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Original Research

A Qualitative Inquiry into The Adherence of Adults Type 2 Diabetes Mellitus with Dietary Programs

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ABSTRACT

Introduction: Diabetes mellitus (DM) is a chronic disease with the characteristic of treatment complexity. The toughest challenge for DM patients is dietary adherence. On the other hand, the socio-culture is one of the factors that influences dietary adherence. The aim of this study was to examine the dietary adherence of adults with type 2 Diabetes mellitus (T2DM), particularly to dietary programs.

Methods: This study used a qualitative case study design with a positivist approach. The total participants consisted of 14 T2DM patients obtained through snowball sampling. The research phenomenon was the adherence of adults with type 2 Diabetes mellitus to dietary programs. The data collection was conducted through in-depth interviews with question guidelines analyzed using qualitative thematic analysis.

Results: This study obtained five themes regarding the dietary adherence of T2DM patients such as activity, motivation, intention, behavior, and the benefits of dietary adherence. The focus points were activity, motivation, and the intention to comply with the dietary recommendations, including reducing the fatty and fried foods consumed. The patients who felt the benefits of complying with the dietary program found following the dietary adherence to be easier.

Conclusion: Activity, motivation, intention, behavior and the benefits of the dietary adherence program all make it easier for the patient to comply with their diet. This result suggests that health workers should provide education to the patients on the importance, benefits and the way to comply with the T2DM dietary program.

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INTRODUCTION

Diabetes mellitus (DM) is a health problem with the characteristic of hyperglycemia due to abnormal insulin secretion, insulin action or both. DM symptoms include polyuria, polydipsia, polyphagia, weight loss and blurred vision (ADA, 2017).The most common problem in T2DM is dietary non-adherence. One of the causal factors of this is socio-cultural, which drives the T2DM patients to not comply with the dietary recommendations (Basu & Garg, 2017). Whether the patients comply or not depends on the intention of the person (Ajzen, 2005).

The incidence of T2DM in Indonesia has been rising every year. The data from the Baseline Health Research of Indonesia showed that T2DM patients aged ≥15 years in 2013 had an incident rate of 6.9%. This increased in 2018 to become 8.5%. The prevalence was higher in women at 12.7% than in men at 9%. The T2DM patients who did not take medicine made up 11% (National Institute of Health Research and Development Indonesia, 2018). The data from the Public Health Center in Sidoarjo showed that the doctors had diagnosed 66,077 DM patients. From the 10 T2DM patients in Porong and Krembung Public Health Center, 70% of patients feel that it is difficult to comply with the suggested diet and 50% feel bored with the DM treatment.

The research conducted by (Storz & Iraci, 2019) showed that patients who adhere to a diet for a short time can reduce their blood sugar concentration and increase their insulin sensitivity. Dietary adherence is

highly effective when it comes to achieving better glycemic control in patients with type 2 diabetes. Adherence is supported by the environment and their family (Hilliard, McQuaid, Nabors, & Hood, 2014). Strengthening the resilience of dietary adherence in the T2DM patients will provide enthusiasm and a better ability to treat themselves. This is in addition to improved self-esteem and behavior (De Souza Ribeiro et al., 2017)

The T2DM patients' dietary adherence can reduce the incidence of hyperglycemic crisis (PERKENI, 2015). The success of dietary adherence depends on the compliant behavior and intentions of the patients — compliance consists of close and open submissive behavior. Close compliant behavior is a stimulus that has not been clearly seen that is still limited to the form that the knowledge, attitude, perceptions and feelings takes. Open submissive behavior is a reaction to the stimulus in a way of practice that is visible (Notoatmodjo, 2007). Intention can be explained as motivational factors and they have a strong impact on behavior change. The firm intention of T2DM patients will increase their compliance in terms of carrying out dietary management properly (Pinidiyapathirage, Jayasuriya, Cheung, & Schwarzer, 2018). Based on the description above, this study aims to examine the dietary adherence of adults with type 2 Diabetes mellitus (T2DM) on dietary programs.

MATERIALS AND METHODS

This study was a qualitative case study design used to inquire into the adherence of adults with type 2 diabetes mellitus to dietary programs with a positivist approach. The aim of a positivist approach is to explore a good story or experience from a participant related to their adherence to dietary programs. A case studies is a form of investigation and exploration that looks into a case in-depth and in detail. It allows the researchers to get a complete and detailed picture of the phenomenon that is to be studied. It involves the understanding of a person's events and activities (L Mccaslin & Scott, 2003). The following steps are a part of case studies in order to ensure the best possible outcome: 1) information organization, 2) reading all of the information and coding, 3) writing a detailed description of the case and its context, 4) interpreting and developing generalizations naturally from the cases and 5) presentation in narrative form (Vanwynsberghe, 2007).

The participants of this study were 14 T2DM patients obtained through the snowball sampling technique. The inclusion criteria were 1) T2DM patients from the Public Health Center in Sidoarjo, East Java Province, 2) good dietary adherence according to dietary adherence screening and 3) not a pregnant woman. The exclusion criteria were 1) resident citizens from the Public Health Center in Sidoarjo, East Java Province and 2) not communicating verbally well.

The researchers themselves are the data collection tools and thus they cannot be represented or delegated. The data collection tools consisted of voice recorders, stationery, field notes and the in-depth interview guidelines. The interview questions included behavioral attitude, subjective norm, perceived behavioral control, intention, and adherence behavior. The interview data was analyzed using qualitative thematic analysis by searching for any themes that emerge. This becomes important when looking into the description of a phenomenon or case. The stages of thematic analysis include: 1) developing manual code, 2) conducting reliability tests on the code, 3) summarizing the data and identifying the initial themes, 4) applying templates to the codes and supplementary codes, 5) linking the codes and identifying themes, and 6) strengthening and validating the theme (Fereday & Muir-Cochrane, 2006).

The study was conducted in three Public Health Centers in Sidoarjo, East Java Province for two months, January 2019 - February 2019, with a high prevalence of good dietary adherence based on the successful achievement of the Public Health Center-ran programs. The participants determined the location of the interview at the time of the informed consent contract. This study was registered to research ethics board of the Health Research Ethics Commission of the Faculty of Nursing, Universitas Airlangga, letter-number: No.1194-KEPK published on 3rd November 2018.

RESULTS

The participants in this study consisted of 14 people consisted of 1 male and 13 females aged between 45 - 85 years old. The most common education level of the participants was that of primary school. All of the participants were married. Most of the participants did not work. One participant (P12) dropped out because he didn't complete the interview stages. A total of five themes emerged from the results of the in-depth interviews concerning the dietary adherence of the T2DM patients such as activity, motivation, intention, behavior, and the benefits of doing dietary adherence. The characteristics of the participants have been summarized in Table 1.

Theme 1: Activity

Activities which increase dietary adherence include physical exercise (P10, P14), controlling their routine in the health care centre (P02, P15), reducing their sugar consumption (P01, P04) and praying to God (P06).

> "...If I want my body to feel good, I do exercises like jumping in the field after cooking..." (P10)
> "...I prefer walking around in the field while looking at green scenery. I feel better..." (P14)
> "...If I feel sick, I go to the health care centre to control it. Yesterday I felt unwell. Unfortunately, my uric acid was high..." (P02)

Table 1. Characteristic of Respondents

Code	Gender	Age (years old)	Marital Status	Work	Education
P01	Female	53	Married	Does not work	Junior high school
P02	Male	68	Married	Does not work	Junior high school
P03	Female	70	Married	Does not work	Primary school
P04	Female	69	Married	Does not work	Primary school
P05	Female	73	Married	Does not work	Junior high school
P06	Female	85	Married	Seller	Primary school
P07	Female	45	Married	Seller	Junior high school
P08	Female	60	Married	Does not work	Junior high school
P09	Female	66	Married	Does not work	Primary school
P10	Female	65	Married	Does not work	Primary school
P11	Female	75	Married	Does not work	Primary school
P12			Drop out		
P13	Female	60	Married	Does not work	Primary school
P14	Female	57	Married	Does not work	Primary school
P15	Female	51	Married	Does not work	Primary school

**P=Participants*

"...I want to feel healthy, so I routinely control it in the health care centre..." (P15)
"... I used to drink less sugar milk. Now I have a little sugar on my meal..." (P01)
"... No, I do not eat sweet food. Fatty food also. I reduce the amount of sugar..." (P04)
"... I sincerely undergo this sickness. I prayed to God to give me a healthy and long life..." (P06)

Theme 2: Motivation

This theme explained that the participant get their motivation from social support, including from the health workers (P03), other T2DM sufferers (P05) and their family (P06).

"...I get motivated to adhere to the diet from the doctor. The doctor said that I have to control my diet and he suggested for me to eat or take a meal once every three hours..." (P03)
"... T2DM patients who I am acquainted with always remind me about dietary adherence and they invite me to the DM association so then I can get support and more information..." (P05)
"...My wife reminds me about reducing my rice consumption, especially hot rice. If the rice is cold, then I can eat little more..." (P06)

Theme 3: Intention

This theme explained that the participants' intention rises after getting education from the health care provider (P01). The participants maintain adherence through considering the amount, type and time of the food consumption (P05).

"...After being educated by a health care provider, I have the intention to consider what I eat..." (P01)
"...For example, if I have eaten and someone offers me food, I reject it wisely..." (P05)

Theme 4: Behavior

This theme explained the dietary adherence behavior done by the participants. The dietary adherence behavior considers the amount, type and time of the food (P03, P15), the reduction of their sugar consumption (P06) and reducing the amount of fried food (P13).

"...I consider the amount of rice like 8 - 10 spoons. I only eat rice three times a day in the morning, noon, and evening. Snacking is only at 3 PM..." (P03)
"...I eat every 3 hours and start at 7 AM. It consists of three-times eating eight spoons of rice and three times snacking. I avoid eating fried food ..." (P15)
"...I reduce my sugar consumption. I do not eat sweet fruits like yam..." (P06)
"...I avoid eating fried food and fatty chicken meat..." (P13)

Theme 5: Benefit

This theme explained the benefit of dietary adherence. The participant felt that dietary therapy could support their medical treatment (P01) and that accurate dietary therapy can reduce the signs and symptoms of sickness (P03, P05, P14).

"...I only consume medicine, but I think that it does not heal my sickness well. I combine medication and diet and hope that it can help prevent wounds..." (P01)
"...I do not comply with the diet. I feel sick like I have headache, plus tingling and pain. I comply with the diet only so then my glucose is stable and I do not feel sick anymore..." (P03)
"...My vision is a blur when my glucose is high. My vision is brighter when my glucose level is stable. My glucose level is stable when I comply with the dietary adherence..." (P05)
"...When I comply with dietary adherence, the pain and frequency of my urination decreases, my body is fit, and the tingling disappears..." (P14)

DISCUSSION

The first theme revealed that physical exercise, controlling their routine in the health care centre, reducing the sugar consumption and praying to God emerged as activities that influence dietary adherence. (ADA, 2017) advises for people with DM to exercise at a medium to high intensity for at least 150 minutes per week. They should exercise for 15 minutes every two days and then the duration is increased slowly to at least 150 minutes per week according to the recommended amount (Colberg et al., 2016). Exercise not only reduces the blood sugar levels but it also lowers the blood pressure, reducing the levels of low-density lipids, increasing their energy, and reducing stress (Restuning, 2015). DM patients have to routinely undergo control visits to the doctor or Public Health Center every month. The time of control depends on the patient's condition. The worse their condition, the more often they have a control visit to the doctor or the health care provider. The provider will assist in their DM management through education, dietary therapy, exercise, and pharmacology therapy (Poretsky, 2017). DM patient need drugs and DM management to control their blood glucose level. Belief in God and in the power of prayer, as well as in religious instructions, is obtained in conditions of difficulty. This is proven to decrease the incidence of depression (Doolittle & Farrell, 2004). The spiritual aspect has a significant influence on changes in patient behavior and motivation. The emotional stability resulting from good spiritual integrity not only affects the achievement of positive behavior but it also contributes to physical health (Friedman, 2018).

The second theme revealed that the participants get a variety of support which includes support from their family, from fellow DM sufferers, and from the health workers. The family factor has an important role in supporting diabetes management (Delamater, 2006). For patients with chronic conditions such as diabetes, social support has been shown to provide positive outcomes in relation to glycemic control, adherence to care, and improvements in their emotional status. Patients who have good family support will experience a comfortable feeling that can increase their motivation to comply with the dietary recommendations (Ilmah & Rochmah, 2015). Social support from fellow DM sufferers has the same effect, or it was found to be better than support from their wives or friends who did not have diabetes (Van Dam et al., 2005). Interactions between the health workers and patients will lead to an understanding of the importance of treatment. Health workers give full attention to the patients, even though the consultation time is concise (Niven, 2002). Time is not a determinant of good quality interactions between the patients and health care workers. Friendliness, attention and the empathy of officers will provide a feeling of security and inner security (Moehyi, 1992). Communication is very important in the context of providing nutrition education to the patients, in their willingness to provide explanations and in offering alternatives which will help them to fulfill their patient's needs (Wahyuningsih, 2009).

The third theme revealed that participant's intention in relation to dietary adherence is to comply with the amount, types and timing of the food recommendations. The various intentions possessed by the participants are a way to increase the persistence in dietary adherence. Humans are unique individuals; the intention of each individual is varied. Different desires called intentions represent the functions of two basic determinants, namely individual attitudes towards a behavior (a personal aspect) and the individual perceptions of the social environment (Ajzen, 2005). Practice or behavior according to the Theory of Planned Behavior (TPB) is influenced by intention, while intention is influenced by subjective attitudes and norms (Sommer, 2011).

The fourth theme revealed that the participants were just trying to keep to the dietary adherence in the beginning and they whole-heartedly complied with the suggested guidelines. The results of this study also support the Skinner theory in that behavior is a person's response to a stimulus or object. Responding depends on the characteristics and other factors of the individual (Gordan & Amutan, 2014). The acceptance of new behavior must be based on knowledge so then the behavior is long-lasting. The change or adoption of new behavior follows the following stages through the process of change: knowledge (attitude), attitude (attitude) and action (practice) (Notoatmodjo, 2003). Individuals begin with trial and error until they really want to apply it forever. According to (Green & Kreuter, 1991), behavior is determined by three factors: predisposing factors (knowledge, attitudes, values and beliefs), enabling factors (facilities and infrastructure / facilities for the formation of healthy behavior) and reinforcing factors (family support/friend /figures/groups, health workers, health insurance and decision-makers).

The fifth theme revealed that belief in the benefits of the diet in line with the results of the study shows that changing to a healthy diet can rearrange the normal insulin production process and improve the condition of type 2 diabetes (Mann, Allegrante, Natarajan, Halm, & Charlson, 2007). The excess food intake is reduced significantly through a low-calorie diet. It shows that a decrease in body fat results in the stabilization of insulin sensitivity. T2DM patients only need to lose one-sixth of their body weight to be able to remove fat from the pancreas, thus allowing the organ to produce enough insulin to return to normal levels (Sublett & Bernstein, 2011).

Other findings from the interview were that the participants expressed some positive feelings towards the diet such as feeling healthy because of self-suggestion, used to being disciplined, being interested in the dietary advice, being satisfied with the present situation, and feeling happy and healthier. DM patients who can change their perspective of suffering will be able to see the meaning and wisdom

of their illness. The meaning of life can be found in the suffering condition that cannot be avoided (Frankl, 2004). Individuals who have a meaningful life experience show a vibrant lifestyle that is full of enthusiasm and passion for life. They become more directed, more disciplined, and adapt to the environment (Bastaman, 2007).

CONCLUSION

The findings of this study revealed the motivation, activity, intention and dietary adherence behavior. This includes complying with the amount, types and time of the diet recommendations and reducing their fat and sugar consumption as the themes. If the patient complies with the dietary advice, the easiness of meeting the dietary guidance will increase their dietary adherence too. Easiness can be gained if the participant feels the benefit of the diet or the perceived benefit of the diet. Health workers need to provide health education to every T2DM patient in order to increase the perceived benefits of dietary adherence. A good understanding of the importance of dietary adherence will improve the patients' behavior in complying with the dietary recommendation.

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Original Research

The Affirmation – Tapping on Pain Perception and Serotonin Serum Level of Post – Caesarian Section patients

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ABSTRACT

Introduction: Affirmation - tapping interventions have been shown to reduce pain complaints in post-operative patients completing conventional treatment. This is thought to be due to serotonin performance but clinical studies have not been conducted**.** The aim was to compare the mean perception of the pain reported by post-operative patients given affirmation- tapping treatment with another treatment as a complementary nursing intervention. This was to see if the performance of the serotonin serum level is different from in other treatments.

Methods: We used a randomized post-test only control group design carried out in parallel in post-caesarean section patients. The sample totaled 40 patients divided into four groups (10 in affirmation, 10 in tapping, 10 in affirmation-tapping and 10 in the control). They were obtained through simple random sampling. The instruments included affirmation-tapping guidelines, Elisa kits and the McGill - Melzack Pain Questionnaire short-form (MPQsf). The independent variable was the intervention of affirmation-tapping and the dependent variables were pain perception and serotonin level. The data was analyzed using simple linear regression.

Results: The average variant of the serotonin levels in the affirmation-tapping treatment group was higher and thus differed significantly from the other groups.

Conclusion: Affirmation-tapping as a complementary nursing intervention can increase the serotonin serum levels of the post-caesarean section patients by complementing conventional treatments. Participant pain complaints were lowest in the affirmation-tapping group with the highest serotonin levels present and these were significantly different to the other groups. Affirmation – tapping was recommended as a complementary intervention in nursing post-operative patients that complements conventional treatment.

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INTRODUCTION

Post-operative acute pain complaints result in tachycardia, increased blood pressure, decreased alveolar ventilation, and ultimately, wound healing disorders. Acute pain complaints can be chronic if it is not treated immediately. Due to neural sensitization centrally and peripherally from the N-Metil-D-Aspartate (NMDA) activation process, this results in long-term potentiation (long-term potentiation), so the pain complaint lasts longer (Argoff., 2014).

Despite the treatment, there are still many complaints of post-operative pain felt by the client. Severe pain after cardiac surgery was reported by 28% of patients (Bordoni, Marelli, Morabito, Sacconi, & Severino, 2017), pain after thoracic surgery was reported in 25% of patients, even to be point of it being chronic. Moderate post-sectional caesarean pain was reported in 48.2% of patients, and the incidence of pain was 92,7% (IC 95%: 90,9 -94,2). The average level of pain intensity at the time of worst pain was 6,6 (dp=2,2) (Silva, Silva, & Tatagiba, 2017). Complaints of pain result in a disruption of the healing process, wound healing (Argoff., 2014) and a disruption of productivity (Kawai, Kawai, Wollan, &

Yawn, 2017). An incomplete pain intervention will reduce a person's quality of life (Gibbs et al., 2019).

Affirmation - tapping has been proven to deal with pain complaints, but the scientific proof and how its mechanism of action works needs to be examined. Post-operative pain from moderate to severe levels is still perceived by more than half of all patients who have undergone surgery, despite receiving treatment as a standard post-operative patient (Ward, Guest, Goodall, & Bantel, 2018; Komann, Weinmann, Schwenkglenks, & Meissner, 2019). Recommendations for post-operative pain management with treatment includes both drugs and non-drugs, as well as treatment-free therapy (Chou et al., 2016) and complementary approaches with affirmation – tapping (Mudatsyir, K, & Sundari, 2012; Wijiyanti, 2010). Post-operative nursing care management with affirmation-tapping has been done through the Spiritual Emotion Freedom Technique (SEFT) method in post-operative patients and it provides good benefits (Mudatsyir et al., 2012; Wijiyanti, 2010). Reciting Qur'anic verses as a prayer has also helped to reduce the pain of post-operative patients (Beiranvand, Noaparast, Eslamizade, & Saeedikia, 2014).

The complementary nursing approach has consistently been in line with the nursing care policy, particularly for managing nursing pain. This is still rarely done due to the limited scientific support regarding the performance and effectiveness of complementary affirmative nursing interventions (Chou et al., 2016; WHO, OECD, 2018). The aim was to compare the mean perception of pain reported by post-operative patients given the affirmation – tapping treatment with another treatment as a complementary nursing intervention. This proves that the performance of the serotonin serum level is different from how it is in other treatments, where the affirmative sentences are used as a prayer. They take verses from the Qur'an and this is still combined with the stimulation of several acupoints simultaneously.

MATERIALS AND METHODS

This study used a Randomized Post-test Controlled Group design in parallel for all treatment groups. The sample of the study was a portion of post-operative caesarean patients taken through simple random sampling for as many as 40 respondents (Sakpal, 2010). Randomized Assignment was then carried out so then there were ten respondents for each group of affirmation, tapping, affirmation-tapping and the control. The criteria for inclusion in the sample was 1) Muslim patients post-caesarean section who volunteered to participate after obtaining an explanation and 2) they were approached on the first day after surgery, 3) they were aged 18 - 41 years, 4) they had no complications outside of pregnancy and childbirth and 5) they received anti-pain treatment according to hospital standards

The independent variable was the intervention of affirmation-tapping and the dependent variables were pain perception and serotonin level. The data collection tools were 1) the guidelines of the affirmation - tapping procedure, 2) the McGill - Melzack Pain short-form questionnaire with permission from Prof. Melzack, with the language adjusted accordingly (Katz & Melzack, 2011)(Hargiyanto, 2008) and 3) the equipment used for taking venous blood specimens (Simundic et al., 2017). The serotonin level was analyzed using ELISA kits (Elabscience, 2019), carried out by the Institute of Tropical Disease (ITD) Universitas Airlangga. The ELISA kit used the Competitive-ELISA principle. The micro ELISA plate provided in this kit was pre-coated with ST/5-HT. During the reaction, ST/5-HT in the sample or standard competes with a fixed amount of ST/5-HT on the solid phase supporter for sites on the Biotinylated Detection Ab specific to ST/5-HT. Excess conjugate and unbound sample or standard were washed from the plate, and Avidin conjugated to Horseradish Peroxidase (HRP) was added to each microplate well and incubated. An TMB substrate solution was then added to each well. The enzyme-substrate reaction was terminated by the addition of a stop solution and the color change was measured spectrophotometrically at a wavelength of 450 nm ± 2 nm. The concentration of ST/5-HT in the samples was then determined by comparing the OD of the samples to the standard curve (Elabscience, 2019).

All groups got standard treatment, with the affirmation treatment groups getting these plus affirmations for 10 minutes. The tapping group added tapping for 5 minutes while the affirmation group - tapping added affirmations and tapping at the same time for 10 minutes. The control group only received standard treatment four hours after the end of the anesthesia. The distance between the treatments was 8 hours, and they were given four treatments. Following this, 10 minutes after the last treatment, the pain perception data was collected using MPQsf. The venous blood specimen was then taken for the examination of the serotonin levels using the ELISA method.

The data analysis was directed at examining the different effects of serotonin on pain perception due to affirmation - tapping. The serotonin data processing and pain perception of the four groups was performed through simple linear regression with a defined level of significance of 95%. The research protocol obtained an ethical approval certificate from the Surabaya Ethics Hospital Health Research Commission, Number 073/37/KOM.ETIK/2017.

RESULTS

The characteristics of the participants from all groups have been listed in the following table. The oldest mean age was 32,1 (± 5,8) and the youngest was 29,3 (± 6,1). The highest body weight was 56,5 (± 7,8). The highest body height was 164,5 (± 8,8) and the lowest was 159,6 (± 4,6). The highest systolic pressure was

Table 1. Characteristic of Respondents (n=40)

Variables	Groups							
	Affirmation (n=10)		Tapping (n=10)		Affirmation-tapping (n=10)		Control (n=10)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (year)	32.1	5.8	31.1	6.4	31.4	5.1	29.3	6.1
Body weight (kg)	55.7	4.9	54.4	7.9	56.5	7.8	52.9	6.4
Body height (cm)	164.5	8.8	161.6	5.9	159.6	4.6	160.5	4.2
Systolic pressure (mmHg)	126.8	4.7	127.9	4.3	125.9	6.5	125.5	5
Diastolic pressure (mmHg)	79.6	1.3	78.6	5.1	81.5	6.9	84	7
Pulse rate	88.2	0.6	88.2	3.8	84.6	3.8	87.2	2.7
Respiration rate	21	3	20.8	2.5	20.4	2.1	21.2	2.1

**SD: Standard Deviation*

Table 2. Serotonin levels (ng / mL) and pain perception per group (n=40)

Variables	Groups							
	Affirmation (n=10)		Tapping (n=10)		Affirmation-tapping (n=10)		Control (n=10)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Serotonin	0.50	0.02	0.37	0.06	0.69	0.13	0.19	0.03
Pain perception	3.93	0.59	4.79	0.6	3.2	0.83	4.92	0.52

**SD: Standard Deviation*

127,9 (± 4,3) and the lowest was 125,5 (± 5,0). The highest diastolic pressure was 84,0 (± 7,0) and the lowest was 78,6 (± 5,1). The highest pulse frequency was 88.2 (± 0,6) and the lowest was 84,6 (± 3,8). The highest respiratory rate was 21,2 (± 2,1) and the lowest was 20,4 (± 2,1). The data on age, weight, height, systolic and diastolic pressure, pulse and breathing is normally distributed (-2 <Skewness Ratio <2), so comparative analysis can be performed between the groups in Table 1.

From Table 2, it can be seen that the highest serotonin mean was found in the affirmation-tapping treatment group (0,69 ± 0,13) with the lowest pain perception (3,20 ± 0,83). In order to test the effect of treatment on pain perception related to the serotonin serum levels, simple linear regression analysis was performed. The normality regression requirements are that there is normally distributed residual data. The normality test results obtained an unstandardized residual Sig = 0,072 (> 0,05), so it can be concluded that the distribution is normal. The simple linear regression analysis results obtained a Sig value = 0.00 (<0.05). This means that there is an influence between serotonin and pain perception as a result of affirmation - tapping.

DISCUSSION

The data processing proves that affirmation - tapping treatment can help the patients to reduce pain perception after caesarean section surgery. The clinical trial studies conducted in the hospital prove that affirmative-tapping as a complementary approach has been able to reduce the pain of traumatized patients. The most complementary approach was to utilize integrative medicine for the postoperative care of patients (Moon, Shin, Shin, Kwon, & Lee, 2017). Research on affirmative-tapping approaches has also helped to reduce dysmenorrhoea pain in adolescents (Lenni Sastra, Jasmarizal, 2016). Research conducted by Wijiyanti has also proven that the affirmation-tapping approach can reduce pain after caesarean section surgery (Wijiyanti, 2010). The affirmation-tapping approach has also been proven to reduce the pain suffering of cancer patients (Taber, Klein, Ferrer, Kent, & Harris, 2016), control fibromyalgia pain complaints (Benor, Rossiter-Thornton, & Toussaint, 2017) and control the pain and depression complaints of war veterans (Beiranvand, Noparast, Eslamizade, & Saeedikia, 2014; Church, 2014).

The biological perception of pain is an accumulation of stimulus and response performance results that are controlled consciously or outside of the consciousness by the brain, especially the forebrain and the central nervous system including the spinal cord (Bushnell, Ceko, & Low, 2013; Thakur, 2015). By utilizing the descendent and ascendant mechanisms of action, the journey of the stimulus and pain response can be controlled using neurotransmitter media via the forebrain and amygdaloid (Bourbia, 2015; Thompson & Neugebauer, 2017).

The empowerment of the forebrain by affirmation can eliminate the default - inhibition (inhibitory functional work as a necessity) from the amygdaloid (Bourbia, 2015) so as to activate the descendent pathway that blocks pain signals that lead to the dorsal horn spinal cord. This means that pain transduction through the ascendant pathways to the central nerves and brain can be prevented (Neugebauer, 2015). Praying by focusing one's attention and thoughts on God followed by acupoint stimulation through affirmation-taping will increase the level of serotonin (Liu, Tan, Molassiotis, Suen, & Shi, 2015; Ménard, Pfau, Hodes, & Russo, 2017). This will modulate their pain perception (Martin et al., 2017).

Affirmations using prayers that are uttered with sincerity and confidence can double the empowerment in the forebrain and amygdaloid, boosting performance so then the function of pain control becomes better and more effective (Beiranvand, Noparast, et al., 2014; Fajarudin, 2006; H.M. Amin Syukur; Fathimah Usma, 2012; Neugebauer, 2015). Tapping as a form of acupoint stimulation can inhibit the transduction of pain from various areas of the body to the center, thereby the pain stimulation from surgical wounds can be inhibited. Consequently, the participants do not suffer from pain (Liu et al., 2015).

Affirmations - tapping increases serotonin levels, thereby it is able to strengthen the performance of descendent pain inhibition, thus inhibiting the transduction of pain from the peripheral to the center, thus overcoming the pain complaint (Emami, 2018). The limitation of this study is that no screening for participants with diabetes mellitus was performed.

Affirmations done using prayers from Al-Fatihah followed by tapping on several acupoints can reduce the complaint of post-surgical pain. Affirmation-tapping interventions can be continued and recommended by nurses who have been trained and licensed to do so.

CONCLUSION

Participant pain complaints were lowest in the affirmation-tapping group with the highest serotonin levels. This is significantly different from the other groups. Affirmations - tapping has been proven to have a therapeutic effect in the context of overcoming post-caesarean section pain complaints. The novelty of the study is the affirmation-tapping performance when dealing with pain complaints associated with increased serotonin. Affirmations - tapping with Al-Fatihah prayers can thus be recommended to overcome pain complaints as a complementary approach to nursing.

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Original Research

The Effectiveness of Prone and Supine Nesting Positions on Changes of Oxygen Saturation and Weight in Premature Babies

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ABSTRACT

Introduction: Stress experienced by the baby will affect the body's function by increasing the body's metabolism. Nesting is used to reduce stress in premature babies. Nesting can be done in a supine or prone position. Few studies have examined the effects of body position on body weight and oxygen saturation. The objective of the study was to determine the difference in oxygen saturation and weight change on the use of nesting in the prone and supine positions in premature babies.

Methods: The research used a quasi-experimental design. The sample consisted of 30 premature babies, which was obtained using a consecutive sample technique. The independent variables were nesting positioning (supine and prone), and the dependent variables were oxygen saturation and body weight. The data of oxygen saturation and the baby's weight were collected using pulse oximetry; the baby's weight scale used observation sheets. The data was analysed using the t-test, Wilcoxon Sign Ranks Test, and Mann Whitney U Test.

Results: The results showed that there was a difference in oxygen saturation before and after the use of nesting in the supine (p=0.001) and prone position (p=0.000). There was a weight difference before and after the use of nesting in both supine (p=0.000) and prone position (p=0.000). There was no difference in oxygen saturation value and infant weight, before or after, between the supine position and the prone position (p=0.18; p=0.9).

Conclusion: The use of nesting in both positions (supine or prone) can increase oxygen saturation and infant weight. Researchers recommend the use of nesting with supine or prone positions routinely in premature babies.

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INTRODUCTION

The process of environment adjustment for premature babies is going to be more difficult. This difficulty of adjustment is due to immaturity of the organ system (Sari, 2018). Immunity of organs in premature babies includes immaturity of the nervous system and low stability in the physiological functions of the infant, low ability to solve stress in the infant will affect the body's function, and will affect the function of the hypothalamus, which will adversely affect growth, heat production and neurological mechanisms (Hockenberry & Wilson, 2013). Stress in the baby will affect the function of the body by increasing its metabolism, so it requires more oxygen consumption to stabilize physiological functions.

The WHO stated that 44% of infant deaths in the world in 2012 occurred within the first 28 days, and the major cause was premature birth, accounting for approximately 37% (WHO, 2012). In Indonesia, based on data from the Health Profile of Indonesia in 2014, it states that the highest incidence of deaths in babies occurred during the neonatal stage. Basic Health Research (Ministry of Health of the Republic of Indonesia, 2018) showed that 78.5% of deaths occurred in neonates at 0-6 days).

Increased oxygen consumption will cause a risk of respiratory distress, acidosis and hypoxia (Hockenberry & Wilson, 2013). Physiological changes in increasing stress hormones increase pulse rate and decrease oxygen saturation (Oken, Chamine, & Wakeland, 2015). Another impact of stress

experienced by premature babies can lead to excessive use of energy, causing barriers to energy conservation resulting in weight gain difficulties (Hockenberry &Wilson 2013). Low-weight babies will have a much heavier adaptation than high-weight babies (Bayuningsih, 2011).

One effort in the provision of developmental care is to set a comfortable position on the neonate using nesting. Nesting is a material made of phlanyl fabric with the length adjusted to the baby's body length which acts as a protective position for the baby so that it is not in an extension condition, and also keeps the baby's position changing as a result of gravity (Kahraman, Başbakkal, Yalaz, & Sözmen, 2018). The benefit of using nesting in neonates is to facilitate hand to hand and hand to mouth position patterns so that the flexion position is maintained (Priya & Biljani, 2005).

Another study on the benefits of nesting explains that nesting is effective in improving comfort and hemodynamic stability in weight babies in the Neonatal Intensive Care Unit (NICU) (Anju & Paulose, 2015). The use of nesting in premature babies is done in the prone or supine position. Bayuningsih, Rustina, & Widyatuti (2011) conducted a study of the effectiveness of nesting and prone position against oxygen saturation and pulse frequency in premature babies. It was found that there was a significant difference in oxygen saturation in infants using nesting in the prone position. Based on studies in the perinatology room of one of the referral hospitals in Bandung, where nesting is used with supine position, the baby looks more comfortable, sleeps longer and allows the nurse to observe it. Based on a previous study on 6 infants with 3 infants using the prone position while in nesting, and 3 infants positioned in supine flexion. It was found that oxygen saturation was increased in all infants, but increases were found in oxygen saturation in 2 infants in the prone position, which is lower than the others because the two infants look uncomfortable and always moved; after their position was changed in the supine, they did not move much, and oxygen saturation increased. From the results of previous study and existing phenomena in the room, researchers were interested in examining whether using nesting and the supine baby position influences oxygen saturation and infant weight in response to physiological stability. Thus, the objective of this study was to identify oxygen saturation and body weight in premature babies before and after using nesting in the supine and prone positions.

MATERIALS AND METHODS

The design of this study used a quasi-experimental design. The population in this study were premature babies treated in the perinatology ward in one of the referral hospitals in West Java Province, and the average number of babies undergoing treatment each month was 40 babies. The research sample used a consecutive sampling technique. The sample inclusion criteria were premature babies weighing 1500-2000 grams, premature babies get nutrition through sonde, premature babies are treated in incubators and the baby's parents allowed the baby to be the subject of the research. Sample exclusion criteria are premature babies with NEC (necrotic enterocolitis), anemia, sepsis and hyperbilirubinemia, premature babies with lung problems and respiratory function and premature babies with congenital abnormalities. Drop out criteria is premature babies who died during ongoing research. Based on inclusion and exclusion criteria, 15 infants were in the supine position and the other 15 infants were in the prone position.

The instruments used in this study include an observation sheet, pulse oximetry and a baby weight scale. The observation sheet contains patient data consisting of name, gender, gestation, age. Further data are vital signs such as temperature, type of nutrition, oxygen saturation and weight. Pulse oximetry was used to measure oxygen saturation and used a new pulse oximetry, with a blue brand fingertip pulse oximeter - pulse rate and SpO2 monitor, which was calibrated at the time of removal by the manufacturer. The baby weight scale was used to measure the baby's weight, that is in Perinatology room that was scale calibrated on 28 March 2016.

Before data collection, the researcher gained informed consent from the parents of premature babies; all the parents had been informed and signed the consent form. Data retrieval began by determining the respondent according to the criteria. Oxygen saturation and weight gain had been recorded before using nesting in the supine and prone positions and then documenting them on observation sheets. The nesting position is the position where premature babies are placed in a circle, similar to a position taken when in the womb with two hands in front of the chest, with the chin touching the chest. With this same position the baby in nesting can be placed in a supine or prone position.

In the final stage, data for oxygen saturation were collected before the premature babies slept in the nesting position (pre-test) and then they were positioned nesting supine (for group supine) and prone (for prone group) for 20 minutes. Their saturation were measured, after which they were positioned into the nesting prone position and supine position (post-test nesting supine and prone). This intervention was only held once a day for 7 days. After 7 days the baby slept in the nesting position, baby weight was weighed and the result of the assessment was written on the observation sheet. Data analysis used in this research is univariate analysis, normality test, and bivariate analysis. Univariate analysis explains and describes characteristics of variables to be studied, that is oxygen saturation frequency distribution before and after using nesting and distribution of frequency of body weight before and after using nesting.

Table 1. Characteristic Demographic (n=30)

Characteristics	Supine		Prone	
	n	%	n	%
Sex				
Male	4	26.67	10	66.67
Female	11	73.33	5	33.33
Gestational Age				
32 Weeks	4	26.67	3	20
33 Weeks	6	40	4	26.67
34 Weeks	5	33.33	8	53.33
Body temperature				
36.5 °C	4	26.67	1	6.67
36.6 °C	3	20	3	20
36.7 °C	4	26.67	4	26.67
36.8 °C	3	20	6	40
36.9 °C	1	6.66	1	6.66
Food supply				
Breast milk + Formula Milk	15	100	15	100

The data normality test used *Shapiro Wilk.* Bivariate analysis was conducted to see the effect of nesting (supine and prone) toward oxygen saturation and body weight in premature babies in the perinatology room. Prone position data including oxygen saturation and weight had normal data distribution and they were tested by a paired t-test, and supine position data had abnormal data distribution, so the test was conducted using Wilcoxon difference test. To see the differences of oxygen saturation value change and body weight between using nesting at prone position and supine position they were tested using the Mann Whitney test. Then the results of the analysis were interpreted by using significance test $\alpha = 0.05$ and confidence interval (CI) 95%.

Ethical clearance for data collection had been obtained from the research ethics committee of the General Hospital No. LB.02.01/C02/1329/1/2017. All respondents had been informed consent and agreed to participate in the research.

RESULTS

Based on the table 1, it can be explained that the respondents in supine groups were mostly female, as many as 11 premature babies (73.3%) with 33 weeks' gestation age of 6 premature babies (40 %). However, the respondents in prone groups were mostly male, as many as 10 premature babies (66.67%) with 34 weeks' gestation age of 8 premature babies (53.33 %). All the respondent's body temperatures were within the normal body temperature range, which is between 36.5$_o$C - 36.9$_o$C and for the type of food given to infants as a whole (100%), respondents were given a similar type of food, namely breast milk and formula milk.

Table 2 showed that oxygen saturation of infants after 20 minutes using nesting in supine and prone positions increased oxygen saturation. In the supine position, the minimum oxygen saturation after intervention was 93%, and in some of the infants the saturation could increase up to 98%. Furthermore, there is a difference in oxygen saturation before and after using nesting in the supine position ($p = 0.001 < 0.005$). Otherwise, after a prone position, the infants' oxygen saturation was in the range of 95% to 98%, and there is a difference in oxygen saturation before and after using nesting in the prone position ($p = 0.000 < 0.005$). Based on the Mann Whitney test, there is no difference in oxygen difference between the supine and prone positions ($p = 0.180 > 0.005$).

Based on table 2, it can be seen that after seven days using nesting in the supine and prone position, the baby's increased their weight. The amount of babies who reached their weight of more than 2000 grams was increased. There are differences in body weight before and after using nesting both in the position of supine ($p = 0.000 < 0.005$) and prone position ($p = 0.000 < 0.005$), but there was no difference in weight gain in the supine and prone positions ($p = 0.900 > 0.005$)

DISCUSSION

Effect of nesting on oxygen saturation

Based on Table 2 the results showed that the baby's oxygen saturation after 20 minutes using nesting in supine and prone positions increased oxygen saturation. The results of this study are reinforced by the results of different test analyses, considering the change in oxygen saturation value after using nesting. According to Table 2 there is no decrease in oxygen saturation between before and after using nesting in the supine position. In 15 respondents there was an increase in oxygen saturation before and after using nesting in the supine position. As can be seen on Rank Ties, which is 0, so there is no equal oxygen saturation value between before and after using nesting in the supine position. Furthermore, the value of p-value, which is 0.001, then p-value <alpha value (0.05) shows that there is difference in oxygen saturation before and after using nesting in the supine position.

In the supine position, increases in oxygen saturation are due to the supine position having

Table 2. Oxygen Saturation and weigh Before and After Using Nesting in supine and prone position (n=30)

Variables	Supine Position (n=15)				Prone Position (n=15)			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
Saturation								
90	1	6.7	0	0	0	0	0	0
91	2	13.3	0	0	2	13.3	0	0
92	0	0	0	0	3	20	0	0
93	2	13.3	1	6.7	2	13.3	0	0
94	3	20	0	0	4	26.7	0	0
95	3	20	4	26.7	3	20	6	40
96	4	26.7	3	20	1	6.7	5	33.3
97	0	0	4	26.7	0	0	2	13.3
98	0	0	3	20	0	0	2	13.3
Mean ± SD	93.4±1.549		96±1.069		93.4±1.549		95.00±1.604	
p*	0.001							
p**					0.000			
p***					0.180			
Body Weigh								
1500-2000	13	86.7	9	60	14	93.3	12	80
> 2000	2	13.3	6	40	1	6.7	3	20
Mean ± SD	1782±193		1919±175		1724±162		1870±161	
p**	0.000				0.000			
p***					0.900			

p: Wilcoxon; p**: Paired t test; p***: Mann-Whitney U Test; Body weigh in gram*

better respiratory muscle strength and low episodes of hyposexuality. This occurs mainly in the supine position with a 45 degree head elevation, where the development of the lungs becomes maximal (Spooner et al., 2014). The use of nesting in the supine position may affect the increase in oxygen saturation value in premature babies because using nesting can adjust the infant in a flexible position. The flexible position can serve as a safety measure to prevent heat loss caused by body surfaces exposed to room temperature. Heat loss in premature or hypotermic infants will require many calories for the stability of body temperature, so it will cause increasing oxygen consumption, and nesting ensures the flexible position, so the metabolic rate will be decreased, the oxygen in the body is enough, so the saturation rate will be increased. The flexible position in premature babies is a good position because it will affect relaxation and reduce metabolism (Kahraman et al. 2018) .

The use of nesting in prone positions in Table 2 indicates that there is a difference in oxygen saturation before and after using nesting. This is proven by a higher mean value in oxygen saturation after using nesting and p-value (0.000) <alpha value (0.05), indicates that there is an influence of using nesting in prone position to oxygen saturation value. The results of this research are in line with another study (Bayuningsih et al., 2011), that using nesting affects the increase of oxygen saturation by p value = 0.001. In the study (Bayuningsih et al., 2011) the baby position in nesting is prone. The prone position can reduce pressure on the diagfragma, decrease the apneu period and reduce the esophageal reflex, so it can increase lung volume capacity (Abdeyazdan, Nematollahi, Ghazavi, & Mohhamadizadeh, 2010).

Based on the results of the study, it showed that the use of nesting in supine and prone positions influences the change of oxygen saturation value. This research conducted a different test to the oxygen saturation value change between nesting in prone position and nesting in supine position. This is conducted to find out the best position to get a better oxygen saturation value. Based on table 7 it is found that there is no difference in the difference value of oxygen saturation change in the supine and prone positions, it is proven by p-value> alpha (0.05).

The results of this study contrast with (Abdeyazdan et al., 2010)'s research that the prone position obtained oxygen saturation value is higher than in the supine position (Abdeyazdan et al., 2010). In a study conducted by Abdeyazdan, oxygen saturation measurement was performed for 120 minutes of using nesting, while in this research it is only measured oxygen saturation after nesting for just 20 minutes. The inhabitant factor of nesting can affect the increase in oxygen saturation. Several studies have shown that there is an increase in the oxygen saturation value during the use of nesting in the prone position of about 1.18 to 4.36% (Rivas-Fernandez, Roqué i Figuls, Diez-Izquierdo, Escribano, & Balaguer, 2016)

Based on the results of the research, it showed that the use of nesting in infants has an effect on increases in the oxygen saturation value. Differences in supine or prone positions in using nesting do not differ in effect on increasing oxygen saturation, since both cause an increase in oxygen saturation value in nesting usage. Nesting is a barrier that serves to support the baby's body. Nesting can reduce acute stress in infants due to sudden and surprising movements (Borle, 2015). Another study proves that nesting can reduce stress in premature babies.

Nesting can reduce stress and pain levels in premature babies compared to non-nesting infants at the time of diaper replacement (Comaru & Miura, 2009). The use of nesting has a positive impact on reducing stress in premature babies, because stress in premature babies can activate the stress hormone which will further affect the increase in pulse rate and decrease oxygen saturation (Maguire et al., 2009).

Factors of oxygen saturation according to (Brooker Chris, 2009) are body temperature, hemoglobin, hyperbilirubin and hypoxemia. Body temperature can affect oxygen saturation because if there is an increase or decrease in body temperature this will increase metabolism. Increased metabolism requires more oxygen levels and will cause a decrease in oxygen saturation. In this research preterm babies, as the sample of the research, had a normal body temperature, which is 36.5-36.8, it will not affect the results of this research. Another factor that affects oxygen saturation is anemia. Anemia is decreasing of hemoglobin, so it will decrease oxygen levels that bind to Hb and will decrease the oxygen saturation value. In addition, hyperbilirubin and hypoxemia will affect oxygen saturation, but in this study the three factors did not affect the results of the study because infants with anemia, hyperbilirubin and hypoxemia were included in the exclusion criteria.

Oxygen saturation levels in infants are very important to be known because when the oxygen saturation level in infants is low, there is a risk of hemodynamic abnormalities. Normal values of oxygen saturation range from 95% to 100%, at 28-34 weeks of normal oxygen saturation value 88% to 94% and in infants with gestational age, <28 weeks, the normal value of oxygen saturation 85% to 92% is still considered normal (Snoek et al, 2016).

Effect of nesting on oxygen saturation

Table 2 shows that after 7 days of using nesting in supine and prone positions weight was gained. The results of this research are reinforced by the results of different test analyses by considering changes in infant weight after using nesting in supine and prone positions. Based on table 2, it can be concluded that there are differences in body weight before and after using nesting both in prone and supine positions, evidenced by the value of p-value (0.000) <value alpha (0.05), but the difference in average infant weight gain before and after using nesting is greater in preterm infants positioned in the prone rather than the supine position.

The research also compared differences in changes in infant weight gain between using nesting in the supine and prone positions. This is done to find a better position to increase the weight of premature babies. The comparison of the difference in oxygen saturation value difference between the two positions (supine and prone) was explained in table 2., it is found that there is no difference in the difference value of change and there is no difference of weight in supine and prone position, it is proved by p-value> alpha (0.05).

Based on the results above, it can be concluded that the use of nesting in supine position and prone positions affect weight gain. Different positions during the use of nesting for infant weight gain show no significant difference in outcome, so nesting can be used in either the supine or prone position. Nesting facilitates the baby in a flexible position that protects the baby from increased metabolism due to stimuli from the environment that can lead to stress and improve the quality of the baby's sleep, so there is no excessive use of energy. Energy that is not used by the body will be stored in the adipose system and increases body weight (Reyhani, Ramezani, Boskabadi, 2016).

Nesting can increase infant growth. It is known from several studies including research of (Kahramen *et al.*, 2017) that improving the quality of sleep will reduce energy consumption or resting energy expenditure (REE). Decreasing REE will improve efficiency and metabolism, thereby increasing the weight of premature babies. Nesting will increase growth because the use of nesting can facilitate the baby to have a longer deep sleep period (Prasanna & Radhika, 2015). In a deep sleep state, 75% of the growth hormone is produced. This is in line with (Reyhani, Ramezani, Boskabadi, & Mazlom, 2016) study that deep sleep in premature babies reduces the crying period which can lead to excessive energy consumption, so no extra energy can be stored, finally it can lead to weight loss (Reyhani, Ramezani, Boskabadi, 2016).

Human growth hormone is an anabolic hormone that plays a very big role in the growth and formation of the body, especially in childhood and puberty. Growth hormone (GH) plays a role in increasing the size and volume of brain, hair, muscles and organs in the body. GH is responsible for human growth from birth. The growth secretion of growth hormone is physiologically regulated by the hypothalamus. The hypothalamus produces Growth Hormone Releasing Factor (GHRF) which stimulates the secretion of growth hormones. The secretion is increased in the state of deep sleep (Kim et al 2015).

According to (Indriansari, 2011) using a quasi-experimental method with a sample of 15 low birth weight babies results in an increase in sleep duration in infants using nesting compared to infants in the control group. Achieving deep sleep is very important in infants as it facilitates low birth weight infants to grow and develop optimally (Rahmawaty, 2016)

Deep sleep is essential for energy conservation, decreased peripheral muscle tone and arterial blood pressure, decreased pulse rate, and resting muscles during deep sleep. Infants who fall asleep in nesting as an indicator of decreased stress due to stress reduction will elicit a relaxed response induced by muscle relaxation and sleep. The sleep phase is a very important phase for the baby because during this phase the secretion of growth hormone and body immunity occurs (Irwin, 2015) .

In general, in this research the weight of respondents experienced an increase after using nesting. The median weight of infants before using nesting was 1753.5 grams and after using nesting was 1894 grams, the weight of premature babies rose in 140.5 grams for 7 days, this is in line with (Mohrbacher, N. & Stock, 2010) that the baby's weight gain will increase by 15-20 grams/day in early life. This happens either in term infants or in premature babies.

Body weight is the result of increasing or decreasing all existing system in the body and a parameter can provide a picture of body mass. Body mass is very sensitive to sudden changes, such as infectious diseases, decreased amount of food consumed and increased metabolism (Drassinower, Friedman, Običan, Levin, & Gyamfi-Bannerman, 2016). Factors that affect weight gain are nutrients because the fulfilment of nutritional and fluid needs in premature babies in the room are adjusted for weight and gestational age. Fulfil the needs of infants by 60-80 cc/kg BW/day which gradually increases up to 100-200c/kg BW/day after the first week. The initial fluid given early in the baby's life is breast milk. If no breast milk is given, then pregestimil with 2x dilution is provided. Premature babies have only a small amount of energy reserves because of the lack of glycogen reserves under the skin. The need for premature babies is divided into 2 important components that need to be maintained for body functions and the need to grow (Johnson & Marlow, 2017). All respondents in this research obtained a combined nutrition between breast milk and formula milk. Nutrition obtained by all respondents is the same, so the nutritional factors have no effect on the results of the study.

LIMITATION

This study has limitations, the number of respondents in this study was small, besides saturation measurements were only performed once for saturation oxygen, even though the intervention was carried out for seven days.

CONCLUSION

Nesting in a supine position and in a prone position affects oxygen saturation and weight gain. This is proven by the difference in oxygen saturation and weight gain that increases before and after using nesting. Differences in the position of infants during the use of nesting did not affect the difference in the increase in oxygen saturation values and body weight. Furthermore, it is recommended that nesting in supine and prone positions can be chosen as one of the interventions to care for premature babies in improving oxygen saturation and weight. The results of this study can be used as a reference for the manufacture of standard operating procedures in the NICU ward because the process involves nurses, doctors, families and other officers, so it can run well. Future researchers should conduct research in more samples and with a longer observation time (120 minutes) using the control group of supine and prone positions on the use of nesting, so the results will be more significant.

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Original Research

Analysis of Sociodemographic and Information Factors on Family Behaviour in Early Detection of High-Risk Pregnancy

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ABSTRACT

Introduction: Pregnancy and childbirth are physiological processes experienced by women, but they sometimes have risky conditions. There are still many pregnant women and their families who are unable to detect a high-risk of pregnancy early. This study aims to determine family behaviour in conducting early detection of a high-risk of pregnancy in terms of sociodemographic and information factors.

Methods: This study uses an explanatory survey design with a cross sectional design. The sample size of this study was 146, with simple random sampling. The independent variables were sociodemographic factors (age, gender, ethnicity, education, income and religion) and information factors (experience, and media exposure) while the dependent variable is family behaviour. The instrument with the questionnaire used the Likert scale. The data was analysed using partial least square.

Results: The results showed that Structural Equation Modelling-Partial least square (SEM-PLS) statistical analysis, through Confirmatory Factor Analysis (CFA), obtained sociodemographic factors on family behaviour of 1,999, and information factors on family behaviour of 13,78. The value of the influence of sociodemographic factors (0.102) and the value of the influence of information factors (0.754). R^2 (0.63) and Q^2 value of 0.65.

Conclusion: Sociodemographic factors and information factors significantly influenced family behaviour factors in early detection of high-risk of pregnancy. Information factors have a greater effect on family behaviour than sociodemographic factors. Midwives as health service providers at the health care centre need to optimize family empowerment through health information efforts in health promotion efforts. Further research requires the involvement of other factors to improve family behaviour, especially in the ability of families to detect early high-risk pregnancies.

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INTRODUCTION

Pregnancy and childbirth are physiological processes experienced by a woman, but sometimes there are risky conditions (Holness, 2018). The ability of pregnant women to detect early high-risks is still below the average, which is one of the causes of complications that can endanger the welfare of the mother and foetus (Lee, Ayers, & Holden, 2016).

For this reason there is a need for social support from family, friends, colleagues and health care providers to provide support to pregnant women, especially in risky conditions. This is especially important given the importance of maternal mental health during pregnancy (Wei et al., 2018).

National maternal mortality rate (MMR) from 1991-2015 has fluctuated. The results of the Indonesian Demographic and Health Survey (IDHS) 2017 showed a decrease in MMR during the 1991-

2007 period from 390 to 228 per 100,000 KH, in 2012 it increased to 359 per 100,000 KH, in 2015 it decrease to 305 per 100,000 KH. Results of the 2015 Intercensal Population Survey (SUPAS) again showed a decline in MMR to 305 per 100,000 KH. The reduction in mortality has not yet reached the MDGs (Millennium Development Goals) target of reducing MMR to 102 per 100,000 KH in 2015 and is still far from SDGs (Sustainable Development Goals) output to reduce MMR to 70 per 100,000 KH in 2030 (Ministry of Health Republic Indonesia, 2017).

Surabaya City is the highest regency / city in East Java with pregnant women experiencing obstetric complications of 9,496 out of 47,480 pregnant women in 2016 (Health Office of East Java Province, 2017). The number of high-risk pregnant women in 2015-2017 continued to increase, in 2015 amounted to 17,656 pregnant women, in 2016 amounted to 17,928 pregnant women, and in 2017 amounted to 19,698 pregnant women (Health Office of Surabaya, 2017).

The phenomenon in the community at this time is that there are still many pregnant women and their families who do not and are not able to perform early detection of a high-risk pregnancy. This is proven by the low coverage of early detection of high-risk by the community. Lack of community participation in early detection of high-risk of pregnancy is due to low levels of education and family knowledge, behaviour that is less supportive such as social position, economic ability and thus causes families to experience powerlessness in carrying out early detection of high-risk pregnancy (Khadijah & ., 2018).

The factors affecting individuals as well as family, act among other things: personal factors (general attitudes, personality traits, values of life, emotions and intelligence), sociodemographic factors (age, gender, ethnicity, education, income and religion) and information factors (experience, knowledge, and media exposure) (Nursalam, 2017). Socio-demographic factors such as income and education can influence the condition of pregnant women and even depression (Biaggi, Conroy, Pawlby, & Pariante, 2016).

The impact of early detection of high-risk pregnancy is not done optimally by the family, among others, is the occurrence of delays called 3 late. The first is late in recognizing danger signs of pregnancy and childbirth, the second is too late to make decisions, the third is too late to get to the hospital or referral is late. 3 late results in a higher maternal mortality rate (MMR) and infant mortality rate (IMR) (Fatkhiyah, Kodijah, & Masturoh, 2018).

The family is expected to act as the closest support system for pregnant women, because in the family there are strong emotions to help take care of the mother during her pregnancy including in detecting abnormalities and danger signs (Joyce, Tully, Kirkham, Dicker, & Breathnach, 2018). Early detection of symptoms and danger signs during pregnancy is the best effort to prevent the occurrence of serious disruption to pregnancy and maternal safety. Conducting early recognition of risk factors in pregnancy and childbirth as far as possible by pregnant women themselves, their husbands and families (Klugman, Li, Barker, Parsons, & Dale, 2019).

Family behaviour in terms of sociodemographic factors and information can improve the ability of families, in this case the husband to participate in the care of pregnant women in recognizing the high-risk of pregnancy, and important aspects in caring for these pregnant women, as well as increasing family involvement in family empowerment. The purpose of this study was to determine family behaviour in conducting early detection of a high-risk of pregnancy in terms of sociodemographic and information factors.

MATERIALS AND METHODS

In this study, the design is an explanatory survey design with a cross sectional design. The population and sample are family. The independent variables are sociodemographic factors (age, gender, ethnic, education, income and religion) and information factors (experience, and media exposure) while the dependent variable is family behaviour.

The sample size of 146 respondents from the population pregnant women in the area around the Dupak Health Center is obtained by simple random sampling. This research was conducted in August to September 2019 in Puskesmas Dupak Health Center Surabaya, East Java. With the inclusion criteria of families who live together with pregnant women, and who play an important role in family decision maker. The questionnaire used the Likert scale. Exogenous variables (sociodemographic and information) and endogenous variables (family behaviour).

Valid indicators of social factors are education (0.76) and income (0.91), religious indicators (0.22) and gender (0.22) are quite valid. Education and income indicators have a significant effect on sociodemographic factors, religious and gender indicators also have a significant effect. Information factors are validly explained by experience indicators (1.00) and media exposure (0.30). So, the indicators of experience and media exposure have a significant effect on the information factor. Based on the composite reliability and Cronbach alpha values above which are worth more than 0.6 for sociodemographic factors (0.61), information (0.75) and family behaviour (1.0), it can be concluded that these factors are reliable (reliable) or consistent.

Data collection is done directly / primary data, and analysed by SEM-PLS, through CFA (Confirmatory Factor Analysis). Ethical clearance has

been issued by the Airlangga University Faculty of Nursing Ethics Team No. 1752-KEPK in August 2019.

RESULTS

Data obtained from 146 respondents are presented in the Distributed Table.

Table 1 shows that the age of the respondents spread in all groups. Where the most age groups are 36-45 years and 26-35 years, respectively 35.6% and 30.8%. The gender of the majority of male respondents was 89%, education was spread at all levels, with the highest level of education being elementary education (SD-SMP) as much as 56.8% and secondary education (high school) as much as 31.5%. The ethnic origin of respondents are almost entirely Javanese at 76%, then Madura at 23.3%. The income of the respondents is almost entirely in the sufficient category which is 80.8%; and the religion practiced by almost all Islam/Muslims is 83.6%.

Related information variables with experience indicators (54.8%) had received counselling and for indicators of media exposure almost all (89.7%) were exposed to media in the form of posters. In regard to family behaviour related to actions taken by family members in carrying out family tasks in early detection of a high-risk of pregnancy, it is known that the achieved or positive behaviour is 52.7%, while that which is not achieved or the behaviour towards negative is 47.3%.

Table 1. Frequency distribution of socio-demographic, information, and family behaviour variables (n=146)

Indicator	Sub Indicator	n	%
Sociodemographic			
Age (years old)	17-25	16	11.0
	26-35	45	30.8
	36-45	52	35.6
	46-55	27	18.5
	56 - 65	5	3.4
	>65	1	0.7
Gender	Male	130	89.0
	female	16	11.0
Education	Basic	83	56.8
	Intermediate	46	31.5
	High	17	11.6
Ethnic	Java	111	76.0
	Madura	34	23.3
	China	1	0.7
	Batak	0	0
Income	High	28	19.2
	Enough	118	80.8
Religion	Islam	122	83.6
	Christian	24	16.4
	Catholic	0	0
	Hindu	0	0
	Buddha	0	0
Experience	Ever	80	54.8
	Not yet	66	45.2
Media exposure	Poster	131	89.7
	Leaflet	7	4.8
	Not exposed	8	5.5
Family behaviour			
Family behaviour	Reached	77	52.7
	Not achieved	69	47.3

Analysis of measurement models

The process of analysing the measurement model is done by testing the validity and reliability of the factor variables. Indicator criterion indicators concluded valid measuring the factor variables, if the loading factor value has the value of t-statistics ≥ t-table or if the value of t-statistics of the weight of influence ≥ t-table = $t_{(n-1;\ 5\%\ /\ 2)} = t_{(92;\ 0.025)} = 1.96$. While it is concluded invalid if the factor loading value and the influence weight value both have t-statistic values <1.96. The next tests the consistency / reliability of the factor variables by using composite reliability and alpha Cronbach values. The criterion that the factors concluded reliable is explained by the indicator variables, if the composite value > 0.7 then the consistency of the factors is good, and if the value of 0.6 to 0.7 is still acceptable. It is known that all indicator variables have t-statistics values more than t-table values = 1.96. There are only 2 indicators that do not reach 1.96 and are still above 1, so the conclusion is quite significant.

Indicators of valid sociodemographic factors are education and income, religious and gender indicators are valid enough to explain sociodemographic factors. Education and income indicators have a significant effect on sociodemographic factors, religious and gender indicators have a significant effect. Information factors are explained validly by indicators of experience and media exposure. So, it can be concluded that the indicators of experience and media exposure significantly influence the information factor.

Based on the value of composite reliability and Cronbach alpha. which are worth more than 0.6 for sociodemographic factors, information and family behaviour, it can be concluded that the factors mentioned above are reliable (reliable) or consistent.

Analysis of Structural Model Testing

Analysis of the structural model testing to evaluate several criteria, namely the significance criteria of the coefficient of influence of exogenous variables (sociodemographic and information) of the endogenous variable (behavioural family), then the criteria of the coefficient of determination (R^2), and predicted relevance (Q^2). Significance criteria of the coefficient of influence of sociodemographic factors and information factors on family behaviour factors,

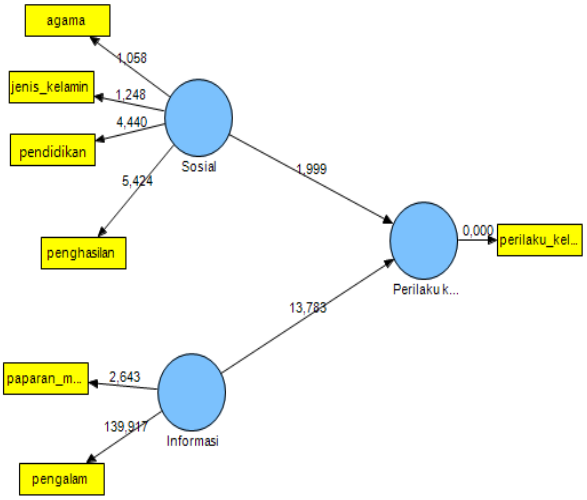

Figure 1. Value of loading factor and t-statistics value of the model

by testing using t-statistics values which are then compared with t-table values.

The results of testing the effect of the coefficient of influence between sociodemographic factors and information factors on family behaviour in early detection of high-risk of pregnancy, that the t-statistics between sociodemographic factors on family behaviour is 1.999 where above the t-table value of 1.96, it is concluded that sociodemographic factors have a significant effect towards family behaviour. Furthermore, the t-statistic value of the information factor on family behaviour is 13.78 where above the t-table value of 1.96 it is concluded that the information factor has a significant effect on family behaviour.

The value of the influence of sociodemographic factors on family behaviour is 0.102, where the value of the influence is linear in the same direction which means that if sociodemographic factors are increased by 1 unit it will increase family behaviour in the early detection of high-risk of pregnancy, with the effect of an increase of 0.102 times. The value of the influence of information factors on family behaviour is 0.754, where the value of the influence is linear in the direction which means that if the information factor is increased by 1 unit it will increase family behaviour in the early detection of high-risk of pregnancy, with the effect increasing by 0.754 times.

Results of processing coefficient of determination (R2) of the influence of sociodemographic factors and factors of information on family behavioural factors in the early detection of high-risk pregnancies, amounting to 0.63. So this value is included in the criteria both in terms of large variations of endogenous factors (family behaviour) that can be explained by exogenous factors (sociodemographic and information). The processing results obtained Q2 value of 0.65. This value is included in the criteria of having a good ability (relevant) in predicting.

DISCUSSION

The sociodemographic factors examined in this study concern age, sex, education, ethnicity, income and religion. Sociodemographic factors have the effect of increasing family behaviour in the detection of high-risk of pregnancy by 0.102 times and the information factor has the effect of increasing family behaviour in the detection of high-risk of pregnancy by 0.754 times.

In this study almost half in the late adult age group 36-45 years (35.6%) and early adults 26-35 years (30.8%). In family members who are old enough the level of maturity and strength of the family will be more mature in thinking and acting. This is seen from the experience and maturity of his soul. Age is one of the factors that influence one's health behaviour (Lin, Broström, Nilsen, & Pakpour, 2018).

Support obtained from husbands, families and health workers is very important in recognizing the symptoms and responses felt by pregnant women (Zand et al., 2017). In this research, in the majority of respondent families, 89% were accompanied by their husband. Husband support is particularly beneficial in reducing anxiety and complications in pregnancy (Abdollahpour, Ramezani, & Khosravi, 2015). Support, especially from couples, is very influential in making decisions (Alemayehu & Meskele, 2017).

Family education is mostly elementary education (elementary-junior high) at 56.8%. The lack of community participation in the early detection of high-risk of pregnancy is due to low levels of education and knowledge, and low income resulting in unsupportive behaviour. Education is one way for families to receive knowledge about antenatal care, with high education and good knowledge which will make families easy to receive information and conduct early detection of high-risk pregnancies (Mehta, Zheng, & Myrskylä, 2019).

Table 2. Convergent validity of latent variables

Latent Variable	Indicator	Convergent Validity		
		Loading factor (λ)	T Statistics	Validity
sociodemographic	Religious	0,22	1,06	Valid Enough
	Gender	0,22	1,25	Valid Enough
	Education	0,76	4,44	Valid
	Income	0,91	5,42	Valid
Information	exposure media	0,30	2,64	Valid
	experience	1,00	139,92	Valid

Table 3. Path Coefficients: effect of sociodemographic and information on family behaviour

Indicators	Original Sample (O)	Sample Mean (M)	Standard Deviation	Standard Error	T-Statistics
Religious <- sociodemographic	0.215	0.210	0.203	0.203	1.058
Gender <- sociodemographic	0.225	0.212	0.180	0.180	1.248
Exposure media <- information	0.304	0.299	0.115	0.115	2.643
Education <- sociodemographic	0.764	0.713	0.172	0.172	4.439
Experience <- information	0.999	0.994	0.007	0.007	139.917
Income <- sociodemographic	0.909	0.865	0.168	0.168	5.424
Information ->Family behaviour	0.754	0.752	0.0555	0.0555	13.78
sociodemographic ->Family behaviour	0.102	0.110	0.051	0.051	1.999

The origin of respondents is almost entirely Javanese 76% and Madura 23.3%. Indigenous peoples' knowledge about health advice can be good information in supporting education and behaviour for pregnant women of certain ethnicities. For example, in Madura many dietary restrictions and food suggestions are applied for pregnant women. This affects the patterns of habits and behaviour of pregnant women and their families (Diana et al., 2018). Culture has a strong influence on decision making. Family participation in perinatal care is very important (Tobing, Afiyanti, & Rachmawati, 2019).

Income shows that almost all (80.8%) respondents have a sufficient income level. It is important for financial income to meet the daily needs of households in the community, specifically with financing, then someone will be able to utilize the existing health facilities such as treatment and control that can still maintain the health of pregnant women. This income is very influential on family behaviour, including pregnant women. A good level of income allows family members to meet better needs, for example in the fields of education, health, career development and so on. Health care professionals should carefully assess the state of family empowerment of primary caregivers who are younger and those with low education, low household income, high burden of child-rearing, and ties are fragile among the members of the family. Home visits and institutional services for the provision of care and services are well coordinated (Wakimizu, Fujioka, Nishigaki, & Matsuzawa, 2018).

Religion, at almost 83.6%, is almost entirely Muslim. Religion is published about life in humans, published in humans. The existence of such rules can provide guidance to families in how to care for and respond to families who are pregnant. Spirituality strongly influences Muslims in supporting spiritual values during pregnancy and childbirth, nurses must be sensitive to women's spirituality and integrate this element in providing maternal nursing care (Budiati & Setyowati, 2019).

The information factors examined in this study include experience and media exposure. Most respondents (54.8%) had the experience of respondents from the study results who had received counselling about risky pregnancy. In addition, most respondents consider themselves experienced when children also have experiences about other people who have already been pregnant. A collaborative education model using multi-disciplines for patient education will be very important to provide information related to assistance provided to support maternal mortality and morbidity (Jain & Moroz, 2017).

In this study nearly half (89.7%) of respondents were exposed to the media related to high-risk pregnancies in poster form. Respondents obtained information about high-risk pregnancies from posters or leaflets provided at Puskesmas, as well as electronic media, and counselling by health workers. Media information about the detection of high-risk of pregnancy can affect one's knowledge (Dewi, 2017).

The results of this study showed the majority of family behaviour reached 52.7%. Information factors have a greater effect on family behaviour in the detection of high-risk of pregnancy. Information about high-risk pregnancies provided by health workers both print and electronic media will increase the knowledge of pregnant women and their families about the importance of early detection of high-risk pregnancies so that they can be encouraged to do so. The role of health workers in providing information about high-risk pregnancies is very important (Widarta, Cahya Laksana, Sulistyono, & Purnomo, 2015). The role of the government in providing information about high-risk pregnancies greatly helps pregnant women and families to obtain better information (Waryana, Supadi, & Haryani, 2016).

The information factor on family behaviour is 0.754 greater than the sociodemographic factor. A more proactive approach to providing information may be valuable not only for those who have a clear desire for more information, but also for those who are unsure of what information they might have missed (Baron et al., 2017).

The behaviour of the family in performing early detection of high-risk pregnancies in influenced by a person's health beliefs (Health belief) in theory HBM (Health Belief Model). HBM (Health Belief Model) is used to identify several important priority factors that have an impact on behaviour (Huang, Dai, & Xu, 2020).

Azwar (2013) stated that according to the theory of planned behaviour, among the various beliefs, the availability of opportunities and resources are the reason to determine intention and attitude. This belief can be derived from the experience, and also it can be influenced by indirect information about behaviour, for example by looking at the experience of a friend or someone else. It is also influenced by several other factors that reduce or increase the effect of the difficulty committing acts.

Human behaviour occurs through a stimulus-organism-response process. The behaviour in question is family behaviour in the early detection of high-risk pregnancies in which behaviour is associated with factors of age, education, income, knowledge, experience and media exposure. In fact, the role of the husband and the family also influences pregnant women in supporting the behaviour or actions of pregnant women in utilizing health services (Chou et al., 2018).

A person's health behaviour is determined, among other things, by the presence or absence of support from the surrounding social support, in this case midwives are the main health care providers during pregnancy, they should ideally emphasize the availability of questions during antenatal examinations (Baron et al., 2017). People who live in an environment that upholds health aspects will be more enthusiastic in maintaining their health (Yeh, Ma, Huang, Hsueh, & Chiang, 2016). Maternal and child health needs to be improved, so in an effort to improve the holistic and integrative approach is not only limited to the medical sector, but also economically, educationally and socio-culturally (Asmuji. & Indriyani, 2016). The involvement of families as caregivers is to improve their health status (Chimowitz, Gerard, Fossa, Bourgeois, & Bell, 2018). The limitation in this research is that it only relates to sociodemographic and information factors. While there are other factors that also influence family behaviour in detecting early high-risk pregnancies.

CONCLUSION

There are social factors and information factors that need to be considered to improve family behaviour in pregnancy care. The information factor has a larger comparison than sociodemographic factors. Family problems can improve the quality of the family in approval of danger signs or problems experienced in the family. Midwives as health service providers at the health care centre need to optimize family empowerment through health information efforts in health promotion efforts. Further research needs an optimal family empowerment model that makes families need help during pregnancy and participates in preventing the presence of maternal and infant applications.

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Original Research

The Effect of Combination Therapy of A Warm Ginger Stew Compress and Ki. 3 Point Acupressure on the Pain Level of Gout Arthritis Patients in Indonesia

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ABSTRACT

Introduction: Gout arthritis is a systemic disease caused by deposition of monosodium urate crystals in the joints, causing pain. Pain management may include complementary therapy such as combination therapy of a warm ginger stew compress and Ki. 3 point acupressure to reduce pain. This research aimed to examine the effect of combination therapy of a warm ginger stew compress and Ki. 3 point acupressure on the pain level of gout arthritis patients.

Methods: The research design for this study is a quasi-experiment pre-test and post-test, with a control group design for 30 respondents. The respondents were assigned to an experimental group with combination therapy of a warm ginger stew compress and Ki. 3 point acupressure for about 30 minutes, and a control group with a warm ginger stew compress for about 15 minutes. Each group consisted of 15 people. The data was analysed using a paired t-test, independent t-test, and Mann Whitney test.

Results: The Mann Whitney test showed an average decrease of pain level in the experimental group of 1,7333 and the control group of 1,0667 so, there were differences in the decreased of pain level before and after intervention between the two groups with *p-value*=0.013.

Conclusion: Combination therapy of a warm ginger stew compress and Ki. 3 point acupressure were effective in decreasing the pain level of gout arthritis patients in Puskesmas 1 Purwokerto Timur. This therapy can be used for the gout arthritis patient to reduce pain level.

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INTRODUCTION

Gout arthritis is a disease of the joints due to a metabolic disorder of uric acid that accumulates (hyperuricemia) in the body tissues (Sustrani, Nature, & Hadibroto, 2007). Gout arthritis occurs due to the deposition of monosodium nerves in the joints. The deposition of monosodium fibres (tophi) will cause inflammation. The prevalence of gout arthritis is expected to continue to increase.

The prevalence of asymptomatic hyperuricemia in the general population in the USA is about 2-13%. Based on the results of basic health research by Riskesdas (2013), joint disease is currently the third (24.7%) leading disease that is not contagious after stroke (57.9%) and hypertension (36.8%), which increases as a person gets older. The prevalence of gout arthritis in Bandungan, Central Java, as reported by the collaborative research of the World Health Organization International League of Associations for Rheumatology Community Oriented Program for Control of Rheumatic Disease (WHO-ILAR COPCORD) among 4,683 people aged 15-45 years, was 17.6% incidence of gout arthritis, experienced by men at 24.3% and women at 11.7% (Kurniari, 2011). The results of a survey conducted in Clinics 1 Purwokerto Timur, for 10 months (January-October 2017) found as many as 33 patients with hyperuricemia. The survey results showed severe pain (28.60%), moderate pain (42.85%), and mild pain (28,5%) of the joint. The definition of pain, according to the International Association for the Study of Pain (IASP) is "as subjective knowledge and an unpleasant emotional experience associated with actual tissue damage or potential or perceived in the events which occurred

the damage" (IASP in Potter & Perry, 2005). Pain that is not immediately handled could lead to discomfort, broad limitations in joint motion, distractions, and other activities of daily living (Handono & Richard, 2013). These impacts indicate that efforts need to be made to control the pain.

It may be managed by pharmacological and non-pharmacological pain therapy. Pharmacological therapy is often used to reduce joint pain, for example by non-steroidal anti-inflammatory drugs (NSAIDs) to control inflammation, which has a bitter taste (Gliozzi, Malara, Muscoli, & Mollace, 2016). There are some side effects from consuming these drugs such as nausea, vomiting, kidney failure, and even death if it is taken without proper instruction in the long term (Misnadiarly, 2008). Nonpharmacological therapy can be used as a complementary therapy, which is effective and safe, for example the use of warm ginger stew compress therapy and acupressure.

The warm ginger stew compress is a warm compress combined with ginger that contains oleoresin, where there is substance in the oleoresin gingerol. Gingerol serves as a compound that is not volatile. Gingerol induces pharmacological and physiological effects of antioxidants that could inhibit prostaglandins and cyclooxygenase which may reduce pain (Nahed & Tavakkoli, 2015). In addition to the warm ginger stew compress, there are other therapies that can be used to handle pain, for example acupressure. The acupressure massage techniques through stimulation of acupressure points will enable the modulation of pain in opioid systems, non-opioid systems, and inhibition on sympathetic dystrophy to reduce nerve pain.

In view of the benefit of warm ginger stew and acupressure to control pain rather than using only single method, this research was conducted to identify the effect of combination therapy of compress of the decoction of warm ginger and acupressure point Ki. 3 on the level of pain among patients suffering from gout arthritis at clinics in region I of Purwokerto Timur.

MATERIALS AND METHODS

This research used a quasi-experimental research design with pretest and posttest, with a control group design. The data was collected from March to April 2018 in the region and Arcawinangun, Mersi Purwokerto. The sample in this study is 30 respondents, where the respondents are patients from clinics I Purwokerto Timur. The respondents were divided into experiments group with the combination therapy intervention compresses of warm ginger stew and acupressure point Ki. 3 for 30 minutes and the control group with intervention therapy of warm ginger stew compress for 15 minutes. Each arm of the of the intervention and control group had 15 respondents. The therapy was conducted by the researcher. The Standard of Operational Procedure can be seen in the supplemental file of this manuscript. Nonprobability sampling techniques of convenience sampling were used to recruit participants. The research was of the variable of a combination of warm ginger stew compress therapy and acupressure point Ki. 3 against gout arthritis pain scale. The research instrument used was a numerical scale on the observation sheet. Data were analysed using the Mann Whitney bivariate test.

RESULTS

Table 1. shows the majority of respondents in this study were aged >60 years and the majority of uric acid levels of respondents were > 8.5 mg/dl. Both groups showed a p-value of >0.05 meaning they are homogenous using the Shapiro Wilk test.

Table 2. indicates respondents of this research according to the gender of the majority of women, at 26 respondents (86.7%), and according to the majority who do not work totalled 17 respondents (56.7%). Characteristics of respondents according to the gender and employment shows a p-value of 0.05 > meaning in both groups they are homogeneous using the Chi Square test.

Table 3. shows that the test based on the paired t-test experimental group and the control group had a p-value of 0.001. Both the experimental group and the control group pain levels were decreased. However, it indicates that there is no difference in the scale of pain in experimental and control groups. After that, a Mann Whitney test was done to see the difference in decreased pain of both groups.

Table 1. Respondent characteristics based on age and blood urea levels (n=30)

Characteristic	Experiment group		Control group		*p*
	Mean	SD	Mean	SD	
Age	64,5	8,4	61,6	9,5	0,847
Blood urea levels	8,7	2,3	8,6	1,8	0,620

Table 2. Respondents' characteristics according to gender and jobs (n=30)

Characteristic	Experiment		Control		*p*
	n	%	n	%	
Gender					
Man	2	13,3	2	13,3	1,00
Women	13	86,7	13	86,7	0
Jobs					
Do not work	8	53,3	9	60	0,71
Work	7	46,7	6	40	3

The table 4 test results showed Mann Whitney p-value = 0,013 (p-value of 0.05 <) which means that there is a difference in the level of pain between the two groups after the intervention. Those results were reinforced with a mean decrease in pain in the experimental group, i.e. 1.7333 and in the control group 1.0667.

Table 3. Effect of The Scale of Pain Before and After The Intervention of The Experimental and Control Group (n=30)

Group	Variable	Mean	SD	*p*
Experiment	Pretest Pain level	6,5	1,8	0
	Posttest Pain level	4,8	1,5	
Control	Pretest Pain level	5,0	2,2	0
	Posttest Pain level	3,9	2,1	

Table 4. The difference of pain scale decrease between experimental and control group (n=30)

Variable	Group	Mean	SD	*p*
The difference pain scale of pre and post intervention	Experiment	1,7	0,8	0,013
	Control	1,1	0,7	

DISCUSSION

The majority of respondents from this study were aged 60 years and above. The average age of respondents for intervention and control groups were respectively 64,47 ± 8,391 year and 61,60 ± 2,467 years. This is in line with the research by Untari (2017) that shows the majority (85.71%, n=12) of respondent are women (86.7%, n=26). This is in accordance with the research by Untari (2017) that shows that the majority (71.4%, n=10) of respondents experiencing gout arthritis older woman is aggregating. This is good for further research to know the differences of pain level between men or women who suffer from gout arthritis.

Hermawati & Probosari (2015) showed that the majority of the respondents were women age 60-years-old and above. The relationship of age increased with levels of uric acid due to the presence of the aging process resulting in decreased organ functions in the body, such as kidney filtration speed, excretion, and reabsorption against the metabolism of uric acid. Increased levels of uric acid in women occur due to the process of the menopause that results in decreased production of the hormone oestrogen. The hormone oestrogen serves as an uricosuria agent that helps the expulsion of uric acid via the kidneys (Setyoningsih, 2009). Meiyetriani, Hamza, & five (2016) explained that during puberty males have higher uric acid levels, whereas women will have an increase in uric acid level when approaching menopause due to oestrogen uricosuria.

The uric acid levels of respondents showed a mean of uric acid levels of respondents of 8.720 ± 2.2693 mg / dl in the experimental group and 8.633 ± 1.7971 mg / dl in the control group. Gout arthritis occurs due to the deposition of uric acid crystals in the joint tissues that affects the inflammatory reaction. The presence of uric acid crystals allows the interaction of the phospholipid membrane and the serum factors that contribute to the inflammatory reaction (Martillo et al, 2014).

The results showed most respondents did not work, at 17 respondents (56.7%). This is in contrast to the research of Meiyetriani et al (2016) that showed the majority of arthritis gout experience was in those who were working, as much as 60% compared to not working as much as 11.7%. Darmawan (2016) explains that less physical activity can cause metabolic syndrome which causes insulin resistance, leading to disorders of the excretion of uric acid. Insulin resistance causes the occurrence of oxidative phosphorylation disorders which will increase the concentration of adenosine systemic resistance, i.e. sodium, fibres, and water.

The results of the p-value show the experiment group and the control group equally mean the pain scale decreased. But based on the value of the mean, a significant decrease in pain occurred in the experimental groups. Based on the test results of the p-value, this shows that the experimental group and the control group equally mean that the pain scale decreased. But based on the value of the mean, a significant decrease in pain occurred in experimental groups, obtaining a combination therapy of warm ginger stew compress and acupressure point Ki. 3 than the control group who simply got the warm ginger stew compress therapy.

The average decrease in pain in the experimental group is significantly more than the control group. Chinomso & Faluso's research (2014) stated that a combination of massage therapy and hot compresses against chest pain on chronic bronchitis patients effectively lowers the pain with a p-value < 0.001. Lestari et al.'s (2014) qualitative research also states that the granting of a therapeutic massage and ginger compresses provide stimulation of the skin and the relaxing effect so effectively as to lower osteoarthritis pain. According to Hidayat & Son (2016), ginger compresses effectively increase blood flow to get the analgesic and muscle relaxant effects of reducing inflammatory processes. This is confirmed by research from Dwi Putri et al. (2017) stating that the influence of giving a ginger compress against the intensity of the pain gout arthritis in the older people in the prosperous South Kalimantan PSTW Budi is more effective than with a warm

compress, with p-value = 0.000. The research on acupressure points used is point Ki. 3. it works by giving local effects in the form of decreased pain on the area around the point of emphasis. It stimulates that the receptor stimulation activates a system of modulation of pain in the central nervous system that will stimulate the hormone endorphins to suppress transmission and perception of pain so that pain can be reduced (Majid & Rini, 2016).

Research of combination therapy of warm ginger compresses stew and acupressure point Ki. 3 proved effective in lowering pain. This has been supported by previous studies which prove that the warm ginger stew compress therapy and acupressure can be used as a selection for non-pharmacological therapy for reducing pain in sufferers of gout arthritis.

CONCLUSION

The characteristics of respondents who experienced gout arthritis in the area of public health 1 Purwokerto Timur are mostly aged 60 years and above, with average levels of uric acid more than 8 mg/dl, most of them were female and not working. There is a significant difference in the scale of pain before and after intervention in the control group. The result from this study suggested that patients receiving combination therapy of warm ginger stew compresses and acupressure point Ki. 3 had reduced their pain level more than the group that were only given the warm ginger stew compress therapy.

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Original Research

Ethnic Foods Diet Program Improve Self-efficacy and Diet Compliance Among Type 2 Diabetic Patients

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ABSTRACT

Introduction: A well-balanced diet is one of the four pillars of diabetes self-management. Patient's culture strongly influences intake food. Diabetic dietary guidelines which fit with the patient's culture is expected to improve patient's self-efficacy and diet compliance. This study was aimed to analyze the effect of ethnic foods diet program in improving self-efficacy and diet compliance among Type-2 Diabetes Mellitus (T2DM) patients.

Methods: This was quasy experiment research with pre and post-test control design. The population was 112 T2DM patients from Sasak Tribes, West Nusa Tenggara. Samples were 36 respondents, divided into intervention (18) and control (18) groups. The independent variable was the ethnic food diet (EFD) program, while the dependent variables were patient's self-efficacy and diet compliance. Data were collected using self-efficacy questionnaire and a 24-hour dietary recall form. Data were then analyzed using Wilcoxon Signed Rank Test and Mann Whitney U Test. The result showed differences in self-efficacy between pre and post-test in the treatment group (p=0,001), but there were no differences in the control group.

Results: There were differences in diet compliance in the treatment group (p=0,001), but there were no differences in the control group. There were differences between treatment and control groups on self-efficacy (p=0,000) and diet compliance (p=0,000).

Conclusion: Ethnic foods diet program can improve self-efficacy and diet compliance among T2DM patients because more comfortable and easier to be applied. Nurses can apply ethnic foods diet program as an intervention to promote healthy diet for T2DM patients.

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INTRODUCTION

Diabetes is the third leading cause of death in Indonesia. The prevalence of T2DM patients increase from 1.5% to 2.0% during 2013-2018(Ministry of Health Indonesia, 2018). Previous research explained that more than 50% patient with T2DM did not comply with their diet(WHO, 2003). A non-compliance can lead to health complications and increase healthcare expenditures(ODPHP, 2018). The T2DM patients need reinforcement through health education program, to encourage them to understand T2DM management, including dietary management, for appropriate care and better quality of life(Sami, Ansari, Butt, & Hamid, 2017).

A well-balanced diet is one of the four pillars of diabetes self-management. International Diabetes Federation (IDF) published a dietary guidelines for T2DM patients, with the right schedule, amount, and type of food(Hu, 2011). PERKENI (Indonesian Endocrinology Association) also had arranged dietary guidelines for T2DM patients(PERKENI, 2015). But, everyone has their own culture, likewise in choosing and preparing their meals. Culture can be influenced by their social environment, such as tribal groups(Hiza, Casavale, Guenther, & Davis, 2013). Patient's culture strongly influences intake food. By

Table 1 The Level of Self-efficacy (n = 18)

Categories	Treatment group				Control group			
	Pre Test		Post Test		Pre Test		Post Test	
	n	%	n	%	n	%	n	%
Strong	6	33.3	17	94.4	6	33.3	6	33.3
Weak	12	66.7	1	5.6	12	66.7	12	66.7
Wilcoxon Signed Rank test	p=0.001				p=0.317			
Mann-Whitney U test	p=0							

Table 2 Dietary Compliance (n = 18)

Categories	Treatment group				Control group			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Calories								
Compliance	6	33.3	13	72.2	8	44.4	9	50
Incompliance	12	66.7	5	27.8	10	55.6	9	50
Meal time								
Compliance	12	66.7	12	66.7	11	38.9	9	50
Incompliance	6	33.3	6	33.3	7	61.1	9	50
The type of food consumed								
Compliance	13	72.2	17	94.4	14	77.8	14	77.8
Incompliance	5	27.8	1	5.6	4	22.2	4	22.2
Dietary compliance								
Compliance	7	38.9	12	66.7	7	38.9	5	27.8
Incompliance	11	61.1	6	33.3	11	61.1	13	72.2
Wilcoxon Signed Rank test	p=0.025				p=0.157			
Mann-Whitney U test	p=0							

tailoring the patient's specific cultural foods, it is hoped that their compliance and adherence would increase. Thus, leading to improved glycemic values and reduced complications from T2DM(Ramsumeer, 2016). So that, dietary guidelines which are concerning with patient's culture were needed.

Sasak Tribes is one of a tribe in Indonesia who lived at Lombok Island, province of West Nusa Tenggara(Syarifaturrahman & Hanafi, 2017). The ingredient of Sasak meals was vegetables (32.46%), spices (29.82%), sweeteners and confectionaries (10.53%), legumes (9.65%), root crops (7.02%), cereals (4.39%), fruits (2.63%), oils (1.75%), and others (1.75%). The typical characters of most Sasak meals are spicy and tasty, which can increase appetite. Generally, its contain plain staple, main dish (vegetable, meat, or mixed), side dish, and condiment. *Sambel* (chili sauce) is a condiment that must be available for most people. Sasak Tribes also have a culture named *begibung*, which means eat together in a large plate(Sukenti, Hakim, Purwanto, & Matthews, 2016). This culture cannot be avoided, so people with T2DM should manage their diet. There were no dietary guidelines for T2DM patients from Sasak Tribes.

According to Leininger's Transcultural Nursing Theory, culturally-based nursing care which is harmonious with an individual or group's cultural beliefs, practices, and values can enhances client's well-being(McFarland & Wehbe-Alamah, 2018). Ethnic foods are defined as foods originating from the heritage and culture of an ethnic group who use their knowledge of local ingredients of plants and/or animal sources(Kwon, 2015a). Ethnic foods diet (EFD) program based on Sasak Tribes culture were expected to improve T2DM patients' self-efficacy and diet compliance through dietary guidelines and regular meeting. By choosing the healthy meals based on their ethnic food, they were expected to be more comfortable and have higher self-efficacy level in complying with their dietary guidelines. Subsequently, they will have a controlled blood glucose level. This study aimed to analyze the effect of EFD program on the level of self-efficacy and diet compliance among T2DM patients.

METHOD

This was a quasi-experimental pretest-posttest with the control group design. There were two groups, one intervention group (EFD program) and one control group (standard dietary guidelines for T2DM on primary health care).

The population were patient with T2DM patients from Sasak Tribes (N=112). Samples were taken by using purposive sampling. Eligibility criteria included: 1) aged 40-60 years old; 2) living at home; 4) have no complication; 4) not on a current diet; 5) able to speak and write in Bahasa, and 6) a willingness to participate. While the exclusion criteria included: 1) patient with cognitive impairment; and 2) patient who referred to the hospital. Eventually, 36 patients completed the study. Divided into treatment group (n=18) and control group (n=18). Matching was conducted by using age, gender, and present diet compliance level.

The independent variable in this research was EFD program. EFD program is completing nutritional needs by consuming traditional food based on the

cultural or ethnic background but still in term of the specific instructions of any illness dietary program. In this program, individual should consume T2DM diet by using any kind of food source that is still related to the traditional food in Sasak Tribe. Patients attend 2x60 minutes' health education about dietary guidelines for the T2DM patients, based on ethnic food in Sasak Tribes. Each patient has specific calorie needs per day. To calculate the number of calories needed by the patients, researcher collaborate with the nutritionist. Health education was conducted by using lecture and demonstration method, with booklet as a media. The dependent variables were patient's self-efficacy level and dietary compliance. A week after health education, the researcher has done the home visit and ask patients to complete self-efficacy questionnaire and A 24-hour dietary recall. These questionnaires took approximately 45-60 minutes to complete. Answers were immediately checked to ensure that the questionnaire was filled out. If missing value were found, the questionnaire was returned to the patient so he or she could fill in the missing item. A small gift was provided as an award.

General demographic data and disease characteristic that were collected included age, gender, education, employment, and duration having T2DM.

Self-efficacy was assessed by self-efficacy questionnaire with Likert Scale. Respondents response to 14 items on 3-point scale with the number referring to 1 = disagree, 2 = uncertain, 3 = agree for favorable questions and vice versa for unfavorable questions. The highest score was 42. A high score on a self-efficacy questionnaire corresponded to a strong self-efficacy.

A 24-hour dietary recall was used to assess the patient's dietary compliance. A 24-hour dietary recall (24HR) is a structured interview intended to capture detailed information about all foods and beverages consumed by the respondent in the past 24 hours, from midnight to midnight the previous day. This form filled within 7x24 hours at the same time for all respondents by an everyday home visit and interview by the researcher. After filling it completely, researcher reviews the calories, meal time, and the type of food consumed by T2DM patient. Compliance means their calories, meal time, and the type of food consumed already fit with their diet program that was given in a booklet as a guidance about T2DM.

An ethics committee from Universitas Airlangga approved this research (reference number 596-KEPK). All respondents were given information about the study and written informed consent was obtained from those patients who agreed to participate. The respondents complete informed consent while undergoing routine checkup at Puskesmas Narmada, West Nusa Tenggara (primary health care center). The grouping determined by several aspects, such as age, gender and diet adherence. Researcher gave nutritional instruction to respondents as a guidance to prepare the meal themselves at home.

Descriptive statistics were used to summarize the characteristics of samples. Frequencies were reported for categorical variables, and the mean were reported for continuous variables. Data were analyzed by using Wilcoxon Signed Rank Test to see the difference between pre and post-test scores on each group. Then using Mann Whitney U Test to understand the difference between post-test scores on intervention and control group. We considered $p<0.05$ to be statistically significant.

RESULTS

The mean age of respondents in this study was 52.05 years old for treatment group, and 50.73 years old for the control group. Most participants in the treatment group were female (88.9%), unemployed (44.4%), had graduated from high school (44.4%), and more than three years suffer from Type 2 Diabetes (66.67%). Most participants in the control group were female (88.9%), unemployed (61.1%), had graduated from high school (50%), and more than three years suffer from Type 2 Diabetes (66.2%). Therefore, no homogenity test were applied to the sample.

Table 1 had shown that on pretest most of the respondents on both groups have weak self-efficacy regarding with diet for Type 2 Diabetes (66.75%). Posttest score has been demonstrated that most of the respondents on treatment group already has strong self-efficacy (94.4%), but most of respondents on the control group still has weak self-efficacy (66.75%).

Statistical analysis by using Wilcoxon Signed Rank Test which compares respondent's level of self-efficacy between pre and post-test on each group had shown that there were significant differences in the treatment group (p=0.001), but no significant differences in the control group (p=0.317). Mann Whitney Test was used to compare the level of self-efficacy on post-test between control and treatment group. The result had shown p=0.000 (p<0.05) which means there was a significant difference in the level of self-efficacy between control and treatment group after EFD program.

Table 2 had shown the patient's dietary compliance by using a 24-hour dietary recall. Pretest result on treatment group showed most of the respondents already comply with the meal time (66.7%) and the type of food consumed (72.2%), but not comply with the amount of calories consumed (66.7%). Pretest result in the control group showed the same characteristic but varies in percentages. Posttest result in the treatment group showed that most of the respondents comply with their calories intake (72.2%), meal time (66.7%), and the type of food consumed (94.4%). While posttest result in control group showed, half of the respondents comply with the amount of calories consumed (50%) and the meal time (50%). Most of the respondents also comply with the type of food consumed (77.8%).

It can also be concluded that on pretest most of the respondents on treatment group not comply diet

program for the patient with Type 2 Diabetes (61.1%), so did most of the respondents on the control group (61.1%). After EFD program, most of the respondents on treatment group comply with their diet program (66.7%). While most of the respondents on control group who didn't get EFD program still not comply with their diet program, moreover the percentage is increasing.

Statistical analysis by using Wilcoxon Signed Rank Test which compares respondent's dietary compliance between pre and post-test on each group had shown that there were significant differences in the treatment group ($p=0.025$), but no significant differences in the control group ($p=0.157$). Mann Whitney Test was used to compare the dietary compliance on post-test between control and treatment group. The result had shown $p=0.000$ ($p<0.05$) which means there was a significant difference in dietary compliance between control and treatment group after EFD program.

DISCUSSION

Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives(Bandura & Wessels, 1997). Self-efficacy can induce motivation through efficacy expectations and determining commitment to follow T2DM care management. So, self-efficacy is very important in changing self-care behavior process, especially in nutritious behavior(Mohebi, Azadbakht, Feizi, Sharifirad, & Kargar, 2013). In this research, perceived self-efficacy referred to the T2DM patients' belief in their capabilities to follow the diet program, to control their blood glucose level. On pretest, most of the respondents in both groups have weak self-efficacy. It is understandable because most of the respondents were women. Self-efficacy can be influenced by gender. A man was more optimistic than women(Zimmerman & Martinez-Pons, 1990).

As many as six respondents on both groups indicate a strong self-efficacy on the pretest. Bandura stated that individuals acquire information about their self-efficacy from four sources, includes: 1) performance outcomes; 2) vicarious experience; 3) verbal persuasion, and 4) physiological feedback(Bandura & Wessels, 1997). Mastery experiences are the most influential source of efficacy information. If one has performed well at a task previously, he or she is more likely to feel competent and play well at a similarly associated task(Bandura, 1977). Individuals with high levels of self-efficacy approach difficult tasks as challenges to master rather than as threats to be avoided(Williams & Williams, 2010). Respondents with strong self-efficacy on pretest have had T2DM since more than three years ago. As long as dealing with T2DM and its treatments, ones will have more experience and lesson learned from their past experiences. They will be built better self-efficacy to face their health condition.

After EFD program, by seeing respondents score on post-test, can be evaluated that almost all of the respondents on the treatment group had a strong level of self-efficacy, only one respondent on a low level. Most of the respondents have a significant increase on magnitude dimension. It indicates EFD program can increase the level of self-efficacy in the treatment group. Ethnic food can be defined as an ethnic group's or a country's cuisine that is culturally and socially accepted by consumers outside of the respective ethnic group(Kwon, 2015a). EFD program is a form of health education about dietary guidelines for the patient with T2DM, which is arranged to fit with patient's culture and ethnic food, and also fulfil the amount of calories needed by each patient. According to Leininger's Transcultural Nursing Theory, nursing care that respects to patient's culture can optimise the well-being of the client(McFarland & Wehbe-Alamah, 2018). The patient can gain more knowledge about Sasak's cuisine which is still fit with dietary guidelines. So that, the barrier to comply with T2DM diet can be, and they feel easy to deal with this disease management.

EFD program can increase T2DM patient's self-efficacy to comply with their diet management. Previous research also found that culturally based diabetes self-management education can significantly increase diabetes self-management knowledge(Weldon Grunden, 2016). Bandura stated that culture could influence self-efficacy through values, beliefs, in a self-regulatory process which is functioned as a source to assess self-efficacy and also as a consequence of belief on one's self-efficacy(Bandura & Wessels, 1997). Leininger assumed nursing as a profession, contribute to the harmony of culture and health services along sick and healthy to people with various cultural backgrounds(McFarland & Wehbe-Alamah, 2018). Regarding the transcultural nursing approach, EFD program has been adapted to Sasak Tribes cultural needs, which given as a help, support, facility, or as a creative professional intervention, to help patient adapt and negotiate with their own culture which is beneficial for their health. So that, it can facilitate and increase self-efficacy to run a diet program.

Posttest result had shown that there was a significant increase in patient's dietary compliance, especially in the amount of calories consumed per day. During EFD program, respondents not only get information about dietary guidelines for the T2DM patients, but also type, portion, and recipe of food from Sasak's cuisine which can be consumed. Respondents also get a booklet to help them remind and re-read the material while at home. Health education can positively influence the health behaviour of individuals and communities as well as the living and working conditions that affect their health(Tones, Robinson, & Tilford, 2013). Dale said, by using media, such as booklet, the effectiveness of health education can be optimized(Davis & Summers, 2015).

Compliance also influenced by ethnicity or culture. Cultural differences were associated with the kind of food selected and the way in cooking it(Ettner et al., 2009). Diet for patients with Type 2 Diabetes is more manageable to comply when there is no cultural barrier(Ramsumeer, 2016). They were already familiar with the taste and the way to produce it. A healthy EFD program was lead to better dietary compliance and blood glucose level. The principle of EFD programs is maintaining the culture owned by respondents(Kwon, 2015b). So that, respondents do not need a change in many types of food they consumed, especially for Sasak's Tribe.

EFD program significantly increases the T2DM patients' dietary compliance. Educational interventions regarding dietary guidelines that are adapted to culture have a significant influence both on the stability of blood glucose levels and also increase knowledge and dietary compliance in the T2DM patients(Schäfer et al., 2014). Another previous research found that education on healthy eating with a special module, regarding patient's culture (such as fasting for Ramadhan, for moeslem) improved adherence to a healthy diet(Pratiwi et al., 2018). The best educational program for the T2DM patients is a program which meets patient's culture and contextual condition. It can help them to be more active and create strategies to deal with the barrier and stress. It also gives a positive impact on a patient's self-management. It can be seen on the research's result, the level of self-efficacy and dietary compliance of T2DM patients from Sasak's Tribes rise significantly after EFD program which is designed to meet Sasak's cuisine.

Limitation of the study includes the relatively small sample size of 36 T2DM patients, which may limit the power to generalize research's findings. Post-test measurement should have conducted more than once to do longitudinal analysis.

CONCLUSION

EFD program can increase T2DM patient's self-efficacy to comply with their diet management. Regarding the transcultural nursing approach, EFD program has been adapted to Sasak Tribes cultural needs, which given as a help, support, facility, or as a creative professional intervention, to help patient adapt and negotiate with their own culture which is beneficial for their health. So that, it can facilitate and increase self-efficacy to run a diet program.

EFD program significantly increases the T2DM patients' dietary compliance. Educational interventions regarding dietary guidelines that are adapted to culture have a significant influence both on the stability of blood glucose levels and also increase knowledge and dietary compliance in the T2DM patients(Schäfer et al., 2014). The best educational program for the T2DM patients is a program which meets patient's culture and contextual condition. It can help them to be more active and create strategies to deal with the barrier and stress. It also gives a positive impact on a patient's self-management. It can be seen on the research's result, the level of self-efficacy and dietary compliance of T2DM patients from Sasak's Tribes rise significantly after EFD program which is designed to meet Sasak's cuisine.

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Original Research

Differences in Clinical Simulation with Audio-visual and Practicum-based Standard Operating Procedures in Nursing Student Competencies

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ABSTRACT

Introduction: The biggest challenge in nursing education is to produce nurses who are professional and competent. Effective and efficient learning through appropriate methods and media is very important. Practical learning based on standard operating procedures (SOP) has been widely applied, but clinical simulation approaches with audio-visual media have not been scientifically proven. The purpose of this study is to compare student competencies through clinical simulation learning with audio-visual media and practicums based on SOP.

Methods: This was a quasi-experimental study with a pretest-posttest control group design. The sample consisted of 40 students recruited using simple random sampling and then divided into 2 groups: 20 respondents were given clinical simulation methods using audio-visual materials and 20 respondents were given practicum based on SOP. The independent variables were clinical simulation with audio-visual media and practicum based on standard operating procedures. The dependent variable was student competency, assessed using competency assessment including cognitive, affective, and psychomotor methods. Data analysis was conducted using the Wilcoxon test.

Results: The use of clinical simulations with audio-visual media and practicum based on SOP can increase the value of competency in nursing students, but the median value on the use of clinical simulations using audio-visual sources is higher than practicum based on SOP.

Conclusion: Clinical simulations with audio-visual media can be recommended as effective learning methods and media for nursing students.

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clinical simulation; audio-visual; practicum; Standard Operating Procedure; competence

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INTRODUCTION

Nowadays, health problems are increasingly complex and demands for health services are also increasing. Nursing education must prepare competent graduates to be able to compete both nationally and globally. National nursing competency test graduation rates increased, but not significantly, in 2015 by 38%, and in 2016 by 51%. In East Java Province it increased from June 2014 (45.8%), November 2014 (68.2%), September 2015 (82.6%), but in 2016 it decreased to 51.6%. Based on a preliminary study conducted at one of the high school health sciences in Nganjuk District, it was found that the passing level of nurses' competency tests had not yet reached maximum results. Only 17 of 63 students passed the competency test in June 2015 (26.9%), and in 2016 out of 2 competency tests students passed 32 of 98 students in April 2016 (32.6%), and 21 out of 78 students (26.9%).

One of the efforts to increase the level of graduation of students in the national competency test is through a learning process that is supported by various learning components to achieve the desired goals. The use of audio-visual media is one form of intervention that can be given in addition to conventional methods. Audio-visual media provides stimulation to hearing and vision, so that the results obtained are more optimal (Maulana, 2009). Another strategy that can be used to optimize learning outcomes is through clinical simulation methods. The use of simulation as an educational technique has

been widely adapted in the health field, both for evaluation of training and nurse performance. Initial uses of simulation include teaching psychomotor skills and competency tests (Larew C, Lessans S, Spunt D, Foster D, 2006).

Simulation plays an important role in clinical education and evaluating the competencies of graduates of nursing students. Clinical simulations were developed to provide opportunities for students to identify patients in general, think critically, and be able to show appropriate interventions (Levett-Jones & Lapkin, 2014). The application of clinical simulation with audio-visual materials is expected to be able to make students practice as in real situations so as to achieve the expected competence. The purpose of this study was to determine the effectiveness of clinical simulations using audio-visual media compare to practicums based on SOP toward nursing student competencies.

MATERIALS AND METHODS

This study used a quasi-experimental with a pretest-posttest control group design. The population of this study were all students in one of the health sciences at a high school in Nganjuk district who were in the 6th semester and who had completed the neuro-behavioural system course. The research sample consisted of 40 nursing students recruited using simple random sampling. The samples were divided into 2 groups: 20 students who were given clinical simulations with audio-visual sources and 20 students who were given practicum based on SOP. The independent variables were clinical simulation with audio-visual media and practicum based on SOP. The dependent variable was student competence. Data collection tools used observation sheets and competency assessment sheets (cognitive, affective, and psychomotor).

The intervention for treatment group given by using simulation modules and audio-visual media (15 – 20 minutes) was conducted 8 times. While the control group were given case scenarios and standard operating procedures for 100 minutes held 4 times. All of the respondents were tested for competencies before and after intervention.

Data were analysed using the Wilcoxon test to determine differences in competency values (cognitive, affective, and psychomotor) in the clinical simulation with the audio-visual group and practicum based on SOP groups with a significance level of 95%.

The study has obtained an ethics approval certificate from the Health Research Ethics Commission of the Faculty of Nursing, Universitas Airlangga Surabaya, with the certificate number 528-KEPK in 2017.

RESULTS

The characteristics of respondents from both groups are shown in Table 1. In both groups, 40 respondents (100%) were aged ≤ 25 years and had previous practical experience and most of the 24 respondents (60%) were female.

Table 2 shows that cognitive, affective, and psychomotor abilities in the clinical simulation group with audio-visual media have a higher median value than the practicum group based on SOP. Wilcoxon test results measuring the differences in competence obtained p value 0,000 (<0.05) in the clinical simulation group with audio-visual media and p value 0.001 (<0.05) in the practicum group based on SOP. In both groups, both used clinical simulations with audio-visual media and practicum-based SOP have an influence on the competence of nursing students despite the difference in median values.

DISCUSSION

The results of data analysis proves that the clinical simulation method with audio-visual media can improve nursing student competencies. These competencies include cognitive, affective, and psychomotor abilities. The selection and use of media and method is one important component in supporting the implementation of learning. Problem-based learning is one of the learning methods that stimulates students to learn independently so as to enable students to practice with real situations (Castro-Sánchez et al., 2012).

Research conducted by (Bloch & Bloch, 2013) proved that 220 emergency room nurses received written instructions and 216 with video contained significant knowledge. Instructions that use video can increase the emergency room nurse's knowledge in 2 to 5 days quicker rather than written instructions. The satisfaction of the ER nurse is also greater than in writing. In line with (Armstrong et al., 2010) audio-visual media can present informed consent and wound care instructions more effectively and produce higher satisfaction than verbally. (Lin, Khaira, & Khairuzzaman, 2014) also proved that multimedia-based health education is not only limited to information providers but can increase the motivation, skills, and self-efficacy needed in taking actions related to improving health. Rosen et al (2010) also proves that Entertainment Education (EE) through audio-visual media aims to deliver health education messages in an interesting and entertaining way. The study of hand washing through audio-visual media contributes to changing unhealthy behaviours into healthy ones. The media is able to stimulate or enter information through sensory sharing. The more stimulation, the easier the information is to accept. Audio-visual media provide stimulation through the eyes and ears. The combination of information channels through the eye reaches 75% and the ear 13%, will provide stimulation that is good enough so that it can provide optimal results (Maulana, 2009).

The use of appropriate methods in one presentation of material is very important in order to achieve the desired goals. (Levett-Jones & Lapkin, 2014) define simulation as a technique used to

Table 1 Characteristics of Respondents in Clinical Simulation Groups with Audio-visual and Practicum Groups based on Standard Operating Procedures

Characteristics	Clinical Simulation Groups with Audio-visual Media		Practicum Groups based on Standard Operating Procedures		Total	%
	n	%	n	%		
Age (year)						
a. <25	20	100	20	100	40	100
b. ≥ 25	0	0	0	0	0	0
Gender						
a. Male	7	35	9	45	16	40
b. Female	13	65	11	55	24	60
Practicum Experiences						
a. Don't Have Experiences	0	0	0	0	0	0
b. Have Experiences	20	100	20	100	40	100

Table 2 Obtaining Competency, Cognitive, Affective, and Psychomotor Scores According to Pre-test and Post-test in the Clinical Simulation Group with Audio-visual and Practicum Groups based on Standard Operating Procedures

Group	Variable		Med ±Min-Max	*ρ value*
Practicum Group based on Standard Operating Procedures (n=20)	Cognitive	*Pre test*	7,50±5-10	0,002
		Post test	8,00±5-12	
	Affective	*Pre test*	46,50±42-63	0,004
		Post test	47,50±42-63	
	Psychomotor	*Pre test*	42,50±29-52	0,001
		Post test	43,50±28-56	
	Competency	*Pre test*	97,00±84-108	0,001
		Post test	99,50±84-115	
Clinical Simulation Groups with Audio-visual Media l (n=20)	Cognitive	*Pre test*	7,00±3-10	0,000
		Post test	9,00±5-13	
	Affective	*Pre test*	48,00±42-63	0,000
		Post test	55,50±42-67	
	Psychomotor	*Pre test*	47,00±29-63	0,000
		Post test	59,00±28-71	
	Competency	*Pre test*	103,00±84-120	0,000
		Post test	120,50±84-145	

replace or strengthen real experiences guided by experiences that evoke or replace substantial aspects of the real world in a fully interactive way. (Woodworth, Chen, Horn, & Aziz, 2014) compared respondents that were given video exposure and video-based simulations. The results showed that there was a significant increase in knowledge related to USG anatomy and skills, but in the two groups there was no significant improvement in procedures. The results of the study show that instructional videos and simulations can be effective tools to explicitly increase knowledge. Computer-based simulations combined with several types of procedural training can improve technical skills (McGaghie, Issenberg, Cohen, Barsuk, & Wayne, 2011). (Lippe & Becker, 2015) assessed the learning process of simulation in providing care to critically ill patients. The results of statistical tests show that the attitude and competency scores of students have significantly increased. Therefore, it can be concluded that clinical simulations offer strong teaching strategies to improve students' attitudes and competencies in treating comatose patients. Other studies conducted by (Przybyl, Androwich, & Evans, 2015) showed the use of simulations proved effective in increasing nurse satisfaction, understanding of the principles of CRRT (Continuous Renal Replacement Therapy), and critical thinking skills with CRRT operations, scores increased from pre-simulation to questionnaire post simulation. (Blake, 2014) also reinforces that instructional-based simulations equip medical students with knowledge, skills, attitudes, and behaviours towards clinical conditions in various situations. (Dalton, Head, & Levett-Jones Rn, 2015) Simulation scenarios create opportunities for students to apply and practice the knowledge gained from learning materials, and collaborative and supportive arrangements. Students will more easily understand cases through scenarios rather than theory in class so that they can reduce their failure rate when taking clinical action in the hospital.

The limitation of this study is that there is no specific clinical simulation space available that is designed as a visual environment that is visually, auditory, and kinaesthetic. Implementation of clinical simulations with audio-visual media can be continued and recommended for nursing students by providing facilities and competent instructors according to their expertise.

CONCLUSION

In both the clinical simulation group with audio-visual media and practicum groups based on standard operational procedures affect cognitive abilities, affective, and psychomotor, but the higher median values were obtained by the clinical simulation group with audio-visual media than practicum groups based on standard operating procedures. Clinical simulation methods with audio-visual media have proven to be effective on the competency abilities of nursing students.

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Original Research

Developing Family Resilience Models: Indicators and Dimensions in the Families of Pulmonary TB Patients in Surabaya

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ABSTRACT

Introduction: Family resilience is the process of adaptation and coping in the family as a functional unit. A lack of family involvement in the care programs for TB sufferers is one of the factors of concern. The purpose of this study was to analyze the indicators of the family resilience of patients with pulmonary TB.

Methods: This study used an observational analytical method with a cross-sectional approach. The study population was the families of new pulmonary TB sufferers in the Surabaya area, taken using the rule of the thumb guideline with a sample of 130 respondents. The sampling technique using was systematic random sampling. The variables in this study were the stages of family resilience: survival, adaptation, acceptance, growing stronger and helping others, which were measured using a questionnaire. The data was analyzed using second CFA.

Results: The results showed that the family resilience model is also the fit model. This refers to the results of the goodness of fit test. Family Resilience = 0.724 Survival, Family Resilience = 0.762 Adaptation, Family Resilience = 0.945 Acceptance, Family Resilience = 0.783 Growing Stronger and Family Resilience = 0.879 Helping Others.

Conclusion: The results of this study provide information on the stages of family resilience and the ability of each stage so then it can be used as a reference when developing family nursing care plans for patients with pulmonary TB.

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INTRODUCTION

The family has a very important role in maintaining optimal levels of patient health in the face of illness (Samal, 2016). The family support received by the pulmonary TB patients plays an important role in improving treatment adherence. Lack of family and social support predicts poor treatment adherence (Py et al., 2013). Good support and care from the family becomes a consideration when paying special attention to the daily routine of patients with pulmonary TB, especially in terms of medication adherence (Kaulagekar-nagarkar, Dhake, & Jha, 2012). The family as a system can cause problems and at the same time, be effective in overcoming problems (Friedman, 2010). Family resilience is the process of adaptation and coping in the family as a functional unit. Resilience involves dynamic processes that help them adapt to significant problems. It is this strength and the available resources that enable individuals and families to successfully face crises and problems. It is important to learn the stages of family resilience related to the pulmonary TB sufferers as well as the strength or ability in each stage of family resilience itself. In the previous studies that have discussed the stages of family resilience, they did not test the indicators of each stage

Tuberculosis (TB) is the leading cause of death in the world. An estimated 10.4 million people became ill with TB in 2016 of which 90% were adults, 65% were men, 10% were people living with HIV (74% in Africa) and 56% were in the following five countries:

India, Indonesia, China, the Philippines and Pakistan (WHO, 2017). The detection rate of TB cases, also known as the Case Detection Rate (CDR), in Indonesia in 2020 is estimated to be > 70% while the success rate of TB treatment, or the Success Rate, is estimated to be (SR) >85%, even though Indonesia is still included in the ten countries that contribute to TB cases in the world. The number of TB sufferers in Indonesia ranks third in the world after India and China (WHO, 2017).

Surabaya is the second largest city in Indonesia. In 2015, the number of new cases of pulmonary TB disease in Surabaya was 2,330 patients, the cure rate of BTA+ was 70.43%, and the success rate of the treatment provided was 79.21% (Dinkes, 2015). Data from the Surabaya City Health Office in 2016 showed that the total number of TB patients in the Surabaya city area was 5,389 patients, with 3,421 patients were reported by 63 Public Health Centers and 1,968 patients reported by 33 public and private hospitals in the Surabaya City area (SITT data source online version 10.04).

Family resilience is expected to be able to increase the independence of the family when caring for family members suffering from pulmonary TB with the end result expected that the patients will have a support system in the form of their family during the treatment process. Family resilience through the 5 stages or processes indicates that when the family is faced with various problems that simultaneously occur in the family, the family will go through 5 phases of resilience. The first stage of the family resilience process is survival (survival). The second stage is where the family begins to adapt to the problems that occur, the third stage is where the family begins to accept the problems and family condition and the next stage is where the family will become stronger because they have experience handling problems. The fifth stage is where the families are able to help others who face the same problems (Lietz & Strength, 2016).

Every family going through the stages of family resilience does not always follow a sequential process. When the family has stepped into the next phase, it is possible to be thrown back to the initial phase when a new crisis occurs. In addition, in this phase, not every family will be in the same phase to begin with. The accuracy of knowing the current phase of the family and the strength of the family itself helps the family to adapt and to develop in relation to their needs (Lietz & Strength, 2016). Family resilience shows that the family is able to be independent when caring for the family member suffering from pulmonary TB with the expected result that the patient will have a support system in their family which complies with the care process. The purpose of this study was to analyze the development of a family resilience model in the family of pulmonary TB patients.

MATERIALS AND METHODS

Table 1. Variables and Sub Variables

Variable		Sub-Variable
Survival (B)	B .1	Respect the family
	B .2	Worship
	B .3	Resolve the problem yourself
	B .4	Dependent
	B .5	Consulting each other
	B .6	Strong when facing problems
	B .7	Strong faith
	B .8	Mutually keep feeling
	B .9	Family will help when there is a problem
	B .10	Be aware that the family presence is important
	B .11	Seeking advice from religious experts
Adaptation (A)	A .1	Families can overcome things that are not desirable
	A .2	Open minded to new ways in the family
	A .3	Understanding among the family members
	A .4	Asking for clarification if there are things not understood
	A .5	Sharing responsibility
	A .6	Awakened family confidence
	A .7	Trying new ways to solve problems
Acceptance (P)	P .1	Accept TB disease-related difficulties as a part of life
	P .2	Belief that they can overcome the problem and this becomes a family commitment
	P. 3	Honest to the family
	P. 4	Compromise if there is a problem
	P. 5	Communicating in a relaxed and warm, even humorous, way
	P .6	Can ask the purpose of the message that is conveyed by the family related to the success of the treatment
	P .7	Solve the problem by discussion
	P .8	Discussing the problem until there is a solution that can be completed and there is successful treatment
	P .9	Open to expressing their opinion to get insights
	P .10	Have the power to solve the problem
	P .11	Hearing honest information
	P .12	Understand the intentions of the other family members
Growing Stronger (G)	G. 1	Becoming part of a complete family
	G .2	Making important decisions related to the treatment of disease, especially in the family
	G .3	Able to cope with pain and to mutually understand the effects of the disease

	G .4	Able to adapt to the demands that befall them as a family in the presence of disease
	G .5	Able to solve problems due to the disease correctly
	G .6	Able to resolve the issue positively
Helping Others (H)	H .1	Helping each other with the neighbors who have pulmonary TB
	H .2	Able to survive if other problems are encountered
	H .3	Interacting with the family and others
	H .4	Sincerity to help others
	H.5	Feel secure living in the family and in the social environment
	H .6	Feel free when becoming a family member and in the social environment
	H .7	Mutual learning from mistakes and sharing with others
	H .8	Participate in social activities
	H .9	Providing assistance to those in need
	H .10	Caring for their family members and others
	H .11	Caring for the family members of others
	H .12	The family is a place that is good for the members of the family
Family Resilience (Y)		

Table 2. Demographics of the Respondents (n=130)

Indicator	n	%
Family type		
Nuclear	88	67.7
Extended	27	20.7
Other Type	15	11.6
Socioeconomic family		
High	3	2.3
Medium	30	23.1
Low	97	74.6
Position in the family		
Husband	20	15.4
Wife	47	36.2
Children	31	23.8
Other	32	24.6
Supervisor the taking of medicine (PMO)		
Family	93	71.5
Other	37	28.5

Analytical observational research with a cross-sectional approach was used in this study. The population in this study was the families of pulmonary TB patients who had just been diagnosed in the data collection period in the working area of the Public Health Center in the city of Surabaya. Samples were taken through systematic random sampling and calculated using the rule of the thumb with a total sample of 130 respondents. The research instrument used was a questionnaire. The variables in this study are the following dimensions of the family resilience: Survival (B), Adaptation (A), Acceptance (P), Growing Stronger (G) and Helping Others (H) as well as the Dependent Variable (Y) of family resilience. The indicators of each dimension (sub-variable) are as follows:

The data was analyzed using Second Confirmatory Factor Analysis (2CFA). This study has received the recommendation to carry out the research from the National Unity, Politics and Community Protection Agency of Surabaya City. It obtained ethical approval from the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University

RESULTS

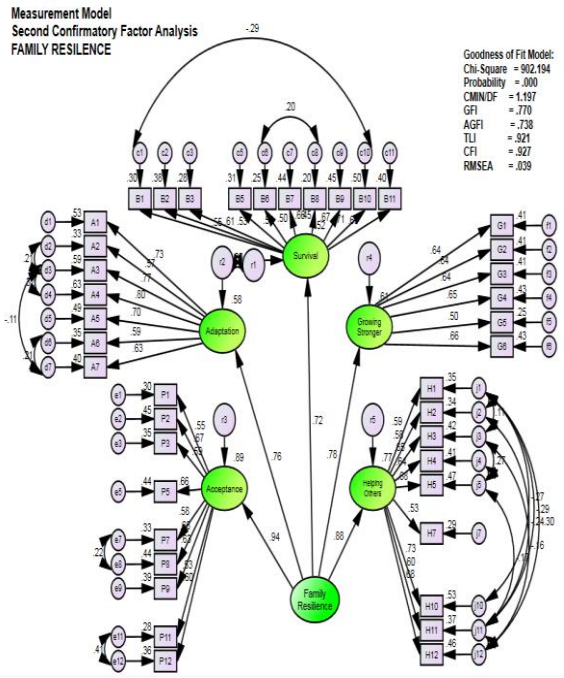

Figure 1. Family Resilience Measurement Model

Table 3. Results of Testing the Family Resilience Model

Criteria	Cut-off value	Calculation results	Information
Chi-Square	Expected to be small	796.978	$\chi 2$ with df = 754 is 818,991 Well
Significance Probability	≥0.05	0.135	Well
RMSEA	≤0.08	0.039	Well
GFI	≥0.90	0907	Well
AGFI	≥0.90	0838	Pretty good
CMIN / DF	≤2.00	1,057	Well
TLI	≥0.90	0.921	Well
CFI	≥0.90	0.927	Well

The results of the study focused on 130 families of pulmonary TB sufferers showed the follow results. Table 2 shows that the most family type is that of a nuclear family (67.7%). Most families of the pulmonary TB patients have a low socioeconomic level (74.6%). The position of the family members who were the respondents was mostly that of a wife (36.6%). The majority were the supervisors of the patients with pulmonary TB when taking their medicine (71.5%)

The indicator description includes the minimum, maximum, average and standard deviation value of each indicator as presented in Table 3. CFA modeling requires multivariate normally distributed data. The results of the analysis show that the CR multivariate value of 0.07 lies between the -1.96 values up to 1.96, thus showing the multivariate normal distribution of the data (Table 4). Next, the 2CFA modeling is presented in the following figure.

The results of testing the measurement model with the complete AMOS program can be seen in the following table.

Table 3 shows that the 7 (seven) criteria used to assess the feasibility of the model were good. It can be said that the measurement model for 2CFA is acceptable, which means that there is a match between the model and the data.

From the appropriate model, each path coefficient can be interpreted. The path coefficients are the hypotheses in this study which can be presented in the following structural equation:

Family Resilience = 0.724 Survival
Family Resilience= 0.762 Adaptation
Family Resilience= 0.945 Acceptance
Family Resilience= 0.783 Growing Stronger
Family Resilience= 0887 Helping Others

DISCUSSION

The families who were respondents in this study were the families of pulmonary TB patients recently diagnosed with pulmonary TB. The analysis shows that most of the families were in the 'acceptance' and 'helping others' phases. This proves that not all families undergo the series of family endurance stages sequentially. Previous studies discussed the stages of the resilience of the families but they did not test the indicators of each stage. The indicators in the family resilience stages will be explained in the following discussion.

Survival

When a family faces a crisis, loss or trauma, they will usually experience a period of time in which the family members only try to do the minimum of what is needed throughout the day. In this phase, the family has not been able to make adjustments and accept reality. The family is only trying to survive. The survival phase is the phase where the family is only able to get through the problem as it comes every day. Many families explained that before making adaptations to their family life, they just have to find a way to survive. The main family strength in this phase is spiritual power and social support (Lietz & Strength, 2016).

The results show that the respondents stated the spiritual and religious strength of the family was their most important ability in terms of overcoming and finding meaning in their struggle. During this phase, many families stated that prayer and worship were an important part of survival in the beginning of the crisis. The loading factor of each indicator shows that there are behaviors among the family members who care for each other's feelings, who feel strong when facing problems and who feel the presence of their family. This is a translation of family support and the indicator of asking for help from religious leaders had a greater value than the other indicators. Following this, 67,7 % of respondents with a nuclear family type had a positive impact on family support. When an individual in a family experiences illness, all of the family members are affected because they are connected. The effect on each family member varies in terms of intensity and quality.

During the survival phase, emotional support is very important. Social support in this phase is more about getting help from outside of the family system, including from the extended family, friends, support groups and professionals. In this stage, the family feels an increase in the burden on the family, especially if the sick individual is the husband or wife. The results showed that 47 respondents (36.2%) were husbands. The husband, as the head of the family, has the main role of providing a decent life for their family so when the husband is sick, it will have an impact on the family. Thus when a family member is sick, the rest of the family feel this as a burden. This is in line with the results of previous studies that showed that the burden of care felt by the family is related to confusion about the illness, emotions, physical, time, and financial and social burdens. This leads to a decrease in the quality of life of family and family functionality. There are opportunities for negative outcomes in relation to family resilience (Fitryasari, Yusuf, Dian, & Endang, 2018). In this stage, the family needs support from outside of the family, especially from the environment and health workers, to help the family to identify the burden of care and to improve their coping as a part of recovering from adversity.

The problem for the families of TB sufferers is the misunderstanding of the family and community which leads to discrimination related to the disease (Kaulagekar-nagarkar & Aarti, 2012). Discrimination felt at the beginning of the diagnosis is one of the causes of depression in TB patients and their families (Li-Yun Lee, Heng-Hsin Tung, Shu-Ching Chen, 2017). Social support from the community will be meaningless if there is still stigma and discrimination felt by the TB patients and their families. Fear of contracting TB is often the reason for this discrimination. In subsequent studies, this will be further investigated in terms of the effect of stigma on family resilience. In this study, the indicator which states that families are interdependent when others

keep away for fear of contracting the disease has no significance. This shows that at this stage, the family is still oriented towards the impact of any problems internally. This is where the family is more focused on surviving with the problems that they face, which are related to one family member suffering from pulmonary TB. The results of the analysis of the survival stage provide a 0.72 effect on family resilience in the families of pulmonary TB patients.

Adaptation Phase

This phase refers to the time that the families need to readjust their lives in order to accommodate the crisis that they face. At this time, the family may not really accept new challenges and they begin to find that they need to immediately start making changes. The adaptation phase is the time when changes are made, even before the family really accepts the nature of their current situation. The most relevant family strengths during this period were initiative, flexibility/creativity, and limitation management. Initiative refers to the willingness of the families to take responsibility and to handle situations while the management of restrictions refers to the ability of the families to separate themselves from unhealthy influences (Lietz & Strength, 2016)

Family creativity is the ability to find several solutions to a problem. Flexibility is the desire of families to try new things when dealing with problems or crises in the family. The results showed that all of the indicators can significantly measure the adaptability of families of the pulmonary TB patients. At this stage, the biggest loading factor value is the family clarifying a problem that is not understood (0,80). Other indicators that have a large enough value include starting to understand each other (0.77), starting to try new things (0.63) and solving problems (0.73). At this stage, the family in this study - by as much as 36.2% - shows that the representation of the wife is in accordance with the culture in the Surabaya Region. This is how most of the Javanese tribes will act after obtaining approval from the husband as the head of the family who is given authority by the family as decision maker. The analysis shows that the adaptation stage ranks fourth with the structural equation stating that adaptation has an effect of 0.76 on family resilience in the families of patients with pulmonary TB.

Acceptance

The family strengths in this stage include commitment, insight, communication, and humor. Family commitment refers to the dedication and strong desire of the family as a whole. The family is the first priority. When the family faces difficulties, the strength of the family commitment will make it easier for the family to keep trying to get out of trouble. The provision of interventions that facilitate social support from the family's internal system will foster close relationships and commitment among the family members, especially families at risk. Insight refers to the ability of the families to gain an understanding of the problems that they face.

When the families discuss accepting their situation, they identify communication as a family strength that helps them to achieve acceptance. Affective communication includes expressions of love and attention. Attention and is very important to foster a sense of family cohesiveness. A sense of humor is a family strength that refers to the family's ability to be light in the face of adversity. Humor is discussed as something that helps them to accept their difficulties. Similar to communication, this is also a sign that the reception phase is in progress. Families can make their situation light. This activity reduces their pain while also showing that they are starting to accept what they are facing.

The results showed that indicators P4, P6, and P10 were not significant in terms of measuring the acceptance of the family resilience stage. The indicators show that the family can be compromised if there is a problem, that they can ask for the purpose of the message delivered by the family related to the success of care, and that the family has the power to solve the problem. The four indicators above show that at this stage, the family does not have power. The indicators showing commitment, openness to discussion and communication have a great value. When the families discuss in order to accept their situation, they identify communication as a family power that helps them to achieve acceptance while also showing that acceptance does occur (Walsh, 2017). The results of the analysis show that the acceptance stage ranks first with the structural equation stating that it has an effect of 0.94 on family resilience in the families of pulmonary TB patients.

Growing Stronger

Growing stronger is when the families acknowledge and experience reinforcement related to the changes they have made so far. The most important family strength during this stage is assessment. When the families experience loss and difficulties but also find meaning in them, they seem to be better able to avoid the negative consequences that are usually associated with high risk situations. This stage is seen when the families move from their initial anger and fear to acceptance, and finally to a place where they can assess the situation positively. The results showed that all indicators that were built can significantly measure the phase of family growth. All of the competencies that show the strength of the family when taking on a positive decision to solve a problem, to accept pain and the impact of pain, and to beginning to feel that they have the ability to resolve the issue properly as a family unit intact. Each indicator above has a value of a loading factor that is almost the same. According to McCubbin (1996) cited by (Chapin, 2015), positive movements are referred to by McCubbin as "bonadaptation", namely behavior that shows changes that move towards growth and maturation. Growing the family resilience ability is not an easy effort. The family should be able to identify any risk factors and manage them in order to achieve a dynamic family situation. In the stage of

resilience, there is the ability of families to cope with stressors from outside the family, known as risk factors. They respond using the family strength, family resources, and the ability to solve problems within the family, which are collectively referred to as protective factors (Taylor & Distelberg, 2016).The results of the analysis showed that the stage of growing stronger ranks third with the structural equation stating an effect of 0.78 on the family resilience of the families of patients with pulmonary TB.

Helping Others

When families can assess their difficulties in a positive way, the family reaches a point where they want to help others. Some suggest that altruistic pro-social behavior helps families to find meaning in adversity (Lietz, 2018). In other words, the families describe their participation in some pro-social behaviors as an effort to help others while also helping themselves. Families have a major contribution towards the pulmonary TB patients. When the nuclear family and extended family provide mutual support, the family resources of education, employment and socioeconomic level also influence this support in accordance with the previous research which states there is a significant relationship between the family factors of family type, level of education, employment, income, healthy home and stressors in the family with the quality of life of pulmonary TB patients (Rachmawati, 2018).

Providing social support is a family strength associated with this phase. The process of resilience grows from the survival stage where families are desperate to receive social support where they help others in turn to give back. The results show that indicators H6, H8, and H9 - which state that the family feels free to be a family member in the social environment , that they provide assistance and gifts for neighbors in need, that they show love and concern for their family members - are not significant in terms of measuring the stage of helping others. This is because the three indicators are still focused on the abilities of the family internally. More precisely, when the family needs support while in this stage, it is more to provide support to others who have similar problems to those experienced by the family. The indicators that show the ability of the families to help others who have similar problems while continuing to show internal efforts to strengthen the family resources, in addition to a sense of security and comfort in the family and environment, plus the social relationships. These are all indicators with high loading values. The results of the analysis show that the stage of growing stronger ranks second with the structural equation stating an effect of 0.88 for the family resilience of the families of pulmonary TB patients.

CONCLUSION

Based on the results of this study, it can be concluded that the family resilience model is a fit model. This refers to the results of the goodness of fit test. The indicators of each phase of family resilience, which is the development of indicators in the family resilience model as the observed variables in the model, are valid based on the results of the validity test conducted on the measurement model. The construct as described by the observed variable is reliable. The construct of family resilience can be measured clearly using its dimensions or phases which are, sequentially from the greatest value, as follows: acceptance, helping others and growing stronger. Following these three, the adaptation and survival phases have a relatively similar value. The results also showed that not all of the families passed the family resilience stage.

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Original Research

Factors Influencing the Success of the National Nursing Competency Examination taken by the Nursing Diploma Students in Yogyakarta

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ABSTRACT

Introduction: Yogyakarta is a province with the highest percentage of achievements over the past five years. It is argued that it has been affected by many factors. This study was conducted to analyze the factors that influence the success in the national nursing examination of the 3-year nursing diploma students in Yogyakarta.

Methods: This study was a descriptive correlation design with a total sample of 755 participants. The variables in this study were mental preparedness and the learning strategy used by the examinees before the exam (internal factors). This is in addition to the management strategy used three months before the exam, the learning methods used within the 3-year process and the environment where the exam is done (external factors) and also the results of the national nursing competency examination. The questionnaire used in this study was developed by the researcher with a Cronbach's Alpha = 0.82. The data was analyzed with the frequency distribution, Pearson correlation and R2 for the determinant analysis unit obtained.

Results: This study found that the management strategy and exam room/environment were significantly correlated with the results of the exam (p=0.05). The learning methods used were also correlated with the results of the exam (p=0.00). The learning strategies used before the exam was a significant factor influencing the success of the national competency examination with a higher coefficient value.

Conclusion: Various factors are related to the success of the national nursing competency examination in Yogyakarta. This study implies that the nursing diploma management and the students should manage the learning strategies used before the exam to achieve better results in the national nursing competency examination.

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INTRODUCTION

The implementation of the Mutual Recognition Arrangement (MRA) affects the dynamics of the Association of South East Asia Nations (ASEAN) and the Economic Community (AJCCN Forum, 2016). The Global Competitiveness Index in 2017-2018 shows that Indonesia was in 36th place from among 137 countries globally (World's Economic Forum, 2018). Nursing and tourism are some of the free flowing services ready to compete in the free market competition. The current global situation of the nursing workforce is experiencing an undersupply of nursing staff (Marc, Bartosiewicz, Burzynka, Chmiel, and Januszewicz, 2018). The increasing elderly population and decreasing number of births, which influences health policies and health care systems around the world, will affect the human resource demand of nursing. To deal with this condition, some nursing institutions should adapt their strategies to manage their institutions. Nurses who graduate within a similar nursing education system who want to work overseas will take a nursing competency examination and gain professional certification or recertification in order to update their professional competencies to meet the standards of the origin country. This certification can be achieved through bridging programs and certain nursing courses. It ends in the nursing licensure examination (Covell, Primeau, Kilpatrick, and St.Pierre, 2017).

Unfortunately, Indonesia, while producing a great number of nurses each year, has not been able to

fulfill the demands of the market yet. The government should be aware that after five years of the national examination for the health care profession ongoing, it still has a big problem. The facts indicate that from the first results of the examination until 2018, the results did not meet expectations. About half of the students - who came from many different health education institutions who participated in the examination - still failed. The low pass rate of the national nursing examination is a burden for many nursing institutions and the government. Some of the nursing institutions in the West and East provinces of Indonesia even had a 0% - 25% passing grade. Another problem is the mental preparedness of the re-taker examinees who have still failed the examination many times. Almost 50% of the participants in the national competency examination were found to be incompetent (re-taker participants) at the time of the study (PNUK, Nakes, 2018)

This performance still needs to be increased significantly in order to be able to reach a higher level of nursing passing grade in the national examination, thus increasing the level of the competency of the nursing students. A higher level passing grade will reflect the level of competency of the graduate nursing students. If this higher passing grade is achieved well, then hopefully the Indonesian nurses can compete with the other ASEAN countries, particularly Singapore and the Philippines. The Indonesian Ministry of Health is mandating all nurses who work in the healthcare services to have a registration document that can be obtained through the national nursing examination after finishing all credits in the degree program (Indonesian Ministry of Health, 2014).

Responding to this situation, nursing education in Indonesia has changed the curricula into a competence-based curriculum based on *Kerangka Kualifikasi Nasional Indonesia* (KKNI), or the Indonesian National Qualification Framework, in order to have equal parameters of competency that are synchronous and equivalent in the ASEAN scope. The National Competency Examination for the health profession is an examination held by the National Competency Examination committee. It consists of elements from the Indonesian National Nurse Association, the Association of Nursing Education Institution, the Ministry of Research, Technology, and Higher Education, the Ministry of Health, and stakeholders. This examination is a requirement to obtaining a nursing certificate. It is conducted three times a year in the form of paper-based and computer-based examinations. Every student must pass the examination. The examination is taken after the nursing students finish their education and before they apply for work. The conclusion on the passing grade of the examination is determined by the agreement of the expert panel. They are all well-established and independent scientists with over 10 years of professional and multidisciplinary experience in health (Kemenristekdikti, 2016).

The performance and results of the competency examination are influenced by several variables and predictors related to either the internal factors inside of the participants or to the external factors. The internal factors, such as the psychological or mental readiness of the students, the learning strategies used to face the examination several months before until a night before the exam day and the physical conditions of the students while taking the examination are believed to be the important factors affecting the examination score. The demographic profiles of the students such as gender, academic achievements and the cognitive ability of the students, especially their problem-solving ability and critical thinking are also important internal predictors that influence the examination score. Shin, Kim, Suh, Jung, Kim, and Yim (2017) stated that construct analysis and a validity test might be significant contributors that affect success in the national competency examination. In order to have a clear understanding of the question, students need to have ability to understand the test construction in many steps of the case reviews.

Some external factors can also influence success in the nursing competency examination. These factors, such as the role of the management in developing the competency test, the registration process, miscommunications and the absence of specific strategies in preparing the students, need to be explored more seriously in order to achieve the best score in the competency examination performance. Kim, Nikstaitis, Park, Amstrong and Mark (2019) said that some students predicted that they will succeed in the nursing licensure exam because they took review courses, made aggressive use of the practice questions and studied hard. A strategic review is done by many nursing institutions at the end of the nursing program stimuli by the student to collect and form an early understanding of the essential nursing courses. Robert (2018) also supported the statement that an accomplishment in all of the essential nursing subjects will lead the students to achieve a higher grade in the national nursing licensure examination. Palompon, Ong and Banico (2012) found that many variables such as their college entrance examination performance in the IQ test, their college grade point average and their preboard examination performances had a correlation with licensure examination performance. The last two variables significantly predicted their licensure nursing examination score.

Other external factors include support from their family, peers, friends or classmates, the class room environment where the examination is held, the behavior of the lecturers, and the weather. The quality of the clinical instructors, lecturers and the learning methods provided along the program and the location where the competency examination is held are also important variables that affect the examination process (Okanga, Ogur and Arudo, 2017). Considering that there are so many factors affecting the performance of graduate nurses, especially in the national examination process, the researcher is interested in exploring the variables and predictors that affect the results of the national nursing competency examination of the 3-years nursing diploma in Yogyakarta. Yogyakarta was chosen because it is a province that has always had the highest performance in the nursing competency examination in the country since the first time when the examination was held. Although Yogyakarta has only 9 institutions that offer a nursing diploma, this province is always the best province that achieves the highest score and highest percentage in the national nursing diploma competency examination. It also had the highest passing grade of more than 98% from 2015 until 2018 (PNUK,Nakes, 2018).

MATERIALS AND METHODS

This quantitative research used a descriptive-correlative analytical design. The first description was to determine the demographic profile of the participants, the results of the examination, the mental strategies and examination strategies of the participants, the strategies of the managers in preparing the examination and the environment during the examination. This descriptive process was then followed by the correlative analysis process and the analysis of the impact value of the variables in order to explore the most significant predictors of the examination results more deeply and to see the correlations between and among the variables that affect the results of the national competency examination3-year. The independent variables in this study were mental preparedness, learning strategies, management strategies (preparation of the management), learning methods, and the environment/room where the competency test was held. The dependent variable was the results of the competency examination.

The research was conducted in the Special Region of Yogyakarta, Indonesia, and the target population was all of the students participating in the national competency examination at that time. Through the total sampling technique, 766 students doing the 3-year nursing diploma participating in the national competency examination in Yogyakarta were chosen as the sample. The instrument used in this research was a questionnaire that was developed by the researcher consisting of 100 items or statements as follows: 1) The first segment consisted of 20 items exploring the physical, mental, and cognitive preparation of the students before taking the national nursing competency examination; 2) the second segment contained 20 items used to explore the learning strategies of the students when facing the examination in which every statement led to the steps and readiness of the students to face the national competency examination; 3) the third segment, consisting of 20 items, showed the strategies of the managers of the study program in preparing the students to do the final exam; 4) the fourth segment of the instrument consisted of 20 items that explored the types of learning method experienced by the students alongside the learning process of the three-year nursing diploma program

Table 1. The Demographic Profile of the Participants (N=755)

Variable	N	%
Gender		
Male	165	21.9
Female	590	78.1
Age		
20 – 24 years old	689	91.3
25 – 29 years old	16	2.1
30 – 34 years old	3	0.4
35 – 39 years old	13	1.7
40 – 44 years old	23	3.0
45 – 49 years old	11	1.5
Province of Origin		
South Sumatera	14	1.9
West Sumatera	1	0.1
Bengkulu	3	0.4
Lampung	13	1.7
Banten	2	0.3
DKI Jakarta	3	0.4
West Java	7	0.9
Central Java	102	13.5
Yogyakarta	515	68.2
East Java	11	1.5
Bali	22	2.9
West Nusa Tenggara	14	1.8
East Nusa Tenggara	14	1.8
West Kalimantan	14	1.8
East Kalimantan	4	0.5
Central Kalimantan	9	1.2
South Kalimantan	2	0.3
North Maluku	1	0.1
Papua	4	0.5
Senior High School Background		
Natural Sciences	336	44.4
Social Sciences	261	34.6
Health vocational high school	50	6.6
Non-health vocational high school	108	14.3
GPA		
2.00 – 2.99	24	3.1
3.00 – 3.99	731	96.9
Types of housing		
Private house/with parents	493	65.2
Boarding house	210	27.9
Rented house	36	4.8
Student dormitory	16	2.1

Table 2. The Distribution of the Levels of Mental Preparedness, Learning Strategies, Management Strategies, Learning Methods, and the Environment/Room Used by the Participants (N=755)

Variable	N	%
Mental Preparedness		
Ready	395	52.3
Not ready	360	47.7
Learning Strategies		
Effective	397	52.6
Ineffective	358	47.4
Management Strategies		
Helpful	355	47.0
Unhelpful	400	53.0
Learning Methods Used		
Suitable	298	39.5
Unsuitable	457	60.5
Condition of the Room		
Conducive	264	35.0
Unconducive	491	65.0

and 5) the last segment had 20 items that explored the condition of the place or room where the examination took place. Every sentence in the questionnaire was filled in by the participants using dichotomy/ binary category scales. This means that the participants could only answer 'yes' or 'no'. Yes had a value of 1 and no had a value of 0. To make sure that the instruments reliable and valid, a pilot study was performed to test the questionnaire. The results of the reliability test showed that Cronbach's Alpha = 0.82. Every participant was asked to fill in a document of agreement stating that they were willing to participate in the study.

This study implemented ethical principles of human research such as confidentiality, justice and beneficence. The data collection was carried out in two steps. The first was when the researcher gained a permit for the research from the institutions and when they gathered information from the management of 3-year nursing diploma. The second was at the event briefing for the examination, which was the day before the real examination was held in October 2016. The data was collected by the researcher and a research assistant at Poltekkes Kemenkes, Yogyakarta (a place chosen as a site for the national 3-year nursing diploma examination). The secondary data was collected from the formal announcement of the results of the national nursing competency examination from the committee of the national competency examination. In total, 766 examinees from 9 institutions administering the 3-3-year nursing diploma in Yogyakarta filled the questionnaires. After the data were sorted, 755 eligible questionnaires were analyzed; 10 participants did not fill in the questionnaires completely, so the data could not be used. To describe the data through a frequency distribution, the data was then analyzed using SPSS 20 and descriptive analysis. Multiple linear regression was employed to examine the predictors of success in the national competency examination.

RESULTS

The characteristics of the demographic profile of the participants are presented as follows.

The results of the univariate analysis conducted in Table 1 indicates that 590 (78.1%) of the participants were female. The most dominant age range was of 20–24 years old for as many as 689 participants (91.3%). For province, 515 participants (68.2%) came from Yogyakarta and 419 participants (55.4%) had an educational background of senior high school in a non-science program. The GPAs of 731 participants (99%) were between 3.00 and 3.99. As many as 493 participants (65.2%) stayed in their parents' house.

The results regarding the variables that affect the students when facing the examination are presented in the table below. Table 2 shows the predictors affecting the results of the examination. In terms of the mental preparedness of the participants, 395 participants (51.3%) said that they did not feel ready to take the examination while 397 participants (52.6%) used good learning strategies before the exam. On the other hand, 400 institutions (53 %) had bad management when preparing for the examination. In addition to this, 457 participants (60.5%) used bad learning methods in their 3-year study in campus and 491 places (65%) or the rooms used for the examination were unconducive.

After the demographic profile of the participants was tabulated, the data on the correlation of the results of the national nursing competency examination with mental preparedness, learning strategies, management strategies, and learning methods in the bivariate statistical data has been presented as follows.

From Table 3, it can be seen that the variable of learning strategies has a significant correlation with the mental preparedness of the participants when facing the examination with a p value = .01. The correlation exists at the moderate level with a value of r = .092 *. The learning strategies also have a significant correlation with the preparations performed by the director of the 3-year nursing diploma program with a p-value = .000 and an r - value = .225 ** The data also shows that the variable of the environment during the examination also has an important role in the success of the students facing the competency test. This variable is significantly correlated with mental preparedness with a p value = .000 and an r - value = .144 **, along with the learning strategies (p value = .000 and r value = .246 *), management strategies (p value =, 000 and r value =, 255 **) and learning methods (p value = .000 and r value = .476 **). The results show that the learning strategies before the examination are accepted as the dominant predictor affecting the nursing competency examination.

DISCUSSION

This study has identified that the extrinsic factors correlated with success in the national nursing competency examination are management capability, the learning methods used in the learning process and the environment where the exam is done. The first extrinsic factor is the ability of the managers/directors of the 3-years nursing diploma program in preparing the students from the first semester through to the last semester. These abilities include their inspirational value, enthusiasm, the clarity of the materials used, the plan, the organizational skill materials, the method of learning, and the method of judging and evaluating the learning processes. The capabilities of the managers in strengthening the learning strategies (including the learning processes and the accurate use of learning methods/strategy) are important keys to passing the final competency examination. Nursing managers are also required to be advanced in terms of providing good facilities and infrastructures in the learning process, to employ up-to-date information technology and to update the learning resources used. Pence and Wood (2018) underline that using software and being skillful at managing information technology in the examination will also lead the students to success in the examination, especially in the computer-based test (CBT) examination. Murphy, Goossen, and Weber (2015) also said that educators should have a vision to focus on confirming what informatics competencies are applicable and needed for helping the students in their study and their examination.

The other ability of the manager is planning, managing, and evaluating the learning process of the lecturers. Okanga, Ogur, and Arudo (2017) emphasize that the experience of the faculty has a significant correlation with success in the competency examination. McDonald (2017) adds that nursing educators should provide the students with many opportunities to master the knowledge required for the licensure. Finkelman (2017) also adds that lecturers should be able to serve as a partner for the managers in preparing the nurses for the future.

Pulito (2017) states that in order to be successful in the licensure/competency examination, deep learning is important. Deep learning can be achieved by choosing suitable and accurate learning methods. The deep learning level of the students will be affected by the style of the nursing management used to direct the faculty in teaching and constructing the evaluation/examination. Learning methods are how a person learns something as a part of achieving a certain competency and they are usually designed by the lecturers to achieve a learning outcome in particular course/subject (Mc Donald, 2017). Stojanovic et all (2018) said that students need professional help and support to increase their understanding of some clinical nursing subjects. This idea is supported by Quin, Smolinsky and Peters (2018) who emphasized the role of the nursing faculty is to take steps to prepare the nursing students for success on this difficult examination. The role of the nursing lecturer starts at the beginning of the nursing program and it is focused on the fundamental nursing courses through to the advanced nursing courses at the end semester of the program. The mastery in clinical nursing subject through appropriate learning methods designed by the lecturers and clinical instructors will build a good understanding and mental capacity in the students. Proper learning methods utilized from

Table 3. The Correlation of Mental Preparedness, Learning Strategies of the Students, Management Strategies, Learning Methods and the Environment (Room Condition) with the Results of the National Nursing Competency Examination in Yogyakarta

		Examination results	Mental preparedness	Learning Strategies	Management Strategies	Learning Methods	Environment
Results of the Examination	Pearson Correlation	1	-.05	.06	.05	.02	.05
	Sig.(2-tailed)		.14	.06	.11	.44.	.12
Mental Preparedness	Pearson Correlation	-.05	1	.09*	.03	.15*	.14*
	Sig.(2-tailed)	.14	.14	.01	.28	.00	.00
Learning Strategies	Pearson Correlation	.06	.09*	1	.22*	.21*	.24*
	Sig.(2-tailed)	.06	.01		.00	.00	.00
Management Strategies	Pearson Correlation	.05	.03	.22*	1	.20*	.25*
	Sig.(2-tailed)	.11	.28	.00		.00	.00
Learning Methods	Pearson Correlation	.02	.15*	.21*	.21*	1	.47
	Sig.(2-tailed)	.44.	.00	.00	.00		.00
Environment	Pearson Correlation	.05	.14*	.24*	.25*	.47	
	Sig.(2-tailed)	.12	.00	.00	.00	.00	1

* The correlation is significant at the 0.05 level (2-tailed)
**The correlation is significant at the 0.01 level (2-tailed)

first year will increase their verbal and critical thinking skills. The capability to verbalize and understand some of the courses critically builds the mental and emotional capabilities of the students. Suitable and accurate learning methods can cultivate curiosity and their manner of being proactive and communicative. Students can also learn to develop their arguments and reasoning, and ability to see correlations (associations), including the ability to see cause and effect. Therefore, the management skills used to arrange their learning methods are needed.

The management skills could also cover the management activity, person, finances and facilities of the successful exam. Park et al (2017) states that the quality of the question items in the examination is influenced by the methods used to develop the test items. Thus, it needs there to be workshops, brainstorming, verification, and content validity from the experts in order to create quality question items. The nursing education field in Indonesia has enforced many nursing institutions to allow them to have the capability to develop items or questions as part of the basic material of the examination package. For reference, one package of items/questions in the examination book consists of 180 items. After the lecturers write the question items, professional nurses review the questions and send them to the panel expert meeting for them to determine the national passing grade. The quality of the test items determines the quality of the test item package. If the quality of the test items improves, then the possibility of having a good passing grade will increase and thus their chance to pass the exam will be higher.

Shin, Kim, Suh, Jung, Kim, and Yin (2017) explain that management should also consider using simulators or a standardized patient-based method as the most suitable format to increase the students' understanding of the patients' condition. Simulations and patient-based methods in a nursing laboratory practicum or in a clinical nursing setting, such as a hospital and primary health care services, will increase the nursing students' communication abilities and nursing care skills, especially when conducting a nursing assessment about the patients' health problems. Communication, critical thinking, clinical judgment, and competency in relation to their nursing skills/procedures are the key components for success in the nursing competency examination. Critical thinking and clinical judgment are very important skills for nursing students.

The second factor that influenced the results of the examination was the learning methods used by the lecturers in the teaching and learning process. Unsuitable learning methods in the process of education (from the first year up until the third year of the nursing diploma program) leads to failure when doing the competency examination. Some of the learning methods used in nursing education that emphasize critical thinking and clinical judgment are case studies, simulations, problem-based learning, project based learning, debriefing, the ability to reflect, peer review scenarios, writing skills and clinical experience/experimental (Kaddaura, Flint, Van Dyke,Yang and Chiang, (2017), Synder (2018) and Caputi (2019)). Zapko et all (2018) emphasizes that serial simulation and having the student's experience a simulation more than once in consecutive years is the best way to increase their clinical practice in the context of nursing education. On the other hand, a lack of experience in using the learning methods focused on student activities (students centered learning), poor case study methods, and a lack of ability and clinical practices will blunt the abilities of the students in terms of making good inferences and reflecting low critical thinking and clinical judgment skills.

It is urgent to reform the nursing program by enhancing the learning methods in terms of clinical judgment and critical thinking. These skills can be achieved through practicing and applying clinical judgment and critical thinking in some thinking competencies. Hence the case study method and real practices in the real field become important factors in these processes, but not all students can generate the meaning of the experience well. In addition, the satisfaction of the students when they engage in experiential learning in the clinical practice area can increase their self-confidence and their ability to resolve their duties and tasks in the examination. Cowen, Hubbard, and Hancokck (2018) identify that having enough experience to communicate effectively with patients and other health professionals, and their experience of many skills/nursing procedures and observations through clinical courses, will increase their critical thinking and clinical judgment.

The third extrinsic factor that was correlated with success in the nursing examination results was the environment where the exam was done. A conducive environment is a significant factor in terms of increasing the mental preparedness of the examinees which will lead to success in the examination (Sanches, Costa, Agea, Izguerdo, and Rodriquez (2018). The environment or the room for the examination must be well prepared and meet the standards as follows: the room should have good circulation, and the distance between the students should at least be 1 m_2. The room must also have a clear and visible clock/timer that can be seen by all of the participants during the examination (Pnuknakes, 2018). In addition, the room should facilitatee a good, calm, and conducive environment, which means that the room should be quiet, as well as being clean, and comfortable with enough lighting and ventilation. Good circulation will facilitate the examinees in terms of having enough oxygen. The oxygen inhaled will be distributed via the blood flow in the body including to the brain of the person. This will increase the brain's metabolic rate and this will increase the work of the brain in terms of

concentrating, recall and memorizing, in addition to understanding and reasoning in the examination. The cognitive activities in the brain contribute to the mental preparedness of the examinees. This mental state in the examination is very important to attain success.

Another standard of the environment refers to clear directions and information about the building which will affect success in the examination. When the examinees do not know the location or the room for the test, they will be confused and anxious. Moreover, when the examinees are late and get lost, they might panic and be more stressed. The anxiety and panic will affect their mental cognitive capacity and capability to understand the test which will influence the results of the examination. The position of the toilet is also important. The examinees should know the location of the toilet. The anxious feeling of the examinees while they are taking the examination will trigger them to urinate more often than usual. The location, cleanliness, and comfort of the toilet will help them to reduce their tension. Appropriate lockers for storing their goods, including hand-phones, is also an important environmental factor that contributes to success in the exam indirectly (Pnuknakes, 2018). In fact, on the day of the examination, the examinees often find that the room is still dirty and hot because of poor ventilation, poor lighting and noise. The noise sometimes comes from the neighborhood of the campus such as the music from a wedding party, motorcycles on the main road, and building construction going on around the campus. The noise will disturb the concentration of the examinees and this will influence the results of the exam indirectly. They cannot concentrate on the examination. Hence, the environment will influence the results of the competency examination indirectly.

The intrinsic factors that were found in this study include mental status and the learning strategies before the exam were used by the examinees. The good mental status of students will decrease their anxiety as well as expand and strengthen their personal competency when the nursing students face the examination. Good psychological wellbeing and emotional security affects cognitive capacity and this can lead to better achievements in the examination. When the students have mental preparedness to face the examination, the chance for them to be successful in the competency test will be higher. Students need help and support to expand and strengthen their psychological wellbeing in terms of improving the level of their competencies. Sanchez, Costa, Agea, Izquierdo, and Rodriquez (2018) explained that social-emotional competencies consist of communication skills, the ability to cope with stress, and engagement in both learning activities and self-efficacy. The process of building their critical thinking and clinical judgment in accurate and suitable learning methods correlates with the mental construction of the nursing students. Nursing students who have a firm mental capacity will have a good emotional security and sense of psychological wellbeing. Psychological wellbeing is an important factor in the examination. Some aspects of psychological wellbeing include good motivation, confidence, the state of being free of panic and anxiety, and the willingness or strong desire to pass the examination. The examinees should be free from anxiety because this will influence their performance in the examination (Stojanovic et all, 2018). Students who have good motivation to become nurses will do their best to pass the examination. The higher their motivation, the better the results of the examination. A person with good motivation will have more enthusiasm and effort and they will struggle more to graduate as soon as possible and to pass the final competency examination. The calling to become a professional nurse and the desire to serve humanity is the highest motivation needed to attain good results in the nursing examination and finally, to become a professional nurse.

Another intrinsic factor was the learning strategies used when facing the exam. It refers to the strategies used by the nursing students to prepare themselves to face the examination from three months up until the day before the competency examination. The learning strategies chosen by the students are a kind of intrinsic factor that can be very specific and personal in the short-term before the examination. Learning only some days before the examination will not fully help the students to pass the nursing competency test. Individuals who use good learning strategies to face the examination are slightly higher in terms of result than those who have poor learning strategies. A few students still did not understand the tips and tricks used to pass the examination. Trying to learn all of the materials in only one night is not a smart strategy. Instead, students can have a course resume, discuss the test questions in a group, attend nursing review classes, and try to answer the test questions on the computer (CBT test questions).

Most students will attend the review class delivered by the management on a very strict schedule several weeks before the examination. Kim, Nikstaitis, Park, Amstrong and Mark (2019) said that some students predicted that they would succeed at the nursing licensure exam because they took review courses, which makes aggressive use of practice questions paired with studying hard. The Health Education System Inc (HESI) test is frequently used as a standardized test in nursing programs. Many students stated that the review course provided by HESI is helpful for achieving a higher passing grade in the nursing licensure examination. Taking review courses seems to be rarely done in Indonesia. The lecturer gave the questions before the exam happened. Some institutions gave them within a week, some within one, two or three months. At the end of the review session, the student did their test taking package and some of them used a computer-based test. The student should be afforded many opportunities to engage in remediation, test taking

and any other support associated with tutoring. These question review methods helped the students to deal with the questions and as a result, they got a higher passing grade in the nursing exam.

Robert (2018) also supported the finding that there was a significant correlation between the pre-admission examination scores and success in the NCLEX-RN (National Council Licensure Examination – Registered Nurse) on the first attempt. Program completion had also a positive correlation with their pre-admission science grade and HESI score. Students who had a higher grade in their pre-admission science course were significantly accomplished in all of the essential nursing subjects and this leads them to achieve a higher grade in the national nursing licensure examination. Czekanski, Mingo and Piper (2018) noted that the preparation strategy for success in the nursing licensure examination consists of at least content review and test-taking strategy. A content review will lead the student to have more of a deep understanding of the essential nursing subjects and it will stimulate their critical thinking and clinical judgment when answering the questions. The test-taking strategy will sharpen the student's skills in terms of managing their time, choosing the best answers and managing stress alongside the examination processes themselves. The preparation review-strategy needs to begin from the early semester of the nursing program and continue until after program completion. The learning strategy will improve the students' understanding of the test questions. The better the learning strategies used by the students, the better their mental preparedness and psychological well-being, thus better results in the examination can be achieved.

CONCLUSION

This study concludes that the factors that influence the success of the nursing students in achieving high results in the nursing competency examination are the learning methods used in the 3-year nursing program, the environment (conducive rooms/places where the examination is held, the direction of the building, and a comfortable room), the strategies of the nursing diploma managers/directors in preparing the examination, and the learning strategies employed by the students from three months up until the day before the examination. The factors of mental preparedness and the learning strategies used from the first semester until the last semester are also important factors that contribute indirectly to success in the national competency examination.

The learning strategies used should be considered a critical aspect in achieving the best results in the national nursing exam. The study then recommends that the nursing students who take the competency examination should have effective learning strategies (personally or institutionally) implemented at least three months before the examination. The institution should improve the learning methods taught during the 3-year nursing program, have a special preparation strategy or treatment available before the examination, and provide a conducive environment/room for the examination which meets the standards as a place of examination.

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