The Effect of Pointer Finger Friction (PFF) Massage on β-Endorphin Levels and Sleep Quality of Postpartum in Semarang

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ABSTRACT

Background: *In Asia, more than 54.7% of postpartum mothers experience sleep deprivation, ranging from 50.9%. Massage can increase the levels of endorphins in the body and stimulate the central nervous system (CNS). This study aimed to determine the effect of Pointer Finger Friction (PFF) Massage on β-Endorphin Levels and Sleep Quality in Postpartum Mothers in Semarang City.*
Method: *This study was quasi-experimental with a pre-posttest control group design. The population consisted of postpartum mothers in the Semarang City Health Center area, and samples were obtained by simple random sampling. The number of samples were 36 postpartum mothers who were divided into 2 groups. The treatment in the intervention group with PFF was carried out five times, starting on the first postpartum day. Venous blood was collected before and after treatment to measure endorphin levels and sleep quality. Data analysis was performed using the Mann–Whitney U test.*
Result: *The results of the study showed most of the respondents were 23 years old and had a high school education (82.9%). The average level of β-endorphins after the treatment group was 135 mg/ml higher than that of the control group (38 pg/ml), and the quality of sleep after the treatment group decreased by 3.5 compared to the control group, with a score of 0.9. There was a relationship between the levels of β-endorphins and sleep quality between the PFF and control groups. To increase the levels of β-endorphins and the quality of sleep of postpartum mothers, we can promote and educate people about the use of the PFF massage method.*

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INTRODUCTION

Sexuality issues are always an exciting topic to discuss. Postpartum mothers at the beginning of their baby's life still feel tired because of the birthing process they have experienced so they need to get strong attention, supervision and support to successfully care for the baby and restore energy.(1) During the postpartum period, most mothers experience changes in sleep quality. Changes in sleep patterns and sleep duration are often experienced by mothers, as are sleep complaints related to wound discomfort, painful uterine contractions, and painful breastfeeding. The physiological and hormonal changes experienced by postpartum mothers can pose a risk of decreased maternal performance. (2)

A prospective study in Australia on the mood of postpartum mothers showed that 20.1% had a high burden of physical symptoms, 19.2% had a high burden of breastfeeding problems, and 11.0% experienced both.(3) Mothers who experience fatigue and emotional stress can disrupt the quality of their rest, which can cause problems in caring for their baby. The lack of family support for postpartum mothers has different impacts on the mother's physiological and mental burden; therefore, it is necessary to assess changes in the physiological and psychological conditions of postpartum mothers from time to time. Previous research by Mindel (2013) stated more than half (54.7%) of mothers in Asia experience sleep deprivation disorders ranging from 50.9% of mothers in Malaysia to 77.8% of mothers in Japan.(4)

Sleep disorders are one of the problems for postpartum mothers due to their role as new mothers, who often sacrifice their sleep to adapt to new routines and responsibilities in breastfeeding newborns.(5) The prevalence of poor sleep quality at 3 months postpartum was higher in older mothers (61.6%) than in younger mothers (38.4%, $p < 0.01$). Multiparous women have sleep quality problems more often than primiparous mothers, mothers wake up more easily at night and in the morning, efficiency is reduced.(6)

Poor sleep quality is positively correlated with the severity of postpartum physical symptoms, lack of exercise, and sharing with the baby.(3) This is indicated by difficulty thinking clearly and acting effectively against environmental demands. The experience of a first-time

mother caring for her baby certainly has different conditions compared to a mother who has given birth several times or has cared for her own baby several times.

Postpartum mothers who experience sleep quality problems will have an impact on breastfeeding and will have an impact on exclusive breastfeeding. The exclusive breastfeeding coverage in Semarang City in 2021 is 71.9%, and in 2022, it will increase to 73.1%. Breastfeeding needs to be given exclusively until the age of 6 (six) months and can be continued until the child is 2 (two) years old. Breast milk is one of the best foods for babies because it contains the nutritional elements that babies need for their growth and development.(7) Previous studies have shown that sleep quality is a risk factor for negative impacts on the mother in the postpartum period. Poor sleep quality is significantly associated with greater symptoms of depression and anxiety. (8)

Mothers who experience fatigue and stress then signals travel through the HPA (Hypothalamo-Pituitary-Adrenal) axis, causing the release of stress hormones including Adreno Corticotropin Hormone (ACTH), cortisol, catecholamines, ß-Endorphin, Growth Hormone (GH) and Luteinizing Hormone (LH), Follicle Stimulating Hormone (FSH). The release of stress hormones causes systemic vasoconstriction resulting in changes in blood pressure, pulse rate, lactiferous duct constriction, and increased plasma cortisol.(9)

There are several ways to improve physiological and psychological adaptation to improve relaxation and sleep quality in postpartum mothers, including various massages that can be done by stroking (massage) or pressure (acupressure) on certain points.(10) So far, providing postpartum midwifery care for the recovery of the mother's physiology and psychology has included education about baby care, postpartum danger signs, and postpartum exercises.(11) Referring to previous research that massage (massage) has a stimulating effect on the central nervous system (CNS), providing a mood-enhancing effect, causing relaxation, and increasing blood flow.(12) Massage can increase β levels of Endorphins in the body. Endorphin is the body's opiate produced by the hypothalamus, which has a pleasant and calming effect. Beta endorphin can facilitate or inhibit the effects of pain and stress, and increase comfort in the mother.(11)

An Educational randomized control trial in Taiwan showed that back massage in postpartum mothers for 20 minutes improves sleep quality. There is massage stimulation on the back, and the autonomic nervous system activates blood circulation, allowing connective tissue and muscles to relax.(12) Apart from that, massage stimulates increased endorphin and serotonin release.(13) This research develops a back massage method using pointer finger friction (PFF) techniques. This is done by pressing the rotation using the index finger under the middle finger and pressing the rotation along the spine or vertebrae up to the 5-6 intercostal bones. Purposeful research was conducted to prove the influence of PFF massage on β-endorphin levels and sleep quality in postpartum mothers in Semarang City.

Good sleep quality among postpartum mothers can prevent postpartum blues and support exclusive breastfeeding. Women with lower sleep efficiency during pregnancy were three times less likely to initiate breastfeeding than women with higher sleep efficiency.(14) Maternal health behavior in adapting to the postpartum period varies. These differences are influenced by many factors, including knowledge, sources of information, and the roles of health workers. Health promotion during the postpartum period focuses on positive health behavior when facing the postpartum transition period and supporting resources from the family, community, and health services. The postpartum period is physiological; however, the process of adapting to the presence of a new family member can create an imbalance between the needs of the newborn and the family. The model of approach and assistance at six weeks postpartum is very important, as it ensures that the mother is able to go through this period well. Providing PFF intervention to postpartum mothers is one of the preventive and promotive efforts for mothers so that they can undergo the transition period of the arrival of a new family member well.(15) According to Khoso, Yew, and Mutalib, there are four dimensions of health behavior, namely preventive health behavior, which is to prevent or avoid health problems; detective health behavior, which is to detect health complaints; health promotion behavior, which is promotive or improves health status; and health-protective behavior, which is protective or protects the individual. from health problems. So that postpartum mothers are in healthy condition and there are no problems in physiological or psychological adaptation, preventive efforts can be carried out by paying attention to these four dimensions.(16)

METHOD

This was a quasi-experimental study with a pre-test–post-test control group design. The study population comprised all postpartum mothers in the Semarang City Health Center area, and sampling was performed using simple random sampling. The total sample consisted of 36 postpartum mothers divided into two groups. This study was conducted between August and November 2022. The independent variable in this research was PFF massage, while β-endorphin levels and sleep quality were the dependent variables. The inclusion criteria for this study were primiparous postpartum mothers, gestational age >

37 weeks, absence of chronic energy deficiency, and severe body weight > 2500 g. In the data collection process, there was 1 respondent in the dropout control group. The data collection method was assisted by six enumerators who were previously given explanations or training regarding the PFF massage. Treatment in the intervention group with PFF was carried out five times, starting on the first day postpartum. Venous blood was collected before and after treatment to measure the endorphin levels and sleep quality. The preparation material for examining β-endorphin levels was the peripheral blood of postpartum mothers. Blood samples were taken in the morning at the same time for each respondent and measured using the Enzyme-Linked Immunosorbent Assay (ELISA) method. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI), consists of 7 (seven) components: subjective sleep quality, sleep latency, sleep duration, daily sleep efficiency, sleep disorders, use of sleeping medication, and daytime activity dysfunction. The results of the data normality test were not normally distributed, so the Mann Whitney test was used for data analysis. This research received permission from the Semarang Ministry of Health Polytechnic Ethics Commission (No. 0701/EA/KEPK/2022.

RESULT AND DISCUSSION

Table 1 shows that the average age of mothers is in the range of 20-25 years, that is, they are at a healthy reproductive age for pregnancy and giving birth. The majority of the mothers' education was secondary school.

Table 2 shows that the average endorphin level before treatment was 159 ng/ml and the control group, and 224 ng/ml 209, after treatment the b endorphin level was 288 ng/ml and the control groups, respectively. The results of the homogeneity test show a p-value of 0.069, which is greater than 0.05, indicating that the treatment and control groups are equivalent. For the sleep quality variable, the PSQI score before treatment in the PFF massage was 13.8 and the control group was 10.4. The PSQI score for sleep quality after the intervention was 10.6 and the control group was 10.1. The homogeneity test results for the sleep quality variable were 0.09, which was greater than 0.05, indicating that the two groups were equal.

Table 3 shows an increase in endorphin levels in the group administered PFF massage (135.4 ng/ml, which was higher than that in the control group (38 ng/ml). The results of the Mann-Whitney test between the treatment and control groups were 0.04, smaller than 0.05, which means there was a difference in endorphin levels between the treatment and control groups. PFF massage was effective in increasing the endorphin levels.

Table 1. Characteristics of respondents

Variables	PFF group (n=17)		Control Group (n=18)	
	n	%	n	%
Age (years)				
20-25	15	88	15	88
25-35	2	12	2	12
Education				
Secondary	15	88	14	78
Height	2	12	4	22

Table 2. Average endorphin levels and sleep quality

Variables	PFF Group	Control group	P
	Mean ±SD	Mean ±SD	
β Endorphin levels (ng/ml)			
Before	159±109	224±227	0.069
After	288±175	209±316	
Sleep quality			
Before	13.8±4.2	10.4±6.2	0.09
After	10.6±4.9	10.1±6.3	

Note:
P= homogeneity test

Table 4 shows that the reduction in PSQI scores in the PFF massage group was 3.2 higher than that in the control group by only 0.29. The results of the Mann-Whitney test between the treatment and control groups were 0.009, smaller than 0.05, indicating a difference in the decrease in PSQI scores between the groups given PFF massage and the control. Sleep quality in the intervention group was better than that in the control group.

This study examined the average age of mothers in the range of 20-25 years. Previous studies have shown that poor sleep quality is positively correlated with the severity of postpartum physical symptoms and sports activities. Older mothers were three times more likely to have poor sleep quality than younger mothers (OR = 3.08; 95% confidence interval 1.52–6.23).(17) Previous studies stated that women with low education had shorter sleep quality and poorer sleep efficiency than those with higher education, this was associated with socio-economic factors that had an impact on psychological stress.(18)

Table 3 shows the influence of *Pointer Finger Friction* on the β endorphin levels. Beta-endorphins are endogenous opioid substances associated with many reproductive and non-reproductive functions. Massage is a systematic touch and manipulation of the body's soft tissues, and is used as an additional therapy to relieve stress and increase relaxation. Massage has been proven to be beneficial for pregnant and postpartum women who experience anxiety, depression, leg and back pain and has shown significant benefits in pain perception during labor.(19) They activate brain reward centers that motivate important behaviors and are involved in the immune, respiratory, and gastrointestinal systems. Stress, distress, and pain. B endorphins are released into the brain to restore homeostasis. In reproduction, β-endorphin levels are effective in the middle range, while lower levels have extreme supraphysiological effects or undesirable prolonged effects, namely inhibiting labor time and slowing labor. and in postpartum it can trigger postpartum blues.(11) Massage performed on postpartum mothers can increase relaxation, reduce pain and stress. Postpartum massage is effective in speeding up recovery and improving hormonal balance.(20)

Several previous studies have reported that massage (*massage*) has a stimulating effect on the central nervous system (CNS) and mood-elevating effects, causes relaxation, and increases blood flow (21). Stimulation of the mother's back by massage stimulates the central nervous system to release β-endorphins. This occurs because of the body's response to receiving a response. Massage stimulates muscle relaxation to improve the quality of postpartum mothers' sleep. The average β-endorphin level in the treatment group was higher than that in the control group. The positive impact of increasing endorphins will make the mother more relaxed and fit in caring for her baby. The first week of birth is a critical period for the mother to quickly adapt to her environment. The new role of the mother requires support from the surrounding environment. The need for sleep during breastfeeding is important because breastfeeding takes a long time. The duration of breastfeeding makes the mother more easily tired.(22)

Table 3. Effect of PFF on postpartum women's β endorphin levels

β endorphin Level (ng/ml)	**Mean ±SD**		***P***
	PFF group (n=18)	**Control group (n=17)**	
Before	159±109	224±227	0.04
After	288±175	209±316	
Delta	135.4±161	38 ±239	

Note:
P= test mann whitney

Table 4. Effect of PFF on sleep quality of postpartum mothers

Sleep quality	**Mean ±SD**		***P***
	PFF group (n=18)	**Control group (n=17)**	
Before	13.8±4.2	10.4±6.2	0.009
After	10.6±4.9	10.1±6.3	
Delta	-3.2	-0.29± 1.8	

Note:
P= test mann whitney

Table 4 shows that there was a difference in the sleep quality of postpartum mothers between the treatment and control groups (P = 0.009). In this study, it was found that postpartum mothers after the massage intervention with PFF experienced an increase in sleep quality, as evidenced by a decrease in PSQI scores in the intervention group of 3.2, which was higher than that in the control group of 0.29. Previous research has shown that women with poor postpartum sleep quality are at risk of experiencing significant postpartum weight retention in response to excessive gestational weight gain. The likelihood of poor sleep quality is negatively associated with minutes of light activity per day and meeting physical activity guidelines.(23) Postpartum sleep disorders (a combination of sleep deprivation and sleep fragmentation) are bidirectionally related to mood disorders, including postpartum depression, which is a critical problem in the postpartum period.(24) Back massage is an effective method in which psychological relaxation can be provided to postpartum mothers at the beginning of the postpartum period. Studies have shown that back massage during the postpartum period increases physical and psychological relaxation in postpartum women. Another study showed that giving back massage to 60 mothers decreased the intensity of postpartum pain.(25) Another study reported that problems with sleep quality, sleep latency, sleep efficiency, and use of sleeping pills at 1 month postpartum are predicted to cause depressive symptoms at 3 months postpartum. Other studies have identified postpartum sleep latency and sleep efficiency as correlates of the occurrence of depressive symptoms.(26) A cohort study conducted on 399 postpartum mothers showed that more than 50% of postpartum mothers experienced poor sleep quality, and there was no clinical difference between sleep quality and physical activity throughout the day.(27) Research result shows that poor postpartum sleep quality is a risk factor for its occurrence postpartum depression. Mothers who experience postpartum depression will have the impact of not giving exclusive breast milk to their babies. Exclusive breastfeeding has important benefits for the growth and development of infants and toddlers. Exclusive breastfeeding was significantly related to the incidence of stunting in children under five years of age. Exclusive breastfeeding can increase the body's immunity, prevent infection, and provide nutrients for optimal growth and protection from the risk of chronic disease.(28)

Therefore, PFF intervention could be an alternative to improve sleep quality in the postnatal period. Studies that measure objective sleep suggest that sleep efficiency and sleep consolidation are more important than total sleep duration and mood improvement.(29) The husband's attitude and support play an important role in the continuity of providing exclusive breastfeeding.(30) The limitations of this research are the condition of the respondent when blood was drawn *pretest-posttest.* It is possible that there is fear and not wanting to experience pain when taking blood samples, which can affect the results of endorphin levels. The research sample was limited to the 20-35 years age group, and the reality in the field is that many mothers give birth under 20 years of age; therefore, data collection takes longer.

CONCLUSION

In this study, it was found that the mother's age was in the range of 20 to 35 years, and her education level was secondary school. The average β-endorphin level after treatment was higher than that in the control group. Likewise, sleep quality in the treatment group experienced a higher decline in scores than in the control group. There was an influence of PFF on β-endorphin levels and sleep quality of postpartum mothers with p value of 0.04 and 0.009. Postpartum mothers need to utilize the PFF method in an effort to provide comfort to the mother, so that the quality of sleep will be better and the mother's fitness will increase during the breastfeeding period. To increase the levels of b endorphins and the quality of sleep of postpartum mothers, we can promotive and educate people about the use of the PFF massage method. Health promotion is important for mothers during the postpartum period so that they can quickly adapt to the birth of their baby and their new role as mothers. Attitudes and support from family and husbands play an important role in ensuring that postpartum mothers can meet their own needs, such as good quality sleep, providing exclusive breastfeeding, and not experiencing postpartum blues.

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Conflict of Interest

The authors have no conflicts of interest to declare when completing and reporting research results.

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