obtained from three points measurements each variable were mindfulness 34.15, 33.12, and 40.41; spirituality 33.40, 30.87, and 32.56, stress 20.31, 21.56, and 19.48, and quality-of-life 61.49, 55.71, 63.84, respectively. In conclusion, cancer survivors experienced fluctuating levels of mindfulness and spirituality, stress, and quality of life for three months of observations. However, the natural improvement of mindfulness, spirituality, stress, and quality of life improved in month three.

Keywords: *Chemotherapy; coping; mindfulness; stress; quality of life*



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INTRODUCTION

The cancer survivor population has been growing. According to the National Cancer Institute, the number of cancer survivors kept increasing around the world (National Cancer Institute, 2022). The new cancer cases in the world are greater than 19 million, and Indonesia owns 396,000 cases; among them, more than 162,000 new patients survived (National Cancer Institute, 2022). The expanding number of cancer survivors needs special attention since they must overcome multiple difficulties caused by cancer treatments (Fitch, Lockwood, et al., 2021).

Commonly, cancer survivors receive various or combined treatments such as surgery, radiotherapy, and chemotherapy. Side effects related to those therapies such as pain, fatigue, and change of physical appearance can affect the survivors' abilities to perform routine daily activities

(Manik, 2018). These persistent functional deficits, further, cause the survivors to suffer from depressive symptoms and other personal relationship strains and interfered with their work productivity (Duijts et al., 2014). Consequently, the survivors must struggle to cope with these stressors instead of enjoying their successful cancer survival.

Cancer survivors require an ultimate coping strategy to cope with life's challenges and the uncertainty surrounding cancer relapse. Pargament (2013) states that the patient's religious-spiritual aspects could be a long-lasting and beneficial coping strategy. For most, being diagnosed with cancer can improve the survivors' awareness of people and the world and expand their relationship with God (Cipriano-Steffens et al., 2020). This expanded awareness includes spiritual growth which can help cancer survivors to cope with their life stressors. The growth of spirituality, therefore, could improve life qualities of survival. Canada et al. (2016) argued that faith could directly

or indirectly affect patients' quality of life through the mediating role of meaning and peace. Improvements in faith, meaning, and peace are the consequences of expanding spirituality (Canada et al., 2013).

Intensive religious activities or rituals during suffering from cancer may facilitate the growth of spirituality among survivors, the growth, however, can be different based on their ethnic backgrounds. Indonesian are well-known as a religious countries (Gebauer et al., 2014). Therefore, people were habituated to religious and spiritual thoughts from the earlier of their life. During being exposed to such stressful events, being sick for example, they tried to take benefit from their religious background, then intensify them through spiritual self-transcendence (Reed, 2014). Enhanced spirituality, however, can contribute to the well-being of survivors.

Notably, cancer survivors face multiple and long-term challenges in maintaining their quality of life, particularly if they received chemotherapy and might suffer both its effects and side effects that can cause the survivors great physical and psychological distresses (Noviyani et al., 2015; Vehmanen et al., 2014). Previous study findings have found that promoting patients' mindfulness has provided benefits for quality of life (Fish et al., 2014; Garner, 2014; Lötze et al., 2016). Mindfulness is a mental condition when people are fully aware of the situation regarding physical and psychological ailments (Stratton, 2015). The state of mindfulness can facilitate peaceful feelings and is beneficial in managing emotional turbulence during stressful events (Gu et al., 2015; Tint & Zinkin, 2014). However, it is not clear whether mindfulness is helpful to maintain mindfulness, spirituality, perceived stress, and the perception of quality of life during the chemotherapy period. All instruments were using self-response questionnaires that risk fluctuating due to the period of chemotherapy, and most previous studies only portrayed them in one shoot measurement. This study aimed to describe the dynamic of mindfulness, spirituality, and quality of life among cancer patients undergoing chemotherapy, during the first three months of chemotherapy.

METHOD

Study design

A prospective, observational, and correlational research design was used. Data were collected with a set of structured questionnaires at three-time points, baseline, one month, and three months after discharge from the hospital.

Sample and Settings

Cancer survivors who were undergoing chemotherapy at Hospital Kariadi, Semarang, Indonesia from January to May 2018 and met the inclusion criteria were invited to the interview. A convenience sampling method was applied to recruit the cancer survivors who were newly registered for chemotherapy during January and February 2018. Inclusion criteria were all cancer survivors who visited the hospital during the period, understood Bahasa Indonesia well, and were fully independent. Patients who were under 16 years old or had memory disorders were excluded. The sample size was calculated using G-Power 3.1.9.7 with a medium effect size of 0.15, an alpha of 0.05, a power of 0.95, and 12 predictors for the repeated-measures ANOVA. At the baseline, a total of 280 survivors joined the study. One respondent dropped out at the first follow-up, due to not coming to hospital and could not be contacted and five respondents did not complete the questionnaire at the second follow-up. They did not provide any reason, and one

passed away. Finally, 274 survivors fully participated in the study.

Instruments

Demographic Questionnaire

Demographic data were obtained using a demographic questionnaire and then validated in the medical record. This questionnaire investigated gender, marital status, educational background, job, religion, age, survivorship period, and monthly family income.

Mindfulness.

Mindfulness was measured by the Freiberg Mindfulness Inventory (FMI). The FMI consists of 14 items, and each item is scored by the participants with a four-point Likert scale ranging from 1 (rarely) to 4 (almost always). The total score ranges from 14 to 56 with a higher score indicating higher mindfulness. Its validity and reliability have been established (Sauer et al., 2013). The FMI was translated into the Bahasa Indonesia version for this current study. The translation procedure follows the steps of Sperber in translation and back translation (Mulyono & Ekowati, 2023). Cronbach's α for the internal consistency reliability was 0.86 with the corrected inter-item correlation of 0.32-0.86.

Spirituality

Spirituality was examined using the functional assessment of chronic illness therapy—spiritual well-being scale (FACIT-Sp). The validity and reliability of the Bahasa Indonesia version have been established (Widyaningsih et al., 2014). FACIT-Sp consists of 12 items involving three factors, faith, meaning, and peace. Each item is scored with a five-point Likert scale from 0 (not at all) to 4 (very much) with a total score of 0 to 48. A higher score indicates a greater spirituality. The Indonesian version FACIT-Sp reported a Cronbach α of 0.84 (Widyaningsih et al., 2014). In this study ($n=274$), Cronbach alpha for the internal consistency reliability was 0.7.

Stress

Stress of the participants was collected utilizing the Perceived Stress Scale (PSS) Bahasa Indonesia version (Syarif et al., 2019). PSS is a 10-item Likert scale questionnaire, ranging from 0 (never) to 4 (very often). The total score is from 0 to 40, and higher scores indicate higher stress perceived by the survivors. Its Cronbach's α was 0.81 (Syarif et al., 2019). In this study, Cronbach's alpha was 0.7.

Quality of Life

Quality of Life was measured using the WHOQOL-Bref Bahasa Indonesia version. This self-report questionnaire consists of 26 items rated on a 5-point scale (1 to 5). A higher score indicates a greater level of self-perceived quality of life. Each statement represents one facet of life that accounts for a person's quality of life. In a study with chronic renal failure patients ($n=91$), Cronbach's α was 0.90 for the total scale of the WHOQOL-Bref, and 0.76, 0.75, 0.46, and 0.81 for the physical health, psychological health, social relationships, and environmental domains, respectively (Ibrahim, 2004). In this study ($n=274$), Cronbach's α was 0.85 for the full questionnaire, 0.69 for physical domain, 0.74 for psychological domain, 0.68 for social relationship domain, and 0.83 for environmental domain.

Data Collection

Data collection was conducted three times. The procedures for data collection are described as follows. At first, the primary investigator of this study trained three research assistants on the use of the questionnaires and the steps of

the interview. Next, the research assistants practiced interviews with the patients who were recruited from the chemotherapy unit as volunteers. Until they felt confident, they started the data collection. Authors conducted sharing experience among assistants after assessment trial to confirm that they had similar abilities.

A list of survivors was acquired from the chemotherapy unit. The investigators explained the research procedure to the potential respondents and obtained the informed consent. The data collection was conducted during the participants' chemotherapy time for 20 minutes. The second and third data collections were done in the first month and three months after the baseline data collection during the participants' following routine chemotherapy visits.

Data Analysis

Data were analyzed using the IBM SPSS Statistics 21 (NY, Armonk). Descriptive data including frequency, percentage, mean, and standard deviation were presented based on the type of data. Normal distribution of the four main variables was checked to decide the accurate inferential statistical method. Since the dependent variables all showed a significant violation of Mauchly's test of sphericity and quadratic pattern, repeated-measures ANOVAs using the Greenhouse-Geisser tests and tests of within-subjects contrasts were employed (Nesselrode Jr & Grimm, 2018) to

analyze the score changes over time of variables in baseline, after one month, and after three months.

Ethical Consideration

This study is a part of the first author's dissertation project. The project study received approval from the Ethical Review Committee in the Faculty of Medicine Diponegoro University (Hospital Kariadi) numbered 629/EC/FK-RSDK/X/2017 on October 23rd, 2017.

RESULTS

A total of 280 participants enrolled in this study and among them, 274 completed all data collection because one participant dropped out at the second data collection, and five were at the third data collection due to their declined condition or death. The demographic characteristics of the cancer survivors were presented in Table 1. Most participants were females ($n = 171$, 62.41%), married ($n = 254$, 92.7%), having a senior high school background ($n = 83$, 30%), working at the private sector ($n = 90$, 32.85%), and affiliated with Islam religion ($n = 262$, 95.62%). The average age was 48.97 (SD = 11.8) years old, and the average year for being diagnosed with cancer was 1.35 years ranged from 1 month to 5 years. Only 122 participants provided the income information. From the limited information, the monthly family income was IDR 2.5 million (equal to ± 159.4 USD).

Table 1. Demographic Characteristics of the Participants (N=274)

Variables	<i>M</i>	<i>SD</i>	<i>n</i>	%
Gender				
Male			103	37.59
Female			171	62.41
Marital Status				
Unmarried			8	2.92
Married			254	92.70
Widow/widower			9	3.28
Undeclared			3	1.09
Education background				
Elementary school			79	28.83
Junior High school			55	20.07
Senior High school			83	30.29
Academy/Diploma			8	2.92
Undergraduate/Bachelor Degree			45	16.42
Master/Doctor			4	1.46
Job				
Government/police/military service			42	15.33
Private employee			90	32.85
Business/self-employee			33	12.04
Housewife			76	27.74
Dependant			33	12.04
Religion				
Islam			262	95.62
Catholic			8	2.92
Protestant			4	1.46
Age (years)	48.97	11.85		
Survivorship Period (in years)	1.35	2.31		
Monthly income (million IDR) ($n = 122$)	2.55	2.01		

As seen in Table 2, there was 26.64% of the total respondents for each colorectal and breast cancer diagnosis.

Other types of cancers (such as tongue, femur, and rhabdomyosarcoma) accounted for 18.25%.

Table 2. Cancer Types of the Respondents (N=274)

Cancer Types	n	%
Colorectal	73	26.64
Breast	73	26.64
Ovarium	19	6.93
Nasopharynx	33	12.04
Lung	4	1.46
Prostate	5	1.82
Lymphoma malignant non-Hodgkin	12	4.38
Cervix	5	1.82
other	50	18.25

Scores Changes of Mindfulness, Spirituality, Perceived Stress, and Quality of Life Over Time

Figure 1 depicted score changes from three measurements. The graph indicated that spirituality, mindfulness, perceived stress, and quality of life across over time of three points

measurement were change dynamically. Analysis using repeated-measures ANOVA test (all $p < .05$). Post hock test using Benferoni test, supported the difference scores over time (table 3).

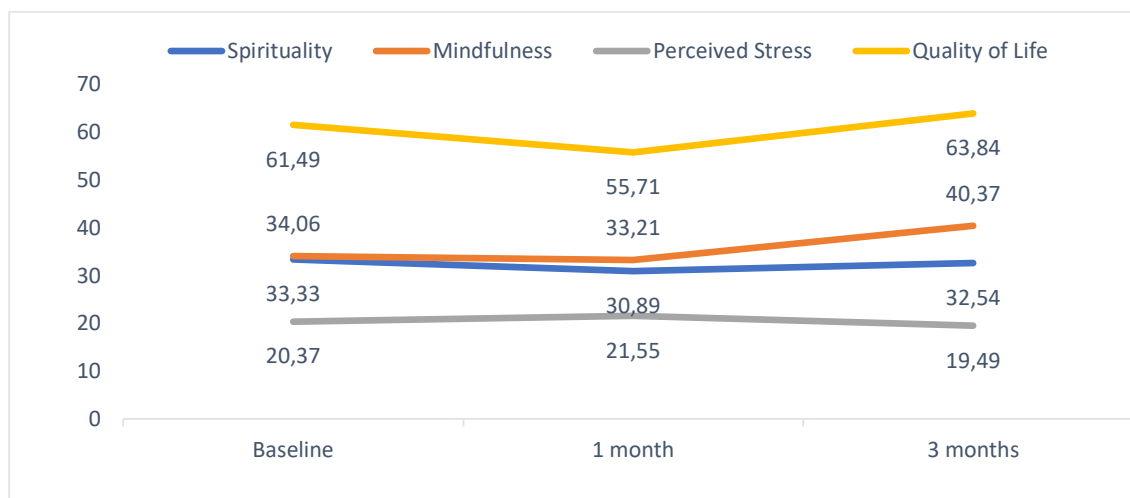


Figure 1. Score Trend o of Spirituality, Mindfulness, Perceived Stress, and Quality of life

Changes of qualitative domains were displayed in figure 2. All domains except physical domains and environmental domains tend to increase over time.

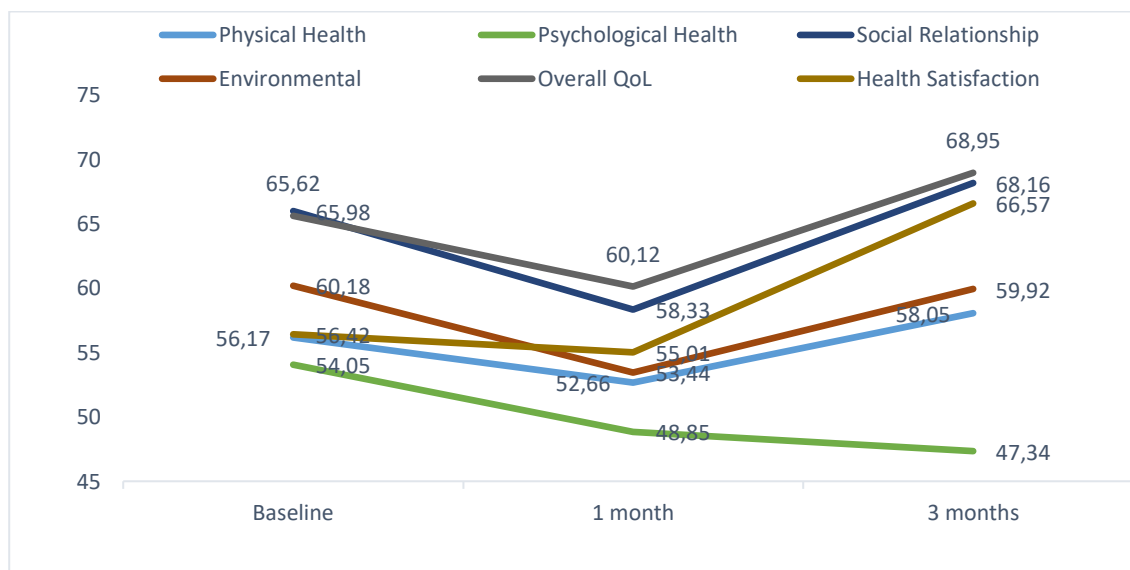


Figure 2. Trend Domains of Quality of Life

Table 3. Mean Difference Each Time Measurement

Variables	Time Measurement		Mean Diff	p
Spirituality	1	2	2.533*	0.00
		3	.847*	0.04
	2	1	-2.533*	0.00
		3	-1.686*	0.00
	3	1	-.847*	0.05
		2	1.686*	0.00
Mindfulness	1	2	-1.248*	0.00
		3	.828*	0.02
	2	1	1.248*	0.00
		3	2.077*	0.00
	3	1	-.828*	0.02
		2	-2.077*	0.00
Stress	1	2	1.029	0.04
		3	-6.259*	0.00
	2	1	-1.029	0.04
		3	-7.288*	0.00
	3	1	6.259*	0.00
		2	7.288*	0.00
QoL	1	2	5.774*	0.00
		3	-2.353	0.04
	2	1	-5.774*	0.00
		3	-8.128*	0.00
	3	1	2.353	0.04
		2	8.128*	0.00
Physical	1	2	4.386*	0.00
		3	-8.778*	0.00

DISCUSSION

This study featured mindfulness, spirituality, stress, and quality of life among cancer survivors during a three-month chemotherapy period. The trend of changes in the mean scores of those variables was fluctuating not linear. The changes over the three months, however, were all significant. Cancer survivors in this study were adults and productive people, 48.97 years old on average, and worked in the private sector (Table 1). Generally, adults at such age are the primary breadwinners of their families. According to a recent study, each adult person covered a hundred dependents (Hakim, 2020). It makes sense that most of the respondents felt stressed because they must share 2.2 million IDR (150 USD) monthly income with their families. Such money, however, maybe merely a small portion of monthly family expenses.

The perceived stress slightly increased at one month 21.56, after the baseline 20.31, measure and then decreased below the baseline in the three months 19.48 (figure 1). Out of control situation following being diagnosed with cancer was the main cause of stress. Average score for this item was 1.2, it meant that most of respondent perceive that they were worse. As studies reported that at the early week there were numerous physical dysfunction symptoms due to procedure for cancer such as radiotherapy and chemotherapy (Heijkoop et al., 2017; Miller et al., 2021). The trend of scores, however, suggested that the stress levels in the survivors were maintained consistently across the three months. Researchers have proposed that survivorship remains challenging for cancer survivors due to the process of stress adaptation. Cancer survivors experience physical, mental, social-economic, and personal relationship problems, and these problems can bring enormous consequences that challenge survivors' lives and create stressful events (Duijts et al., 2014; Koch et al., 2014; Pisu et al., 2015). In this study, about two third of respondents were less stressed than six

months after cancer diagnosed. Therefore, there was increased perceived stress in the first month, a moment when they became more trusting of the interviewer than at the previous meeting.

As expected, this study found a high and fluctuating spirituality score of 33.33, 30.89, and 32.54 in the study sample (figure 1). These scores were in line with previous studies with more advanced cancer (Widyaningsih et al., 2014), and Japanese (32.0) but lower than Malaysian (35.91) (Raja Lexshimi et al., 2014), and American cancer survivors (37.0) (Canada et al., 2016). It has been argued that high spirituality is common for Indonesian population which is commonly religious (Nuraini et al., 2018; Rochmawati et al., 2018). At first, religious practice might consider just a routine obligation for Indonesian religious cancer survivors. However, being diagnosed with cancer has created not only a shocking moment but also a life-threatening event too. Consequently, their spiritualities were recultivated and grew, to help them adapt to the turmoil situation and to relieve distress. Therefore, exploring the cancer survivor's spirituality through such religious spiritual practices could be beneficial for their long survivorship life.

Like spirituality, mindfulness scores at the second measurement were lower than the first, and then sharply increased after three months, 34.15, 33.12, and 40.41. These mindfulness scores change naturally even though they did not receive such mindfulness training. A systematic review reported that standardized mindfulness-based therapies were used to alleviate physical and mental symptoms among cancer patients (Gotink et al., 2015). The mindfulness-based therapy was reported effective for women with breast cancer (Rahmani & Talepasand, 2015). The mindfulness score increased significantly after the mindfulness therapy and keep high after three months of follow-up (Dobos et al., 2015), however, the result of training was not equivocal (Carlson,

2016). As comparison, in this study, the mindfulness score also increased significantly after three months, baseline 34.06, one month 33.21, and after three months 40.37 (figure 1), even though the cancer survivors were not exposed to mindfulness-based therapy or training. Possibly, there were cultural or ethnic influences (Yedjou et al., 2019). For example, religiousness of population where the origin of mindfulness-based therapy is rooted from Indonesians were religious population where the religious aspect was implemented in their daily life. For example, a study said that Javanese Muslims were very spiritual ethics in Indonesia. Their culture and values were close to their relationship with God (Said & Ulyani, 2020), Therefore, everyone in Indonesia, such as cancer survivors in this study, has skill of mindfulness by nature.

Overall, spirituality and mindfulness might be well improved for Indonesians due to the religiousness typical population as Gebauer (2014) said in this study. Most of respondents in our study was Islam and Javanese which were very spiritual (Said & Ulyani, 2020). Islam devotees practice their religious routine five times a day. Following the stressful event, being diagnosed with cancer, cancer survivors intensified the religious routine. Because of positive religious coping, the spiritual improved into deeper personal experiences (Distinarista et al., 2018), a self-transcendence. Cancer survivors got benefit from spiritual/religious coping they practiced (Trevino et al., 2015) because, according to Reed, being diagnosed with cancer was a vulnerable event, and those improved wellness through a moment call self-transcendence (Leelakulthanit, 2022; Reed, 2014). Majority of respondents in this study might respond their stress of cancer diagnosed by their improvement of religious spirituality factors as they integrated religious spirituality in his/her coping strategy (Pargament, 2013; Pargament et al., 1988).

Quality of life change pattern was like mindfulness and spirituality trend except for the psychological domain. Three domains, physiological, social-relationship, and environmental decreased at the baseline then improved after three months (see graphic1). They indicated improved conditions following cancer therapy. This study confirmed Heijkoop et al. (2017) that physical and health problems increase at the five weeks and then became plateau after three months, except cognitive functioning. Another study also reported emotional and physical functioning progress among colorectal cancer survivors three months after chemotherapy (Miller et al., 2021). This study supported the finding how quality of life was decreased at the first month but increased after three months. About two third of respondents in this study were less than six months diagnosed with cancer. Several of them underwent radiotherapy serial before taking chemotherapy. Therefore, there were slightly higher quality of life at the baseline (Leung et al., 2022; Takahashi et al., 2008).

While the psychological domain of quality of life tended to be lower compared to the other domains. Low educational background might contribute to low health literacy which was an influential factor for quality of life as a study reported that subjective low health literacy was a predictor for worsened quality of life and mental disorders (Husson et al., 2015). Patients with elementary school (28.83 %) and junior high school (20.07%) educational backgrounds dominated this study sample. These levels of education commonly work in the low-level sector. Moreover, most of the respondents also worked as private employees (32.85%) where the presence at work was counted tightly. Work tight schedules,

uncertainty, and low income were predictors of a person's happiness (Yamane et al., 2019). According to a study, cancer survivors who returned to work experienced low quality of life and depressive symptoms (Schmidt et al., 2019). Even though the physical functioning progressed, it did not return to the optimal functioning as before the cancer. Moreover, their cognition has not recovered from suffering from cancer. Therefore, the psychological domain remained unstable during the three months of chemotherapy.

In contrast to psychological domain, physiological dysfunction seemed not too burdening for cancer survivors after three months in this study, 55.38, 51.00, 64.16. This finding was not supported by previous arguments that physical disabilities were predisposition for numerous psychological problems because physical impairments prevent cancer survivors to access provided medical services (Edwards et al., 2020). Cancer survivors seemed to achieve support from family and social support for accessing services as reported in a study (Aprilianto et al., 2021). As commonly known that nowadays there were non-profit organizations or religious institutions have provided free ambulances for people need transportation. The budget for this service came from charities such as *amal* or *zakat* (Sari, 2018). Moreover, Indonesian such as Javanese neighbourhoods, or religious societies, such as "jamaah pengajian" or religious (Islam) communities were commonly very supportive for their member. Beside supporting financial, they also support socially such as supporting family while sick people being hospitalized. This support also considered as benefit of religious community (Koenig et al., 2012) for cancer survivors. Therefore, physical dysfunction was not a barrier to access the facilities.

This study only portrayed natural dynamic of subjective perception of cancer patients during their routine chemotherapy procedures. No situations were controlled. Results from this observational study are not able to explain the cause and effect of the phenomena. Since many respondents were Javanese cultural background, this result might not be able to represent Indonesia's population in general.

CONCLUSION AND RECOMMENDATION

This study pictured the natural change patterns of mindfulness, spirituality, stress, and quality of life for three months of observation. The results might indicate that cancer survivors experience dynamic levels of mindfulness, spirituality, stress, and quality of life. The natural improvement of mindfulness, spirituality, and quality of life, however, can be observed at the third month after the baseline measure.

The following study may develop various spiritual care topics such as measurement tools and intervention strategies besides the concept of it.

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**ORIGINAL ARTICLE****NURSE MANAGERS' PERCEPTION AND PRACTICE ON THE THEORY OF TECHNOLOGICAL COMPETENCY AS CARING IN NURSING: A PRELIMINARY STUDY****Yoko Nakano^{1*}, Tomoya Yokotani², Yoshiyuki Takashima³, Feni Betriana⁴, Kyoko Osaka¹, Mutsuko Kataoka⁵, Tetsuya Tanioka⁶, Rozzano C Locsin⁷**

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ABSTRACT

In spite of emphasis on patient-centered care and promotion of their quality, shortcomings have been seen in psychiatric care due to lack of compassion. To improve the quality of psychiatric caring in nursing, it is important to develop and implement in-service education based on Locsin's Technological Competency as Caring in Nursing (TCCN) theory. Objectives to determine psychiatric nurse managers' perception and practice status as a preliminary survey to serve as a resource for in-service psychiatric nursing education. This survey was conducted in August 2022 using the Technological Competency as Caring in Nursing Instrument-Revised for Practice (TCCNI-RePract) scale at "A" psychiatric hospital. Descriptive statistics and Wilcoxon's signed-rank tests were used. Eleven head nurses and assistant head nurses participated in this study. Mean values for the perception dimension of each item of the TCCNI-RePract were high, whereas mean values for practice dimension were low. The results indicated that perception dimension was significantly higher than practice dimension in 21 of 26 items of the TCCNI-RePract. Nurse managers demonstrated a high level of perception of the TCCN theory; however, many practical items scored low. Nurse managers suggested developing a current educational program to inform practice based on the TCCN theory.

Keywords: Advanced technologies, caring in nursing, in-service education, technological competency



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INTRODUCTION

Currently, advanced technologies are being used in psychiatric care, including computed tomography, magnetic resonance imaging, optical topography, and other medical testing equipment, as well as mobile apps, wearable technology, and remote sensors. These technologies are used to assist in patient care for a range of disorders, such as schizophrenia, mood disorders, dementia, personality

disorders, and eating disorders (Depp et al., 2016; Dewa et al., 2021; Naslund et al., 2017; Riva & Serino, 2020; Strudwick et al., 2019).

Additionally, monitoring and assessing the pathophysiology, treatment, and side effects of patients with schizophrenia in psychiatry requires technical abilities and information such as medical history, primary and secondary diagnoses,

intelligence quotient, positive and negative syndrome scale, brief psychiatric rating scale results, medication blood levels, and side effects of antipsychotic drugs (such as malignant syndrome, water intoxication, akathisia, etc., and criteria for determining these). These aspects are essential to consider when providing nursing care based on the caregiving approach.

Recently, advances in digital technology in medicine, such as online medical care, telenursing using information and communication technology (Heo et al., 2021), electronic prescriptions, online guidance by pharmacists, and electronic centralized management of patient information, have made it possible to share a large amount of medical information, including various test data and medical record information. These technologies aim to make accurate diagnoses in determining how we treat our patients, while deriving a course of treatment.

However, focusing solely on information obtained from technology neglects the caring aspect that is so important to the nursing profession and does not help in healing the patient, who is the primary focus of nursing care. Therefore, it is crucial to understand technology, its usage (judgment and practical skills), as well as the ability to provide care and demonstrate compassion towards the patient, as it is an integral part of nursing.

Locsin (2005) suggested that "in nursing, it is important to fully understand the unpredictable and ever-changing human being" and that "the art of care allows us to know and understand the patient more fully as a person." However, in nursing practice that is merely technically skilled without the theoretical foundation of the TCCN theory, the recipients of care (patients and families) are likely to be treated as objects, and it is important to view patients as irreplaceable persons to design patient-centered nursing.

Contemporary healthcare is undergoing significant transformations due to various factors, including changes in disease patterns, an aging population, declining birth rates, and the impact of the COVID-19 pandemic (Mamom & Daovisan, 2022). Consequently, there is a growing need for nursing professionals with advanced practical skills to respond to the increasing diversity and complexity of medical needs. Nurses must also be involved in determining which aspects of nursing practice can be delegated to technology (Pepito & Locsin, 2019). Therefore, it is essential for the nursing profession to possess advanced practical skills to address the increasing diversity and complexity of medical needs. In Japan, however, education on caring in nursing has not yet been geometrically well known, and it is difficult to say that it has taken root in basic nursing education. In addition, some nurses do not have experience with educational content related to caring in nursing. Therefore, it is important to develop in-service education that incorporates the TCCN theory.

McCausland (2012) notes that new interdisciplinary models of care that transcend the traditional boundaries of outpatient, inpatient, and community require trusted clinical leadership. The nurse manager is recognized as an individual responsible for enhancing patient care services and strengthening nursing practice. Leadership is an essential element in providing quality care to patients and in improving nurses' ability to practice.

Clinically competent nurses are thoroughly familiar with collaborative working relationships, autonomous nursing

practice, appropriate staffing, optimization of competent nursing practice, managerial support, and patient-centered culture to create an environment that ensures quality nursing practice competence. Joseph and Huber (2015) found that recognition within the team and leadership in responsibilities impact patient outcomes.

In previous research, the Caritas Coach Education Program based on Watson's theory has been implemented in in-service education on caring in nursing, and post-education evaluation has been reported (Brewer et al., 2020). Additionally, in-service education based on the TCCN theory focuses on technology and caring, was also conducted by Nakano et al. for nurse managers in hospitals providing highly advanced medical care, evaluating their perceptions after a formalized education program using the Technological Competency as Caring in Nursing Instrument-Revised (TCCNI-R) to assess post-education perceptions (Nakano, Yokotani, Tanioka, et al., 2021).

However, current in-service education based on the TCCN theory has not been conducted for psychiatric nurses. In psychiatric nursing, where advanced technology is used, the development and introduction of in-service caring-based education on the TCCN theory is important for improving the quality of psychiatric nursing. There is an urgent need to design, develop, and evaluate in-service education programs specific to psychiatric nursing that provide practice based on the TCCN theory.

This study aims to determine psychiatric nurse managers' perception and practice status using the TCCNI-Revised for Practice (TCCNI-RePract) as a preliminary survey to serve as a resource for in-service psychiatric nursing education.

METHOD

Study design

This study is a preliminary investigation using a self-administered questionnaire survey with the TCCNI-Revised for Practice (TCCNI-RePract) as a preliminary step in developing a psychiatric nursing version of the TCCN theory of in-service education program. Selected psychiatric hospital for this study conducted in-service education based on the caring in nursing theory.

Participants

The participants were nurse managers in one of the psychiatric and psychosomatic hospitals with an acute, chronic, and dementia ward with approximately 300 beds in Japan. Convenience sampling method was employed. Eleven nurse managers engaged in psychiatric nursing practices participated in this preliminary study. Meanwhile, we excluded: a) Persons who are not qualified as registered nurses; b) Nursing directors and deputy nursing directors involved in organizational management; c) Nurses with no previous management experience in psychiatric nursing; and d) The participants were those who did not give their consent to participate in the study.

Instrument

The questionnaire survey consists of two parts: personal attributes, and the TCCNI-RePract questionnaire. For personal attributes, the participants were asked information regarding their gender, age, employment position, length of experience as a registered nurse, length of experience as a psychiatric nurse, and length of experience in psychiatric nursing management.

For the TCCNI-RePract, it was used to measure whether or not nurses can percept and practice the TCCN theory in clinical practice arenas. The instrument consisted of 52 items, 26 each for the perception dimension and 26 items for the practice dimension. In a previous study, the TCCNI-Repract was surveyed among nurses in acute and general wards and structured into four factors and 21 items using exploratory factor analysis, which was tested for reliability and validity (Yokotani et al., 2021). Additional items were added to the TCCNI-RePract (50 items) for the perception and practice dimension, and modified, resulting 52 items for this questionnaire survey.

The perception dimension questionnaire items were developed with a 7-point Likert scale, with values ranging from 1 as "Strongly Disagree" to 7 as "Strongly Agree." The practice dimension questionnaire items were developed with a 7-point Likert scale with values ranging from 1 as "Never" to 7 as "Always."

Data collection

An anonymous self-administered questionnaire survey was conducted from August 1, 2022 to August 31, 2022. The self-administered questionnaires, TCCNI-RePract, were distributed to 11 head nurses and assistant head nurses. To protect privacy, personal collection envelopes were distributed at the same time as the questionnaires and the questionnaires were sealed in the collection envelopes. The researchers collected them.

Data analysis

Regarding the data analysis, one participant did not answer Q1 and another participant did not answer Q11 in the perception and practice dimensions of the collected response

data. Due to missing values in these items, question items Q1 and Q11 were excluded from the analysis.

Descriptive statistics were conducted to compare the medians of the perception and practice dimensions evaluated using TCCNI-RePract using Wilcoxon signed rank sum tests. P values less than 0.05 were considered statistically significant. Data analysis was performed using R (version 4.2.2, R Foundation for Statistical Computing, Vienna, Austria) (R Core Team, 2022)."

Ethical consideration

The ethical approval for this study was obtained from the Ethics Committee of Tokushima University Hospital, Japan (approval number 2914-3). Participation by the subjects was voluntary; no penalty was applied if they decided to quit the study at any time during data collection. Personal information was kept confidential by securing access using a password. All personal data were secured in the researcher's computer that was also accessible only through a password known only by the principal researcher.

RESULTS

Table 1 shows the demographic characteristics of the subjects. A self-administered questionnaire was distributed to 13 participants, and 11 who responded were included in the analysis. The mean age was 54.1 years, ranging from 46 to 63 years. The average number of years of psychiatric nursing experience was 24.5 years. All participants had more than 20 years of nursing experience. The mean number of years of psychiatric nursing management experience was 11.3 years, ranging from 2 to 22 years.

Table 1. Demographic data

Items (N=11)		n (%)	Mean (SD)	Range
Gender	Male	6 (54.5)		
	Female	5 (45.5)		
Age (in years)	40-49	4 (36.4)	54.1 (6.3)	46-63
	50-56	4 (36.4)		
	More than 60	3 (27.3)		
Employment position	Nurse manager	6 (54.5)		
	Assistant Head Nurse	5 (45.5)		
Length of experience as a registered nurse (in years)	20- less than 30	4 (36.4)	32.5 (5.9)	25-44
	30- less than 40	6 (54.5)		
	More than 40	1 (0.91)		
Length of experience as a psychiatric nurse (in years)	5- less than 10	1 (0.91)	24.5 (5.9)	7-33
	10- less than 20	1 (0.91)		
	20- less than 30	5 (45.5)		
	30- less than 40	4 (36.4)		
Length of experience as a nursing management (in years)	1- less than 5	2 (18.2)	11.3 (6,7)	2-22
	5- less than 10	3 (27.3)		
	10- less than 20	4 (36,4)		
	More than 25	2 (18.2)		

Table 2 shows the score for the TCCN-Repract perception dimension. Missing values were found in Q1 and Q11 and were excluded from the analysis. The item of perception dimension with the highest score was Q7 (M=6.45, SD=0.50,

95%CI=6.10-6.81), while the item with the lowest score was Q12 (M=4.55, SD=0.99, 95%CI=3.85-5.24). The ceiling effect was observed in Q17 only. No floor effect was observed in all items.

Table 2. Mean, standard deviation, and 95% confidence interval of the Technological Competency as Caring in Nursing Instrument - Revised and Practice (TCCNI-Repract): Perception dimension

Question number and Items (N=11)	Mean	SD	95% CI	
			LL	UL
Q1 Nurses must emphasize thoughtfulness and consideration for patients.	—	—	—	—
Q2 Nurses are professionals who express caring utilizing competency with technology	5.36	0.77	4.82	5.91
Q3 Nurses have to provide care for patients by using necessary technologies.	5.73	0.86	5.12	6.33
Q4 Nurses must provide nursing care through the harmonious relationship between technological knowing and caring.	5.91	0.51	5.55	6.27
Q5 Nurses need to consider providing nursing care because each patient's wishes always change.	5.55	0.89	4.92	6.17
Q6 Nurses must make a plan of care together with the patient to ensure quality nursing.	5.73	0.62	5.29	6.16
Q7 Nurses need to know patient's health data in order to take care of the patient.	6.45	0.50	6.10	6.81
Q8 Nurses must share information with their patients in order to know them better.	5.73	0.75	5.20	6.26
Q9 Nurses must provide care with a thorough understanding of their own competency.	5.64	0.98	4.95	6.33
Q10 Nurses have to use technology in order to know patients as persons who are complete and to maintain honest relationships with them.	5.82	0.83	5.23	6.41
Q11 Nurses must finish nursing duties within a specific time even if they cannot completely know the patients, for example, their emotional needs or feelings. *	—	—	—	—
Q12 Nurses must respect patients' beliefs and focus on their recovery, while anticipating their hopes, needs, and desires.	4.55	0.99	3.85	5.24
Q13 Nurses need to maintain patients' lifestyles and allow them to regain their healthy lives.	5.27	0.96	4.59	5.95
Q14 Nurses must emphasize thoughtful consideration of patient's feelings, encouragement, and respect.	5.73	0.45	5.41	6.04
Q15 Nurses need to provide timely nursing care in accordance with patients' physical and emotional conditions.	6.18	0.72	5.68	6.69
Q16 Nurses must be devoted towards meeting the patient's needs, hopes, wishes, and dreams.	5.82	0.72	5.31	6.32
Q17 Nurses must act by carefully listening to the patients' voices and expressing compassion.	6.18	0.94	5.52	6.84
Q18 Nurses must consider patient's stress and anxiety level occurring within the nurse-patient relationship.	5.91	0.51	5.55	6.27
Q19 Nurses have to know the patients not only focusing on their physical aspects but also on accurately understanding "who they are as persons.	6.09	0.67	5.62	6.56
Q20 Nurses' competence includes the use of healthcare technologies from the perspective of caring in nursing.	5.82	0.57	5.41	6.22
Q21 Knowing the patient is understanding the whole person.	5.73	0.75	5.20	6.26
Q22 Nursing as caring is the involvement of nurses with patients and their families in ways that allow them to grow together in the shared nursing situation.	5.45	0.66	4.99	5.92
Q23 Nurses use technologies with competency in order to know patients.	5.55	0.99	4.85	6.24
Q24 Nurses use technologies with competency in order to know patients' families.	5.27	1.05	4.53	6.01
Q25 Technology is useful for understanding patients' health conditions.	5.82	0.72	5.31	6.32
Q26 Nurses use technology with competency as caring to facilitate patients' recovery with enhanced self-esteem.	4.91	0.51	4.55	5.27

SD: Standard Deviation, CI: Confidence Interval, LL: Lower Limit, UL: Upper Limit. Likert scale measurement, with values ranging from 1 as Strongly disagree; 2 Disagree; 3 Somewhat disagree; 4 Neither agree or disagree; 5 Somewhat agree; 6 Agree; to 7 as Strongly agree. —, missing value.

Table 3. Mean, standard deviation, and 95% confidence interval of the Technological Competency as Caring in Nursing Instrument - Revised and Practice (TCCNI-Repract): Practice dimension

Question number and Items (N=11)	Mean	SD	95% CI	
			LL	UL
Q1 I emphasize thoughtfulness and consideration of patients. *	—	—	—	—
Q2 I express caring utilizing competency with technology.	4.73	0.45	4.41	5.04
Q3 I provide care for patients by using necessary technologies.	4.82	0.57	4.41	5.22
Q4 I am providing nursing care through the harmonious relationship between technological knowing and caring.	4.82	0.57	4.41	5.22
Q5 I consider patient's wishes in providing nursing care because their wishes always change.	4.64	0.48	4.30	4.98
Q6 I am making care plans together with the patient to ensure quality care.	2.55	1.23	1.68	3.41
Q7 I am assessing patients' health data when taking care of patients.	4.73	1.14	3.93	5.53
Q8 I share information with patients to get to know them better.	4.18	0.94	3.52	4.84
Q9 I am providing nursing care with a thorough understanding of my own competency.	4.55	1.16	3.73	5.36
Q10 I use technology to know patients as complete and to maintain honest relationships with them.	4.82	0.39	4.55	5.09
Q11 I finish my work within the established work time even if I could not know the patient. *	—	—	—	—
Q12 I respect patients' beliefs, focus on their recovery, and anticipate their hopes, needs, and desires.	4.36	0.77	3.82	4.91
Q13 I am caring for patients to maintain their lifestyles and allow them to regain their healthy lives.	4.91	0.79	4.35	5.47
Q14 I am considerate, supportive, and respectful of the patient.	4.91	0.51	4.55	5.27
Q15 I provide timely nursing care in accordance with patients' physical and emotional conditions.	4.64	0.64	4.18	5.09
Q16 I am caring for patients to fulfill their needs, hopes, and dreams.	4.45	0.78	3.90	5.01
Q17 I am listening to the patient's voices and showing my compassion.	5.36	0.64	4.91	5.82
Q18 I provide care and consider the stress and anxieties that the patient has during a nurse-patient relationship.	4.82	1.03	4.09	5.54
Q19 I am working to know patients by focusing on their physical aspects and by understanding who the patient is.	4.73	0.96	4.05	5.41
Q20 I use healthcare technologies as one of my nursing competencies from the perspective of caring in nursing.	3.91	0.67	3.44	4.38
Q21 I am working to know the patient by understanding the patient as a whole.	4.45	0.89	3.83	5.08
Q22 I am providing nursing care by involving patients and families and including me in their growth within the nursing situations.	4.45	0.99	3.76	5.15
Q23 I use technologies with competence as an expression of my caring in order to know patients.	3.91	1.24	3.04	4.78
Q24 I use technologies with competence as an expression of my caring in order to know patients' families.	3.82	1.34	2.88	4.76
Q25 I use technology to understand patients' health conditions.	4.55	1.56	3.45	5.64
Q26 I am using technology and providing caring to facilitate patients' recovery with enhanced self-esteem.	3.73	1.14	2.93	4.53

SD: Standard Deviation, CI: Confidence Interval, LL: Lower Limit, UL: Upper Limit. Likert scale measurement, with values ranging from 1 as Never; 2 Very rarely; 3 Rarely; 4 Occasionally; 5 Frequently; 6 Very frequently; to 7 as Always. —, missing value.

Table 3 shows the score for the TCCN-Repract practice dimension. Missing values were found in Q1 and Q11 and were excluded from the analysis. The item of practice dimension with the highest score was Q17 (Mean=5.36, SD=0.54, 95%CI=4.91-5.82), while the item with the lowest score was Q6 (Mean=2.55, SD=1.23, 95%CI=1.68-3.41). No floor effect was observed in all items. However, a ceiling effect and floor effects were not observed.

Table 4 shows the comparison results using Wilcoxon's signed rank test based on median values, comparing the corresponding perception and practice dimension of the TCCNI-RePract. The results show significant differences for all items except for questions Q2, Q12, and Q13. In particular, for Q6, a median difference of more than 3.0 was found between the perception and practice dimensions, with a median value of 2.0 (IQR = 2.0-3.0) for the practice dimension, which was the lowest among all question items.

Table 4. The compared results of the perception and practice situation of the TCCNI-RePract

	TCCNI-RePract Perception (N=11)		TCCNI-RePract Practice (N=11)		p
	Median	IQR	Median	IQR	
Q1	—	—	—	—	—
Q2	5.0	5.0-6.0	5.0	4.5-5.0	0.063
Q3	6.0	5.0-6.0	5.0	4.5-5.0	0.008
Q4	6.0	6.0-6.0	5.0	4.5-5.0	0.002
Q5	5.0	5.0-6.0	5.0	4.0-5.0	0.016
Q6	6.0	5.0-6.0	2.0	2.0-3.5	0.001
Q7	6.0	6.0-7.0	5.0	4.0-5.5	0.001
Q8	6.0	5.5-6.0	4.0	4.0-5.0	0.008
Q9	6.0	5.5-6.0	5.0	4.0-5.0	0.008
Q10	6.0	5.5-6.0	5.0	5.0-5.0	0.016
Q11	—	—	—	—	—
Q12	5.0	4.0-5.0	4.0	4.0-5.0	0.750
Q13	6.0	5.0-6.0	5.0	4.0-5.5	0.481
Q14	6.0	5.5-6.0	5.0	5.0-5.0	0.031
Q15	6.0	6.0-7.0	5.0	4.0-5.0	0.004
Q16	6.0	5.0-6.0	4.0	4.0-5.0	0.002
Q17	6.0	6.0-7.0	5.0	5.0-6.0	0.020
Q18	6.0	6.0-6.0	5.0	4.0-6.0	0.016
Q19	6.0	6.0-6.5	4.0	4.0-5.0	0.002
Q20	6.0	5.5-6.0	4.0	3.5-4.0	0.001
Q21	6.0	5.5-6.0	4.0	4.0-5.0	0.008
Q22	6.0	5.0-6.0	5.0	4.0-5.0	0.008
Q23	6.0	5.0-6.0	4.0	3.5-4.5	0.006
Q24	5.0	5.0-6.0	4.0	3.5-4.5	0.012
Q25	6.0	5.0-6.0	5.0	4.5-5.5	0.016
Q26	5.0	5.0-6.0	4.0	3.0-4.0	0.039

Wilcoxon signed rank test, Abbreviations: TCCNI-Repract, Technological Competency as Caring in Nursing Instrument - Revised and Practice; —, missing value; IQR, Interquartile Range; Bold values significant at $p < 0.05$

DISCUSSION

Caring and psychiatric nursing

In this survey, using the TCCNI-RePract, it was found that the overall perception of Technological Competency as Caring in Nursing by nurse managers in the psychiatric nursing area was high. In comparison, responses to the practice component showed low results. Additionally, significant differences were observed in many items revealed through the Wilcoxon's signed rank sum test, suggesting that the subjects in this study were highly perceptive of the TCCN theory but did not or could not practice adequately using the TCCN theory. This finding was similar to previous studies that investigated the perception and practice of TCCN theory among nurses in acute and general wards (Kato et al., 2017; Nakano, Yokotani, Betriana, et al., 2021; Nakano, Yokotani, Tanioka, et al., 2021; Yokotani et al., 2021).

In particular, Q6 of the perception dimension showed that, "Nurses must make a plan of care together with the patient to ensure quality nursing" had high mean but median values. However, Q6 of the practice dimension, ("I am making care plans together with the patient to ensure quality care") had

the lowest mean and median values within the 2.0s. This suggests that the importance of care planning with patients who have had to be hospitalized for mental illness is recognized but not put into practice. This was considered as the current situation where advanced technical skills in psychiatric nursing, such as advanced communication skills, empathy, and compassionate attitudes (Sanz-Osorio et al., 2023), were shown not able to be sufficiently demonstrated in dealing with the unique symptoms of patients with mental illnesses and to be guided on how to deal with them.

Nurses involved in psychiatric nursing often experience difficulties in dealing with patients (Seto et al., 2020). These include dealing with acute psychiatric symptoms, changing patient expectations, and aggressive behavior from the patient (Pekurinen et al., 2017; Salberg et al., 2019). Psychiatric nursing requires individualized care and comprehensive responses to patients due to the diversity of mental illness classifications and symptoms (Coombs, Crookes, et al., 2013; Coombs, Curtis, et al., 2013). In addition, in order to practice them, nurses engaged in psychiatric nursing need a high level of expertise, as they

must have the ability to provide support based on a great deal of knowledge, skills, and reasonable accommodation (Yamada et al., 2022). Furthermore, some nurses feel moral distress because they are forced to make ethical decisions and subject their patients to extraordinary restrictions that they do not want in the therapeutic environment they provide for the safety of their patients (Jansen et al., 2021; Ohnishi et al., 2018). As a result, nurses engaged in psychiatric nursing have reported feeling frustrated and helpless about these problems (Ando & Kawano, 2016). Nurses' caring behavior is influenced by several environmental factors, including working conditions, workload, management support, and patient health concerns (Akansel et al., 2021). To practice nursing based on the TCCN theory, it is urgent to address personal and environmental factors that align with the clinical setting.

Advances in technology and the need for technological competency in psychiatric nursing.

In a previous study, psychiatric nurses were positive about the implementation of an Internet technology-based support system for depressed patients but did not incorporate it into their daily nursing practice (Kurki et al., 2018). In mental health services, factors that have been identified as hindering the implementation of new interventions include staff and middle management resistance, poor communication, and novelty (Barak & Grohol, 2011). From this, it can be inferred that some barriers may exist regarding technology-enhanced nursing practice. In addition, technology-enhanced work environments have been shown to positively impact practice by enabling nurses to rapidly perceive the care needed for their patients and make changes to their care (Burkoski, 2019). Using such technology-enhanced work environments in clinical psychiatric nursing is considered a practical approach for psychiatric nurses to improve the quality of care. The COVID-19 pandemic has underscored the increased importance of providing physical care support to psychiatric inpatients (Williams et al., 2021). Quantitative antigen tests and polymerase chain reaction tests are currently proving effective in controlling nosocomial Covid-19 infections (Russ et al., 2022). Also, various laboratory techniques, including X-ray and CT scans, contribute to patient safety and comfort by enabling healthcare professionals to detect pneumonia. These results assist nurses in accurately assessing the patient's condition and planning appropriate care (Li et al., 2020; Wang et al., 2022). Recognizing these technologies is important for enabling psychiatric nurses to implement them in the care of psychiatric inpatients (Foye et al., 2021).

In psychiatry, medication and rehabilitation therapy play crucial roles in promoting patients' therapeutic recovery. Advanced technology is used in the development of various psychotherapeutic agents, and a comprehensive understanding of their pharmacological effects can lead to appropriate symptom management for patients with psychiatric disorders (Pearson et al., 2018). Parkinson's syndrome and sarcopenia are commonly observed in patients with psychiatric disorders, which can result in reduced motor function and lower quality of life. Rehabilitation and nutritional therapy are important in preventing these conditions, as well as technical interventions and assessments to support these treatments (Ashdown-Franks et al., 2019; Kowalska et al., 2019; Pearsall et al., 2014). Using these technologies and implementing them effectively in nursing practice allows psychiatric nurses to have a holistic understanding of their patients. Locsin uses Carper's theory in Locsin's TCCN theory. Carper (1978) suggests that fundamental patterns of knowing in nursing - personal, empirical, ethical, and aesthetic- are necessary to understand

a person holistically. Nurses must have advanced technical skills and competencies to implement these types of knowledge in practice. Locsin (2005) states that competence is the ultimate expression of caring in nursing and that the absence of technical ability is tantamount to the absence of caring.

In Japan, the "Program Medical Device and Medical Management Addition" was introduced in the medical fee revision for the fiscal year 2022 (Ministry of Health Labour and Welfare, 2022). Before this revision, nicotine addiction treatment apps and hypertension treatment support apps were approved by the Ministry of Health, Labour, and Welfare, with nicotine addiction treatment apps being covered by insurance (Ministry of Health Labour and Welfare, 2022). In the area of psychiatry, there have been significant advancements in the development of treatment and care using various technologies, including rehabilitation for patients with schizophrenia and dementia, and research on the use of communication robots to alleviate psychiatric symptoms (Osaka et al., 2021, 2022; Tanioka, Betriana, et al., 2021; Tanioka, Yokotani, et al., 2021). These developments may ultimately lead to insurance coverage for non-pharmacological treatments in the psychiatric area. The development of such technology in the psychiatric area relies heavily on the presence of highly skilled psychiatric nurses. To achieve this, it is believed that support must be enhanced to remove the barriers between technology and psychiatric nursing.

In-service education on the TCCN theory in psychiatric nursing

The TCCN theory suggests that nurses can establish closer relationships with patients by improving their technological competency and getting to know them better. The use of technology in nursing is driven by the contemporary demand for nursing practices that require technological knowledge and skills. Therefore, mutual support between the patient, who is the focus of care, and hospital nurses, who play a central role in providing care, is essential. Furthermore, barriers exist at the organizational, practitioner, and educational levels regarding nurses' caring behaviors (Pashaeypoor et al., 2019). However, Brewer et al., (2020) state that attention to nursing practice focused on reducing professional patient self-care levels guided by theory can reduce some of the negative effects of barriers and work environments. In making this possible, nurse managers, leaders, and educators play an important role in creating excellent nursing care. Nurse managers can expect to improve patient satisfaction and nurses' sense of purpose by intervening to help nurses focus on the satisfaction they derive from caring.

Nurse managers should help nurses optimize the use of technology in nursing by providing technology assistance and opportunities for nurses to use technology and by providing training and education on the specific technologies used in psychiatric areas. Nurse managers must understand the nurse's and patient's perspectives on the impact of technology on the delivery of care, which is critical to meeting the patient's spiritual, psychological, and social needs. Moreover, nurse managers have a role in helping nurses distinguish between technology that enables good care and technology that is a burden on care (Burkoski, 2019).

The use of in-service education programs based on the TCCN is expected to become a practical approach to incorporating new technologies into quality psychiatric care in the future. In-service education programs for nursing staff

take many forms and methods (Chaghari et al., 2017). However, there are few reports on its impact, particularly on professional outcomes. In-service education for psychiatric nurse managers focuses on learning the theoretical basis of nursing from TCCN theory. Psychiatric nurse managers are expected to serve as role models for nursing practice based on TCCN theory in order to improve the quality of nursing care. In addition, psychiatric nurse managers are expected to act as experts in nursing practice by implementing the nursing process based on TCCN theory, which involves "knowing the person as caring." As a result, this hierarchical educational plan is expected to systematically enhance competence in care skills, as an expression of caring in nursing, and ultimately improve the quality of nursing care.

The findings of this study are limited as it was conducted only with nurse managers at a single psychiatric hospital. To generalize these findings, it is necessary to conduct similar surveys with a larger number of participants in multiple psychiatric hospitals in the future.

CONCLUSION AND RECOMMENDATION

Nurse managers demonstrated a high level of perception of the TCCN theory; however, many practical items scored low. In order for nurses to practice based on the TCCN theory, it is important to first identify why they are unable to practice on items where the practical score is lower than the perception score. Additionally, nurse managers need to develop a current education program for nursing staff in order to practice based on the TCCN theory. It is also necessary to establish evaluation criteria based on the TCCN theory to measure the effectiveness of current education and develop a sustainable in-service education system.

DECLARATION OF CONFLICT OF INTERESTS

The authors declare that they have no conflicts of interest.

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DATA AVAILABILITY

The datasets generated during and/or analyzed during the current study are not publicly available due to ethical restrictions but are available from the corresponding author upon reasonable request.

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THE EFFECT OF YOGA ON REDUCING STRESS AND IMPROVING CD4 COUNTS AMONG PEOPLE WITH HIV: A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

Stress is a common mental health problem among HIV patients. Yoga has been frequently used to manage stress, but its potential benefits are not well-established yet. The aim of this meta-analysis is to assess the effect of yoga intervention on reducing stress and improving CD4 among HIV populations. Electronic bibliographic databases were systematically searched for articles reporting randomized controlled trials on yoga, HIV, and stress. The inclusion criteria were studies that (a) assessed yoga intervention in HIV patients; (b) included control groups; (c) evaluated psychological stress or biomarkers of stress as the outcome; and (d) provided mean and standard deviation scores for both groups to calculate the effect size. Meanwhile, our exclusion criteria were studies that (a) used other than randomized controlled trial design; (b) were written in a language other than English; and (c) included participants other than HIV patients. Six studies were sampled, with a total of 348 participants that met our criteria. HIV positive participants who received yoga interventions reported significantly reduced psychological stress compared to control group (total effect size was -0.85, with 95% CI from -1.47 ~ -0.23). Thus, yoga is a stress management exercise that health care providers can use to treat HIV patients.

Keywords: *HIV/AIDS; meta-analysis; stress; yoga*



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INTRODUCTION

Psychological stress is one of the most common mental health problems among people living with HIV (PLWH). Considering the lengthy course of HIV medication and the stigma associated with the disease, it is unsurprising that PLWH experiences stress related to the disease. The prevalence of stress among PLWH is estimated to be as high as one-third of all people with the disease in developing countries (Ayano et al., 2020), and it has gotten worse during the COVID-19 pandemic (West et al., 2022). Most HIV patients confront multiple stressors, including stress related to HIV itself (e.g., treatment with medication) and stressors not directly to HIV (social, financial, political) (Huang et al., 2020). Many scholars agree that this burden of stress contributes to lower quality of life for HIV patients, poorer drug adherence, lower work sufficiency, and raises the risk of HIV

developing into AIDS (de Los Rios et al., 2021; Effendy et al., 2019; Verhey et al., 2018). According to a meta-analysis conducted by Rueda et al. (2016), higher levels of HIV-related stigma are significantly correlated with greater rates of depression, lower levels of social support, compliance with medication treatment, and access to medical services. In clinical settings, stress among PLWH can often go unrecognized by healthcare professionals or by the patients themselves (Felker-Kantor et al., 2019). Even if recognized, assessment and treatment may not be initiated, and even if they are, the treatment for stress may not be successful (Tong et al., 2020).

With the growing interest in mindfulness-based therapy for psychological stress among PLWH, several such interventions have been scientifically successful at reducing

stress and improving the health and well-being of HIV-positive people. For example, mindfulness-based therapies have been proven effective in coping with stress and improving mental health outcomes among PLWH (Scott-Sheldon et al., 2019). Cognitive-behavioral therapy has also been proven to be effective in reducing symptoms of depression and enhancing adherence to antiretroviral medications (Safre et al., 2021).

Moreover, a meta-analysis of stress management interventions among women living with HIV indicates the benefits of stress management interventions for a variety of psychological conditions, such as stress, depression, and anxiety, in addition to fatigue, adhering to treatments, and quality of life (Waldron et al., 2021). The interventions assessed in that meta-analysis included yoga, tai chi, meditation, and aerobic exercise.

Yoga, a type of mind-body exercise that incorporates physical movement, breathing methods, and meditation (Brinsley et al., 2021), is becoming a part of integrative healthcare, and a growing body of evidence supports its use as a complementary therapy. Popular types of yoga practices include Iyengar yoga, Hatha yoga, and Sudarshan Kriya Yoga. Hatha yoga generally focuses more on postures (*asanas*) and body motions, while most Western yoga practices involve breathing and meditation (Decker et al., 2019). Iyengar yoga, a Hatha variety, consists mostly of poses with exact alignment along with breathing techniques (Lutz et al., 2019) and sometimes includes the use of additional equipment, such as chairs and cushions, to make yoga more accessible to people with different degrees of yoga experience and physical limitations. Additionally, practicing Iyengar yoga has been shown effective for dealing with chronic pain (Kempert, 2020), improving physical health, and emotional functioning among pediatric obesity patients for disturbing emotions, such as despair, anxiety, rage, and anger (Hainsworth et al. 2018). Sudarshan Kriya yoga uses various breathing methods and has been shown to improve sleep quality while reducing feelings of depression, stress, and anxiety (Sloan & Kanchibhotla, 2021; Vasudev et al., 2020).

As yoga is becoming more popular in clinical settings, it is increasingly used for reducing stress among PLWH. Mind-body methods such as yoga are particularly popular among PLWH (Agarwal et al., 2015). However, their potential benefits in this group are not yet well-established. According to a randomized controlled trial comparing yoga intervention and treatment as usual (Wimberly et al., 2018), yoga was found to have improved mental outcomes, reduced stress, and reduced the use of mind-altering substances among people with HIV who were reentering society from jail or prison. Previous reviews and meta-analyses of the effects of yoga mostly focus on a broad range of psychological conditions as outcomes. Our objective is to evaluate whether yoga therapy can improve outcomes specifically related to psychological stress and CD4 counts in PLWH and to present our findings as a basis for future scientific research.

METHOD

Study design

This study followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) developed by Moher, Liberati, Etzlafl, Altman, and PRISMA Group (2009). The PRISMA checklist is included as a supplemental document (Figure 1).

Eligibility criteria

This review included randomized controlled trial studies that (a) assessed yoga intervention for PLWH; (b) included control groups; (c) evaluated psychological stress or biomarkers of stress as the outcome; and (d) provided mean and standard deviation scores for both groups to calculate the effect size; (e) provided information regarding the disease progression (e.g., CD4 counts) and biomarker of stress (e.g., cortisol). Meanwhile, our exclusion criteria were studies that (a) used other than randomized controlled trial design; (b) were written in a language other than English; (c) included participants other than HIV patients.

Information source and search strategies

A comprehensive search strategy was used to find studies in electronic bibliographic databases, such as PubMed, CINAHL, Medline, ProQuest, and the Cochrane Library. Data collection occurred from February to March 2022. The search for relevant literature was done using broad search terms, such as "HIV," "yoga," and "stress." To zoom in on the topic specifically, the search strategy used a Boolean search plan with the following keywords: "HIV" OR "human immunodeficiency virus" OR "AIDS" OR "HIV/AIDS" OR "PLWH" OR "PLWA" OR "PLHA" OR "people living with HIV" OR "people living with HIV/AIDS" OR "HIV+" OR "HIV-positive" OR "HIV Seropositivity" OR "HIV individual" AND "Yoga" OR "Mind-Body Relaxations" OR "Yogic" OR "Hatha" OR "asana" OR "Pranayama" OR "Dhyana" OR "Vinyasa" OR "Body mind exercise" AND "Stress, Psychological" OR "Stress" OR "Psychological stress." We modified the electronic bibliography database search strategy for each database website when necessary. For example, by adding or removing the MeSH (Medical subject headings) text word search in titles and abstracts [tw] and eliminating wildcards [*].

Study selection

In the first step, we removed all duplicate articles. Next, two examiners reviewed the titles and abstracts to determine studies that were eligible for inclusion in our review. Review studies and meta-analyses were removed, along with studies that were not RCTs. Moreover, studies that did not involve PLWH were not included in this study. Studies where the outcomes did not include stress and those where the intervention was not yoga were also excluded from consideration. The two authors obtained the complete text of the remaining papers and examined them for eligibility. The remaining papers were retained for the next step; the literature review and meta-analysis.

Summary measure

We calculated the effect sizes between the groups (yoga group and control group) for differences in psychological stress and biomarkers of disease progression. If the studies had more than one post-test, we only included the last post-test result. Effect sizes were calculated by dividing the mean differences between the yoga intervention and control groups or comparing post-test outcomes with pre-test standard deviations (Becker, 1988; Morris & DeShon, 2002). All effect sizes were corrected for sample size bias (Hedges, 1981). Positive effect sizes indicate that participants in the yoga intervention group had improved outcomes compared to the control group. The two authors calculated the effect sizes independently and reconciled the differences through discussion.

Statistical analysis

The Review Manager 5.4 computer software was used for the data analysis (Copenhagen: The Nordic Cochrane Centre,

The Cochrane Collaboration, 2014). For the meta-analysis, the magnitude of Cohen's *d* was defined as follows a) "big" for scores bigger than 0.8; b) "moderate" for scores between 0.5 and 0.8; and c) "small" for scores between 0 and 0.5. For heterogeneity, we used the following statistical functions: a) Tau^2 for calculating the variance between studies; b) Chi^2 ; and c) I^2 for calculating the percentage of variation caused by heterogeneity. The most prevalent classification of I^2 considers scores above 50% to be highly heterogeneous, scores between 25% and 50% as moderately heterogeneous, and scores below 25% as having limited heterogeneity (Higgins & Thompson, 2002).

RESULTS

Study selection

In this study, a total of 98 articles were identified, consisting of 18 papers from PubMed, 17 from CINAHL + Medline, 49 from ProQuest, and 14 studies from the Cochrane Library (Figure 1). The screening process removed 21 duplicate studies, yielding a total of 77 articles. Of those 77 studies, we excluded 67, specifically: 27 review studies, 9 studies that did not use an RCT design, 14 studies whose participants were not PLWH, 7 studies in which stress was not an outcome, 3 studies in which the intervention was not yoga, and 7 studies where the CD4 results were not presented. Ten studies met our inclusion and exclusion criteria and were eligible for our review. Two more studies were removed because their study design did not include a control group. Another two were also removed because they did not provide statistical results to calculate the effect size. After careful analysis, six studies were eligible for the meta-analysis.

Study characteristics

The summary of the papers' characteristics is presented in **Table 1**. Of the total 348 participants in the six studies, 176 were assigned to a yoga intervention group and 172 to a control group. The studies included in our paper were published between 2006 and 2018, with four studies conducted in North America and two studies conducted in South-Asia (India). The participants were recruited from several different settings, including outpatient clinics, medical centers, HIV/AIDS clinical trial networks, and HIV-specific service organizations. All studies randomly assigned participants to a yoga group and compared them with a control group receiving routine care.

Participants' characteristics

The average age of participants across the six studies was 43 years ($SD = 7.9$). Moreover, of the total 348 participants, 50 were male, 103 were female, and 2 were transgender. However, our research found that two studies did not include information on the age and gender of participants (Brazier et al., 2006; Hrushikes & Sharma, 2017). In one study, the participants had been diagnosed with HIV and/or AIDS an average of 11 years ago, but other studies did not include the duration of the disease (Cade et al., 2010). Antiretroviral treatment (ART) was administered to roughly 50.7% of patients in the trial reported by Wimberly et al. (2018). All six studies clearly documented participants' stress status before and after the intervention. Two studies measured stress using

the Perceived Stress Scale, and one used the Daily Stress Inventory. Meanwhile, three studies used CD4 counts as a biological stress marker and one measured cortisol levels.

Assessing the risk of bias

Table 2 shows the risk of bias for the six studies included in the meta-analysis following the recommendations of the Joanna Briggs Institute of Systematic Review for Randomized Controlled Trials. This tool is designed to analyze the quality of randomized controlled studies. The highest possible score using the JBI checklist is 13, with each item having four possible answers: Yes, No, Unclear, or Not applicable. One point is given if the answer is Yes and zero if the answer is No, Unclear, or Not applicable. The first and second authors of the current study independently assessed the quality of evidence, deciding whether or not an article met the inclusion criteria. When there was no consensus on the inclusion or exclusion of the study, the dilemma was solved by consulting the two other researchers who participated in this study.

In our study, according to JBI, the studies conducted by Agarwal, Kumar, & Lewis (2015) and Cade et al. (2010) scored 10 by the first author and 9 from the second author. Moreover, the study by Brazier, Mulkins, and Verhoef (2006) scored 10 by both authors. Next, the study by Naoribam, Metri, Bharghav, Nagaratna, & Negendra (2016) scored 9 by both authors. In addition, the study conducted by Wimberly, Engstrom, Layde, & McKay (2018) scored 9 by the first author and 10 by the second author. The last study conducted by Sharma & Hrushikesh (2017) scored 8 by the first author and scored 5 by the second author, thereby indicating that this study's quality was not very good.

Intervention characteristics

The details of the yoga interventions in all six studies are shown in Table 1. The types of yoga used included Hatha, Asanas, Ashtanga Vinyasa, and integrative practices. Our review found that the components of yoga most widely practiced among PLWH were breathing exercises (Pranayama), body postures (Asanas), and meditation (Dhyana). The total average duration of yoga interventions offered to the participants was 10.6 weeks, and the total number of sessions ranged from 16 to 90.

Assessment of results

Stress as an outcome

In our study, three articles examined stress by using a self-report scale. Two studies used the Perceived Stress Scale, and one study measured stress using the Daily Stress Inventory. The Perceived Stress Scale is available in three different versions, each with a different number of items. One version contains 14 items (the PSS-14), another contains 10 items (PSS-10), and the third has 4 items (PSS-4). To assess the frequency of stressful situations, these scales use five-point Likert-type responses (from never to very often). In addition, the Daily Stress Inventory is a self-report measure of minor stressors administered to patients daily. This scale has been revised multiple times, resulting in many different versions with a varying number of items.

Table 1. Characteristics of studies, participants, and interventions

Author	Study site	Characteristic of participants			Intervention detail						
		n	Age (Mean, SD)	Gender	Type of yoga	Component of yoga	Control	Duration (weeks)	Session (total)	Tools	Outcomes
Agarwal, Kumar, & Lewis (2015)	Medical Wellness Centre, Miami, the United States	Total: 24 IG: 12 CG: 12	IG: 47.0±8.9 CG: 49.3±4.1	Male/Female IG: 8/4 CG: 7/5	Integrative	Physical posture, Breathing practice, Relaxation, Meditation	Routine care	8	16	Perceived stress scale (PSS) and cortisol	- PSS: IG: 18.6±8.5 CG: 24.2±3.8 - Cortisol: IG: 3.780±2.678 CG: 1.822±1.273
Brazier, A., Mulkins, A., & Verhoef, M (2006)	Community HIV/AIDS organization, Vancouver Canada	Total: 47 IG: 20 CG: 27	IG: - CG: -	Male/Female IG: - CG: -	Integrative	Physical posture, Breathing practice, Relaxation, Meditation	Routine care	8	16	Daily Stress Inventory (DSI)	IG: 58.6±3.46 CG: 63.5±3.46
Cade et al., (2010)	AIDS Clinical Trials Unit of the Washington University, MO, USA	Total: 60 IG: 34 CG: 26	IG: 45±6 CG: 45±10	Male/female IG: 0/24 CG: 0/29	Asthanga Vinyasa	Physical posture, Breathing practice, Relaxation, Meditation	Routine care	20	50	CD4+	IG: 507±134 CG: 592±268
Naoroibam, Metri, Bharghav, Nagaratna, & Negendra, (2016)	HIV rehabilitation Center, Manipur State, India	Total: 44 IG: 22 CG: 22	IG: 36.92±5.41 CG: 35.36±8.27	Male/Female IG: 10/12 CG: 14/8	Asanas	Physical posture, Breathing practice, Relaxation, Meditation	Routine care	4	24	CD4+	IG: 388.3±78.11 CG: 304±87.72
Hrushikes., & Sharma, (2017)	HIV Network Center Mangalore City, India	Total: 100 IG: 50 CG: 50	IG: - CG: -	Male/female IG: - CG: -	Integrative	Physical posture, Breathing practice, Relaxation, Meditation	Routine care	12	90	CD4+	IG: 634.31±204.65 CG: 519.65±218.33
Wimberly, Engstrom, Layde, & McKay (2018)	HIV/AIDS service organization, Philadelphia, United States	Total: 73 IG: 38 CG: 37	IG: 43.30±1.59 CG: 45.61±1.033	Male/Female /Transgender IG: 29/7/1 CG: 21/14/1	Hatha	Physical posture, Breathing practice, Relaxation, Meditation	Routine care	12	90	Perceived stress scale (PSS)	IG: 18.43±8.78 CG: 21.81±6.87

N: Total participants

IG: Intervention group

CG: Control group

Note: The score in the outcomes was the last measures from each group including intervention group and control group.

Table 2. Risk of bias according to the JBI Critical Appraisal Tool

Study	JBI items													Total
	1. Was true randomization used for assigning participants to treatment groups?	2. Was allocation to treatment groups concealed?	3. Were treatment groups similar at the baseline?	4. Were participants blind to treatment assignment?	5. Were those delivering treatment blind to treatment assignment?	6. Were outcomes assessed blind to treatment assignment?	7. Were treatment groups treated identically other than the intervention of interest?	8. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	9. Were participants analyzed in the groups to which they were randomized?	10. Were outcomes measured in the same way for treatment groups?	11. Were outcomes measured in a reliable way?	12. Was appropriate statistical analysis used?	13. Was the trial design appropriate, and any deviations from the standard RCT design accounted for in the conduct and analysis of the trial?	
Agarwal, Kumar, & Lewis (2015)	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	10
Brazier, Mulkins, & Verhoef (2006).	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	10
Cade et.al. (2010)	Y	Y	Y	N/N	N	N	Y	Y	Y	Y	Y	Y	Y	10
Naoroibam, Metri, Bharghav, Nagaratna, & Negendra (2016)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9
Sharma & Hrushikesh (2017)	U	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	8
Wimberly, Engstrom, Layde, & McKay (2018)	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9
	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	10
	Y	U	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9
	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	Y	U	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9
	U	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	8
	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	U	N	U	N	N	N	Y	U	Y	Y	N	Y	Y	5
	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	9
	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	10

Note: Y: Yes; N: No; U: Unclear

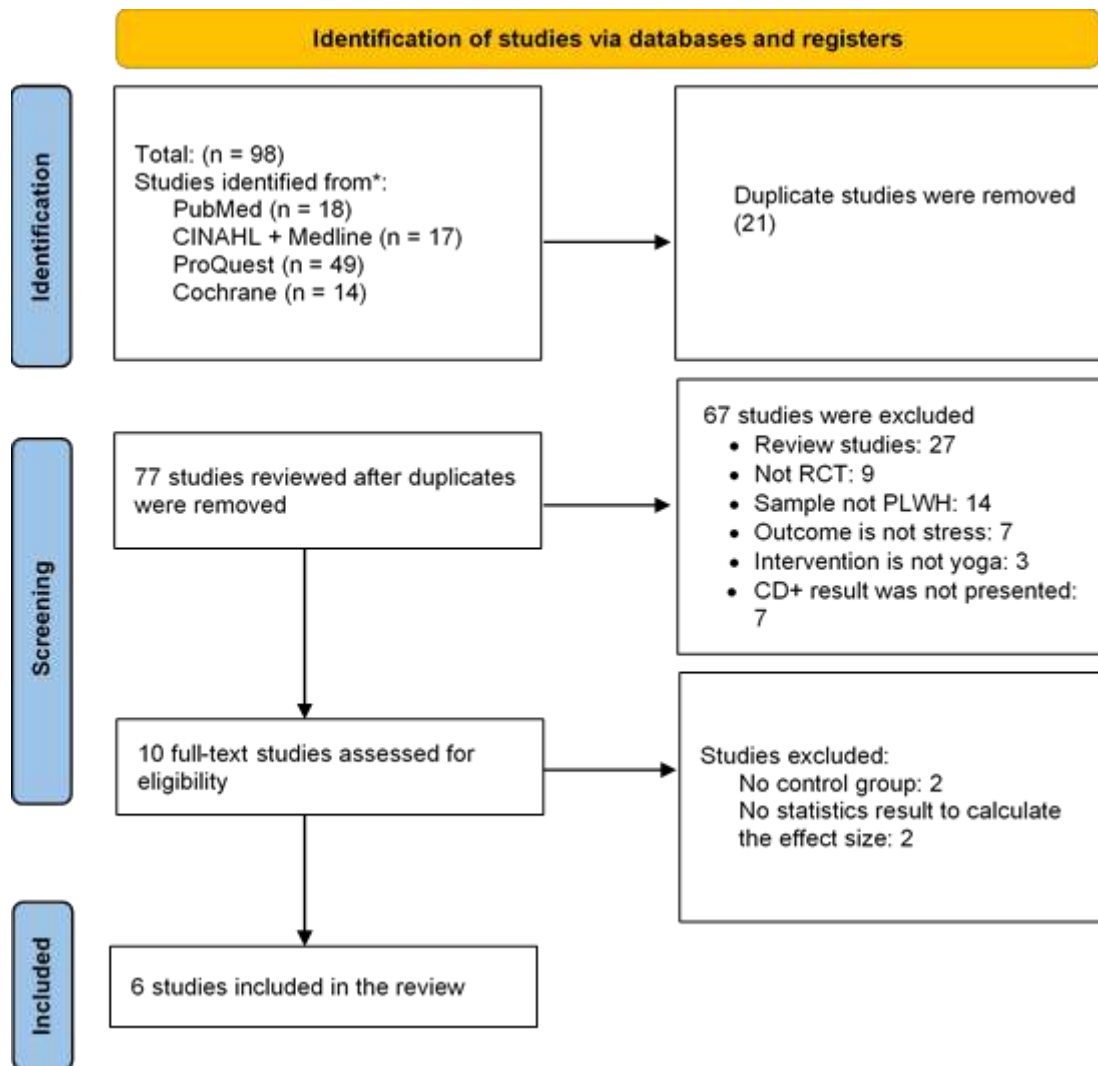
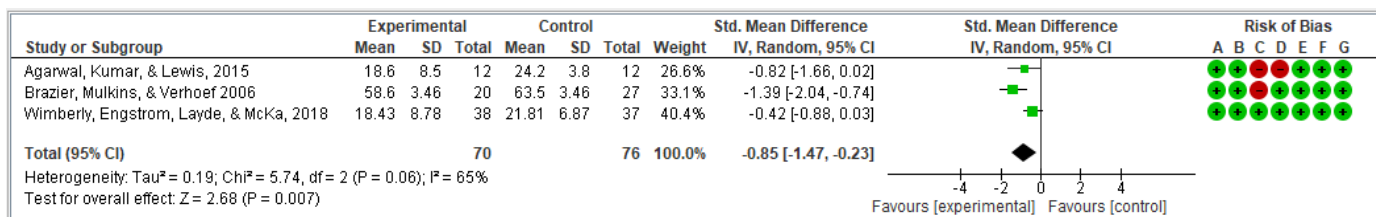
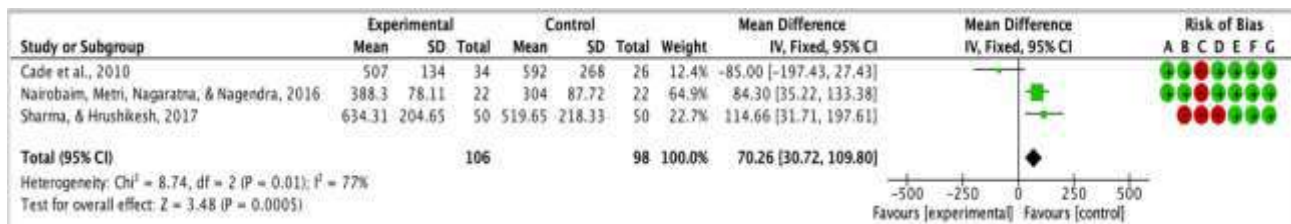


Figure 1. Screening and selection procedures based on the PRISMA statement



Risk of bias:
 A: Random sequence generation (selection bias)
 B: Allocation concealment (selection bias)
 C: Blinding of participants and personnel (performance bias)
 D: Blinding of outcome assessment (detection bias)
 E: Incomplete outcome data (attrition bias)
 F: Selective reporting (reporting bias)
 G: Other bias
 Red color: positive bias
 Green color indicates negative bias

Figure 2. Meta-analysis results regarding the effect of yoga intervention toward stress among people living with HIV



Risk of bias:
 A: Random sequence generation (selection bias)
 B: Allocation concealment (selection bias)
 C: Blinding of participants and personnel (performance bias)
 D: Blinding of outcome assessment (detection bias)
 E: Incomplete outcome data (attrition bias)
 F: Selective reporting (reporting bias)
 G: Other bias
 Red color: positive bias
 Green color indicates negative bias

Figure 3. Meta-analysis results regarding the effect of yoga intervention toward CD4 level among people living with HIV

Our findings show that all three studies that used the subjective scale found that participants who received a yoga intervention had a significantly greater reduction of stress compared to the control group. The total effect size (Figure two) was -0.85. The 95% CI from -1.47 ~ -0.23. The level of heterogeneity was high. $Tau^2 = 0.19, Chi^2 = 5.74, df = 2 (p = 0.06), I^2 = 71\%$; and the test for total effect: $Z = 2.68 (p = 0.007)$. The result showed the SMD (Standard Mean Difference) was -0.85 (95%CI -1.47~ 0.23; $p = 0.06$), indicating that the experimental group performed better than the control group in the stress score (Figure 2).

CD4 level

CD4 counts are one of the biological indicators of the severity of HIV disease. It is also reflecting the stress levels, with lower CD4 indicating greater disease progression and more stress. Normally, CD4 counts are assessed by collecting blood samples. We collected the CD4 value in both the intervention and control groups after the intervention. In our review, we found three studies that assessed the effect of yoga interventions on CD4 levels among HIV patients. Figure 3 shows that two studies found positive and significant results, showing that yoga intervention improved CD4 levels among the yoga group versus the control group (Nairobi, Metri, Bharghav, Nagaratna, & Negendra, 2016; Hrushikes., & Sharma, 2017). Conversely, one study found that yoga intervention negatively affected CD4 levels. In our meta-analysis, the total effect size was 70.26 with 95% CI, ranging from 30.72 to 109.80. The level of heterogeneity was high: ($Chi^2 = 8.74, df = 2 (p < 0.01), I^2 = 77\%$); and the test for total effect: $Z = 3.48 (p = 0.0005)$. The results showed a mean difference of 70.26 (95%CI 30.72~109.80; $p=0.0005$), indicating that the experimental group did not perform better than the control group on CD4 counts in CD4 values (Figure 3). In other words, yoga interventions did not improve CD4 counts.

Cortisol level

The present meta-analysis also investigated the effects of yoga on physiological stress markers, such as blood pressure, heart rate, and cortisol. Only one research article measured blood pressure (cade et al., 2010), while another evaluated salivary cortisol (Agarwal et al., 2015). Effect sizes could not be computed in this meta-analysis because no

physiological markers of stress were assessed by two or more studies.

DISCUSSION

This review and meta-analysis assessed the evidence for using yoga as an intervention to reduce stress in PLWH. Previous meta-analyses have studied yoga as a complementary treatment approach with potential advantages for a variety of health disorders, including psychological disorders (Dunne et al., 2019), chronic pain (Li et al., 2019), easing arthritis symptoms (Ye et al., 2020), and reducing blood pressure (Khandekar et al., 2021). However, limited research has explored yoga as an adjuvant therapy for HIV, specifically for stress management. In our searches related to yoga and stress, only six empirical studies offered evidence of the efficacy of yoga intervention for reducing stress among PLWH.

The findings of this meta-analysis established preliminary evidence that yoga is useful as a stress and psychological management tool for PLWH based on self-reported assessments. The results from three rigorous RCTs showed that yoga significantly reduces psychological distress among PLWH. These results are consistent with an earlier systematic review of yoga for PLWH, which similarly found that yoga was useful in reducing psychological problems (Dunne et al., 2019). Previous studies focused on the effect of yoga on psychological problems from a broad perspective. Meanwhile, our current study specifically explored the effect of yoga on stress reduction among PLWH. Previous authors cited seven studies focusing on depression, stress, and anxiety. On the other hand, this study cited 6 studies that specifically measured stress, three of which measured stress using self-report questionnaires (one of them also measured the biomarker of stress), and another three studies measured disease progression (CD4). Different research questions will lead to different approaches and conclusions.

Furthermore, a systematic review of yoga for reducing the physical and psychological symptoms of HIV found a significant decrease in symptoms and improved quality of life (Ramirez-Garcia et al., 2019). In addition, although it concerned a different population, a systematic review of yoga for tertiary education students conducted by Breedvelt et al.

(2019) found that it significantly improved stress, depression, and anxiety. Moreover, a well-designed RCT study included in this meta-analysis found that a 12-week yoga intervention decreased psychological distress among PLWH returning to society from jail (Wimberly et al., 2018). Nevertheless, more research is required to confirm these findings and test other types of yoga, varied durations of yoga practices, and effects on HIV patients at different stages of the disease.

In our meta-analysis, yoga interventions did not provide a significant result in biological markers of disease progression among PLWH, such as CD4 counts and cortisol levels. One possible reason is the fact that the duration of intervention was short, and few studies looked at the effects of yoga on physiological stress markers. Thus, this meta-analysis was unable to compare them. In the future, additional studies using biological and physiological markers with longer-term follow-ups (e.g., one year) are required to prove its benefits objectively.

This meta-analysis has several limitations that should be considered. The first limitation is the low number of studies examining the effect of yoga programs among PLWH. Moreover, the lack of consistency in the outcomes reported across the articles used makes the comparison inconclusive. Furthermore, it is difficult to compare the results of studies where the yoga interventions had different durations and frequencies. Another limitation was the scarcity of studies that used objective measures of stress, as most studies measured outcomes using subjective self-assessment questionnaires. The absence of studies reporting objective outcomes limited our capacity to find consistent alterations in stress mechanisms and biological factors.

Furthermore, the studies included were mostly pilot trials with limited sample sizes, making them less powerful for detecting significant differences between the intervention and control groups. The fact that several studies had a single post-intervention assessment further limited this meta-analysis by not making long-term changes visible. As a result, we were unable to assess the long-term effects of yoga. Finally, the treatment of control groups differed across studies in that some assessed control groups without any intervention or placebo, while in other cases, the control group received the usual treatment. Nonetheless, these trials give promising preliminary evidence that yoga programs benefit PLWH.

CONCLUSION AND RECOMMENDATION

Based on our present review and meta-analysis, we can confidently recommend that yoga can positively affect stress among PLWH. However, there is a need for further research that utilizes rigorous techniques, such as randomized controlled trial design, to provide more reliable evidence for the clinical application of yoga for stress among PLWH. In addition, blinding participants to the research hypothesis and desired outcomes would be useful to ensure that the trials' results are more accurate. Blinding investigators or data collectors to the participants' health condition is also needed to eliminate potential bias. One option to avoid these possible sources of bias is to use a digitally administered technology assessment tool to help researchers evaluate an intervention.

If resources allow, future studies should continue collecting data for stress biomarkers, such as cortisol levels, blood pressure, and CD4 counts, as this data is often perceived as more objective. To detect changes in immune function and offer evidence of prolonged coping and psychological effects, longitudinal designs with one year of follow-up are needed. In conclusion, our review and meta-analysis results

demonstrate that yoga is a viable complementary treatment for HIV-positive patients and effectively reduces psychological stress among PLWH. Therefore, healthcare providers should incorporate yoga interventions for HIV patients into their routine care, especially for those who psychologically suffer from stress.

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THE USE OF DOMINANCE, INFLUENCE, STEADINESS, AND COMPLIANCE (DISC) PERSONALITY TEST IN THE ASSESSMENT OF NURSES' PERSONAL CHARACTERISTICS

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ABSTRACT

A person's personality may indicate whether or not they indulge in unproductive behavior. An individual's work approach, performance limitations, and performance faults are directly correlated with his or her personality type. The Dominance, Influence, Steadiness, and Compliance (DISC) personality test is one of the instruments used to identify personality types in work behavior. The DISC test assists organizations in describing personality characteristics, making decisions, and communicating with team members and stakeholders. Organizations and managers are able to determine the strengths and weaknesses of the personality types of the individuals they employ using a personality assessment test. This study examined the predominant forms of work behavior exhibited by experienced nurses on the job. This involved 65 nurses from one of Central Java's Islamic hospitals. This study used the DISC profile to assess nurse's personal characteristics. The results showed that 61% of respondents received the maximum possible score for Steadiness, according to the results of this study. They had a dependable, trustworthy, good listener, patient, empathetic, and cordial personalities, which qualified them for the nurse position. Overall, the nurses met the personal characteristics criteria to be a nurse.

Keywords: *Characteristics; DISC; nurse; personality*



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INTRODUCTION

Indonesian Government reveals that health workers, especially nurses, must provide the greatest health services to the community to make people more informed, willing, and eager to live healthy lifestyles. Nurses help to build healthy societies. Health care professionals must act appropriately despite having many responsibilities. (Republic of Indonesia Law, 2014). Due to the high frequency of illness, they must provide health care with patience and "deliberation" (Lu et al., 2019). Illness leads to physical pain. It will have psychological effects, necessitating skilled services and amiable health personnel, especially nurses. Based on that,

nurses should receive specific attention to improve their training and to support systems, such as welfare, incentives, and counseling (Rathnayake et al., 2021).

Along with providing nursing care, nurses also serve as educators, researchers, community leaders, and advocates. Patients commonly complain that nurses do not listen, examine them too long, are hostile, ignorant, less empathy, and engage in malpractice (AL-Dossary, 2017). Hospital nurses frequently discriminate against low-income patients. They can promote, prevent, treat (delegate and command), and recover to patients' illness (Aini, 2018a). When they have

clinical specialists, nurses are able to provide primary care to individuals, families, and communities (Hojat et al., 2013).

Counterproductive work behavior—intentional or unintentional—harms the organization. (Merrill, 2015). Rathnayake et al., (2021) suggest that counterproductive work behavior is one thing that may hurt both the organization and its employees (Rathnayake et al., 2021). Ineffective work habits include using cell phones at work, abusing the company internet, being physically or verbally abusive, sabotaging, refusing to work with others, using drugs, committing fraud, being late to work, accepting bribes, embezzling money, being absent for no reason, taking sabbaticals, and stealing corporate properties (Anjum & Parvez, 2013).

A nurse's negative behavior at work is an illustration of people act counterproductively. The Behavioral Style Assessment examined four parts of a person's behavior (Keogh et al., 2019). Dominance is how one manages challenges and adversities; Influence is the process of persuading others to agree with one's viewpoint; Compliance is how one response to the norms and procedures established by others, whereas Steadiness is how one responds to the tempo of the environment. Individuals with a dominating personality are intelligent and resolute in their approach to resolve problems and overcome the obstacles (Rathnayake et al., 2021).

Occasionally, Human nature can be mysterious and misunderstood, which can be a source of anxiety that prevents enjoyment and productivity. It is predictable despite its intricacy. Personality is not binary in nature. The DISC personality test was adapted from Marston's (1928) presentation of the four components of human personality (Fuqua & Bryan, 2017). Four personality types exist among humans (Dominance, Influence, Steadiness, and Compliance). Everyone has a unique blend. Each personality type influences a person's life in numerous ways, including actions, communication, conflict avoidance, and others (Diab-Bahman, 2021). The findings of this study are described fully in the book *Emotions of Ordinary People* (Aini, 2021). This book emphasized the DISC Behavioral Profile System or DISC Personality Model as a personality evaluation instrument. John Cleaver employs four dimensions based on Activity Vector Analysis: Aggressive, Sociable, Stable, and Avoidant. These four aspects underlie DISC (Mardiansyah et al., 2014).

DISC is a useful tools of fast determination of a person's personality. The ability to interpret the internal and external personality charts that display personality dynamics is crucial for analysis's accuracy. It entails recognizing an individual's propensity to manipulate responses on a certain questionnaire (Bell et al., 2011; KL et al., 2015).

A person's personality will undoubtedly affect many aspects of their life. This condition is also related to their employment prospects. William Moulton Marston proposed the DISC theory in 1928, which became the first personality theory and is still extensively utilized until today (Milne et al., 2019). Foundational DISC is these four factors including aggressive, sociable, stable, and avoidant used by John Cleaver based on Activity Vector Analysis. DISC is a tool that can be used to better understand oneself, understand others, find answers to issues that come up, develop better at communicating, and gain feedback on what qualities of oneself need to be enhanced and minimized. An individual rarely possesses perfect Dominance or Compliance. As an outcome, the results of an online DISC test frequently reflect an individual's

degree of Dominance, Influence, Steadiness, and Compliance. It is possible for one of four DISC characters to be significantly more powerful than the others or for the proportions of the similar characters People who possess the DISC characteristic description can adapt to a variety of situations in the workplace, service sector, and social framework (Diab-Bahman, 2021).

The implementation of the research showed that the The DISC Personality Test proved extremely effective. This personality test produces a more accurate profile of the user's personality. In addition to individual interests, the evaluation method served as a reference in the formation of a division of labor team to provide a consideration in motivating nurses, and adding information about the strengths and weaknesses of their abilities. The personality assessment process was considered in the nurse recruitment process so that it was adjusted to the field that requires that type of personality (Furnham et al., 2009; Slowikowski, 2005). Thus, it is crucial to examine the predominant forms of work behavior exhibited by experienced nurses on the job.

METHOD

Study design

This study used a quantitative research approach applying a descriptive correlational design. This study was conducted in between January and May 2021.

Samples

The sampling technique used the Slovin's formula as follows:

$$n = \frac{N}{N \cdot d^2 + 1}$$

Where :

n = number of samples

N = total population

d² = precision (set 10% with 95% confidence)

Based on this formula, the number of samples was obtained as follows:

$$\begin{aligned} n &= \frac{N}{N \cdot d^2 + 1} \\ &= \frac{186}{(186) \cdot (0,1)^2 + 1} \end{aligned}$$

$$= 65,03 \approx 65 \text{ respondents.}$$

There were sixty-five respondents from one of Central Java's Islamic hospitals were participated in this study.

Nurses who work in hospitals and who agree to participate in the study, and graduated minimum diploma in nursing are eligible to be included in this study. On the contrary, nurses who were on leave and withdrawal from this study were excluded on this study.

Instruments

Data were collected using questionnaires set which consist of demographic data and the DISC Personality Test (Aini, 2021). The questionnaires were provided in online version so respondents may access in the Google Play store (<https://play.google.com/store/apps/details?id=com.flege.disc-test>). (Aini, 2021).

Data collection

The researchers provided sufficient information about the study aim, procedures, benefits, and risk to prospective

respondents. Then, prospective respondents who willing to participate in this study signed the informed consent. The researchers provided information about the DISC application to respondents, how to access and filled out the questionnaire. It required around 10 minutes to filled out the questionnaire.

Data analysis

In this study, the researchers employed a combination of primary and secondary data evaluation and quantitative analysis. A univariate test was used to examine the acquired data, and the results were presented in a table with frequencies and percentages.

Ethical consideration

This research passed the ethics examination and was awarded certificate number 1794/KEP-UNISA/V/2021 from the Health Research Ethics Commission of the Universitas Aisyiyah Yogyakarta.

RESULTS

The average age of the respondents is 39.10 years, with the earliest respondent being 24 years old and the oldest being 56 years old, as shown in Table 1. The majority of the 41 respondents are female (63,1%). With 43 respondents (66,1%), those with a D3 degree were the most educated group. The majority of respondents (81,5%) had worked at the health center for more than five years, with a total of 53 respondents. Based on the employment unit, the majority of respondents, 34 (52,3%), were outpatient nurses. According to Erikson's developmental age categories, the majority of respondents, which are 41 nurses (63,1%), entered the early adult developmental age.

Table 1. Characteristics of Respondent (n=65)

Variable	n	Percentage (%)
Age	39.10; 24-56 *)	
Type Sex		
Man	24	36,9
Woman	41	63,1
Education		
Diploma	43	66,1
Professional Nurse	22	33,9
Long Work		
Less than 5 years	12	18,5
More than 5 years	53	81,5
Work unit		
Dentistry nurse	5	7,7
Outpatient Nurse	34	52,3
Inpatient Nurse	16	24,6
ER nurse	10	15,4
Age (Erikson)		
Early Adult (19 – 40 years)	41	63,1
Mature Madya (40 – 60 years)	24	36,9

As depicted in the accompanying graph, steadiness is a relatively prevalent trait among nurses, who comprise around 61% of the nursing workforce, as shown in Figure 1. The great majority of persons employed in the nursing profession are registered nurses. A severe lack of variety.

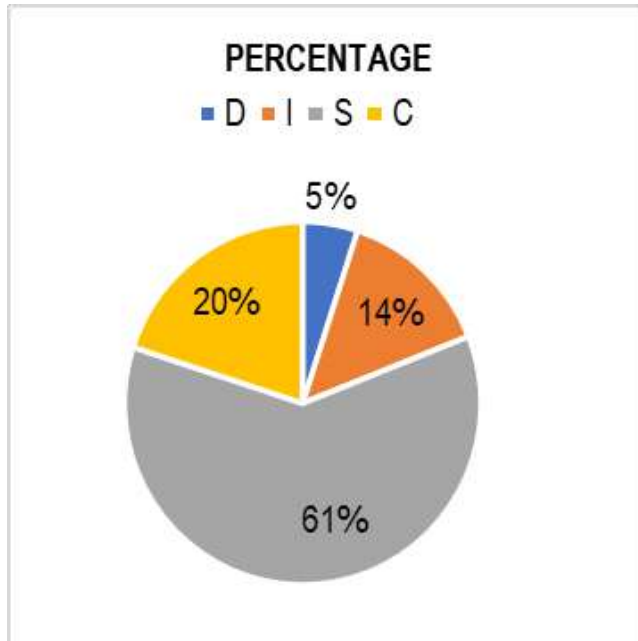


Figure 1. Percentage of Respondents' DISC Personality

Personality profiles could be category according to the ward/work unit in the hospital. There were 34% of respondents work inpatient care, as shown in Figure 2.

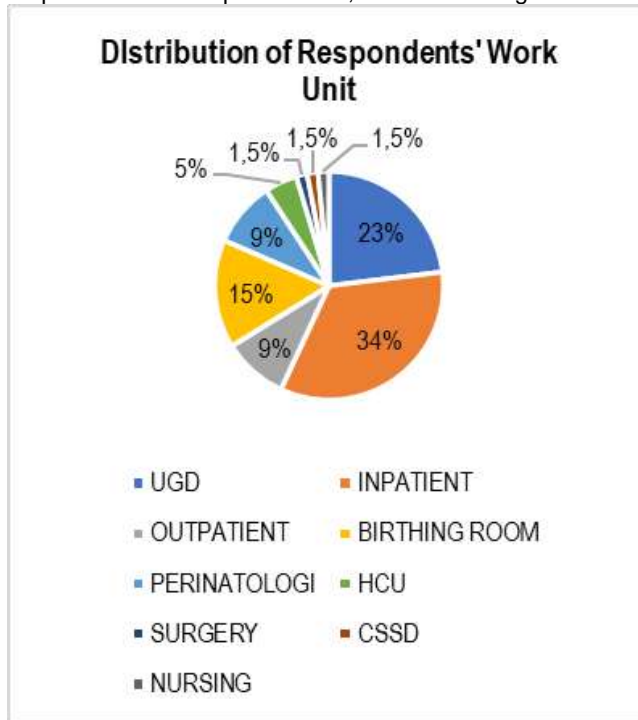


Figure 2. Distribution Respondent's Work Unit

There were 72.73 % of respondents working inpatient ward had steady personalities, 13.33% had influence personalities, and none had a dominant personality type, as shown in Figure 3.

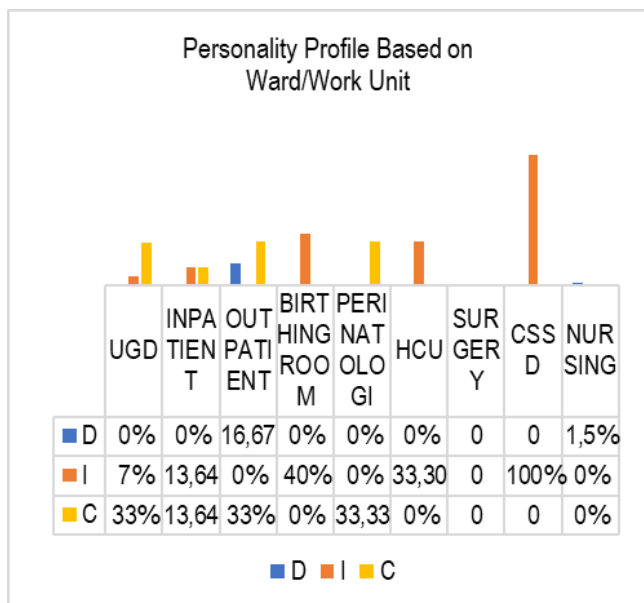


Figure 3. Respondent’s Personality Profile Based Work Unit

DISCUSSION

According to the data, the majority of respondents had type S (steadiness) and followed by type C (compliance) personality. This demonstrates that nurses have an appropriate personality type as service providers who treat patients with nursing care. Team members of the stability personality type are trustworthy and dependable, obedient, good listeners, patient, empathic, and friendly. However, the steadiness type's weaknesses are an aversion to change, slowness to change, sensitivity to criticism, and inability to define priorities. This type's most significant concern is losing their sense of security, and they generally prefer to remain within their comfort zone. (Aini, 2021). The qualities of this sort of compliance are highly suited to the nurses profession, particularly in terms of work that demands regularity, precision, and correctness, with a focus on Standard Operating Procedures (SOP) when providing nursing and midwifery care (Merrill, 2015).

When nurses are categorized by gender, age, and workplace, the stability personality type remains the most prevalent, followed by the compliance personality type. There are only three individuals with this form of dominance, two of them are a senior nurse over the age of 40 and one under the age of 30. There are only a few forms of domination that dare to make decisions and are structured, goal-oriented, and innovative among nursing management and senior nurses. In addition, only one nurse with the dominant personality type is younger than thirty years old. A person enjoys socializing and leading others by invitation (persuasive) and is generally outgoing. Influence types are those who tend to engage in interpersonal behavior; surprisingly, they are extroverted and ready to amuse. (Mardiansyah et al., 2014).

Types C and S are the most suitable personality types for the nurse professions. The constancy personality type is an absolute personality type that nurses must possess (Sovia et al., 2019). A well-balanced team is required in a group. Af service providers team with a well-balanced personality will produce more productive outcomes than one with an unbalanced character (Wiley, 2013).

When interacting with the environment, there are four different types of expressive behavior to consider. These

personality characteristics are Dominance (D), Influence (I), Stability (S), and Compliance (C) (Anirudh Bhardwaj VIT Chennai et al., 2017; Scullard & Baum, 2015; Wiley, 2013). These behaviors are based on an individual's propensity for problem-solving and response to the region's surroundings. Marston first up the DISC theory in 1928, but The DISC test instrument was first developed by Walter Clarke in 1956, and several researchers have subsequently proceeded to improve it. (Milne et al., 2019; Januari, 2015).

In early adulthood (20-40 years), A person's behavior tends to fluctuate between following religious teachings and acting in accordance with spiritual guidelines and norms, starting a job, making an effort to fit in, and looking for enjoyable social groups (Harris, 2017). When a person is psychologically more developed during middle adulthood (40-60), they start to focus their social skills, develop their sense of responsibility, and establish adult roles, and attain and maintain career success (Aini, 2018a).

The Dominance personality type constantly investigates for workplace authority. They relish challenges and adore leadership (Kouzes & Posner, 2007). Individuals with dominating personality types like managing everything individually and making all required team decisions (Diab-Bahman, 2021). Therefore, this personality type is appropriate for leadership positions. They havegoal-orientation, direct-communication, and proper action (Carnevale, Anthony P.|Smith, Nicole|Gulish, 2015; Feather et al., 2015). The leader with the type C and type D characteristics tend to encourage and treat employees with kindness and compassion without leaving a firm impression (Aini, 2021). The leader not only being firm and professional, but also be able to motivate subordinates so that the work program that has been determined can run successfully (Aini, 2018b). The implementation of continuous assessment and training also needs to be carried out in order to improve the abilities and skills of both leaders and subordinates (Aini, 2018a). The limitation of this research was that the characteristics or personality of a person was not only limited to the results of the DISC personality assessment but many other factors.

CONCLUSION AND RECOMMENDATION

This research has proven that the DISC Personality test using the "DISC Profile" app is an excellent tool to assess individual behavioral profiles. Hospitals' management may use the DISC Personality Test to assess their health care providers' personality in order to place them correctly based on their strengths and weakness.

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