

Effectiveness of Infant Massage on Strengthening Bonding and Improving Sleep Quality

Ainurrizma Tri Hartanti¹⁾, Harsono Salimo²⁾, Vitri Widyaningsih³⁾

¹⁾ Masters Program in Public Health, Universitas Sebelas Maret

²⁾ Department of Pediatrics, Dr. Moewardi Hospital, Surakarta

³⁾ Faculty of Medicine, Universitas Sebelas Maret

ABSTRACT

Background: Baby massage is the oldest and most popular touch therapy known to mankind, which is also the art of health care and treatment that has been practiced for centuries. This study aims to determine the effect of infant massage on bonding attachments between mother and baby and the quality of infant sleep.

Subjects and Method: This was experimental study with Randomized Controlled Trial (RCT) design conducted in five health centers in Ponorogo Regency, East Java in March to April 2019. The total sample was 120 mothers and infants aged 3 to 6 months divided between massage groups (treatment) and not massage (control) based on The dependent variable of this study was bonding attachment and sleep quality. The independent variable in this study was infant massage. Data collection was using questionnaires and checklists. This study used the Mann-Whitney test

Result: Infant massage effectively increased bonding attachment (effect size = 6.19; $p < 0.001$), increased infant sleep duration (effect size= 2.79, $p < 0.001$), decreases the number of baby awakened (effect size = -2.78; $p < 0.001$), decreased duration awakened (effect size= -0.80; $p = 0.001$),

Conclusion: Baby massage effectively increased bonding attachment and sleep duration, and effectively decreased the number of awakenings and the duration of awakening.

Keywords: baby massage, bonding attachment, sleep quality

Correspondence:

Ainurrizma Tri Hartanti, Public Health Postgraduate Program, Universitas Sebelas Maret. Jl. Ir. Sutami 36 A, Surakarta 57126, Central Java. Email: ainurrizma.th@yahoo.co.id. Mobile: 085784939555

BACKGROUND

Sleep is a top priority for babies, because at this time, neuro-brain repair occurs and approximately 75% of growth hormone is produced. When sleeping, the baby's brain will develop and reach its peak because the body will produce more growth hormone than when the baby is awake. In addition, in the first year the baby's brain will grow 3 times from the state of birth or about 80% of the adult brain (Ifalahma and Sulistiyanti, 2016). Therefore, babies who sleep longer will achieve optimal growth and development and allow the body to repair and renew all cells in the body (Kusumastuti et al.,

2016). Baby sleep quality not only affects physical development, but also its attitude the next day (Dewi et al., 2014). Sleep also has a great effect on the body's mental, emotional, physical and immune systems (Ifalahma and Sulistiyanti, 2016).

A lot of babies have sleep problems in Indonesia, which is around 44.2%. However, almost or even more than 72% of parents do not consider sleep disorders in infants as a problem. Although it was considered a problem, they only considered it as a small problem. In fact, sleep problems can disrupt a baby's growth, cause vulnerable immune functions, and disrupt the re-

gulation of the endocrine system (Permata, 2017).

A study by Martini (2014) stated that 51.3% of babies experiences sleep disturbances, 42% sleep times less than 9 hours a night, wake up more than three times a night and wake up at night more than one hour.

Besides sleeping problems, babies also still need an adaptation process to the extrauterine environment. One way to strengthen the adaptation process of newborn babies is to strengthen bonding attachments. Bonding attachment through maternal love is a unique connection that develops between mother and baby and becomes permanent over time. Attachments between mother and baby can start from the time of pregnancy, childbirth, and postpartum period. The loving attachment of mother to baby is one of the most important factors in the development and growth of healthy children (Çinar and Öztürk, 2014).

Mothers should get sufficient knowledge about the importance of bonding attachments between mothers and babies so that the needs of these bonding attachments are fulfilled for infant growth and development (Ethicasari, 2012).

The achievement of optimal growth and development results required stimulation and development of child development in a comprehensive and quality manner carried out during the critical period, which was since the womb until the age of 2 years old. This stimulation activity was carried out as early as possible from the womb until the age of 2 years old as proclaimed by the Government of Indonesia through the "First Thousand Days of Life" program (Ministry of Health, 2017).

Currently, various therapies have been developed, both pharmacological and non-pharmacological therapies. One of the

non-pharmacological therapies to overcome the problem of infant sleep is baby massage (Hikmah, 2010). One form of stimulation that can be given is massage stimulation. Baby massage is one of the efforts made by parents as part of fulfilling children's basic needs. By doing massage stimulation it is hoped that it can improve the quality of life so that optimal child growth is achieved and can strengthen the bonding between parents and children as an expression of love through touch. Parents are expected to be able to carry out massage activities for children at home so that they can support the program of Healthy Indonesia efforts by promoting promotive and preventive efforts with community empowerment (Ministry of Health, 2017).

Baby massage was a useful tool to improve maternal skills in interacting with infants (Gnazzo et al., 2015). The definition of massage intervention is a manual application mainly by the mother's hands of certain techniques in structures located within the soft tissues of the skin, fascia, muscles, ligaments, blood vessels, and tendons (Zhang and Wang, 2019). Baby massage is a relatively easy intervention that has a positive effect on babies and their parents. Neonatal nurses who get baby massage training can teach parents the technique of doing baby massage as a way to build bonds between parents and their babies and parents can participate in their baby's care (Pados and McGlothen-Bell, 2019).

Soft touch on the baby is a beautiful means of bonding between the baby and parents (Roesli, 2016). Many experts who have proven that baby massage done by parents (especially mothers) can provide many benefits such as weight and length, sleep better, elimination and reduction in colic, better physiological and behavioral responses (Dalili et al., 2016; Wahyuni et al., 2018).

Massage has a positive effect on mother-baby interactions, improves the quality of baby's sleep, reduces baby's crying, lowers bilirubin levels, increases the frequency of defecation in the neonate, encourages interactions between mother and baby, decreases their crying, and increases mother-baby interaction (Gürol and Polat, 2012; Serrano et al., 2010; Chen et al., 2011; Lin et al., 2015).

Baby massage can also increase the development of high-risk postnatal babies, such as premature newborns or children who are exposed to HIV, increasing physical growth and digestive function in premature babies. Baby massage can also increase the production of breast milk, can develop communication, and understand baby cues (Sari et al., 2013; Porreca et al., 2017; Choi et al., 2015).

SUBJECTS AND METHOD

1. Study Design

This was an experimental study with a Randomized Controlled Trial (RCT) design conducted in five health centers in Ponorogo Regency, East Java in March to April 2019.

2. Population and Sample

The populations of this study were all mothers and infants aged 3 to 6 months in five health centers in Ponorogo District, East Java. The Puskesmas were North Ponorogo, South Ponorogo, Babadan, Sukorejo, and Kunti Health Center. A sample of 120 mothers and infants divided into 2 groups, namely 60 infants in the control group and 60 infants in the treatment group was selected by simple random sampling.

3. Study Variables

The independent variable in this study was infant massage. The dependent variables were bonding attachment and quality of infant sleep.

4. Operational Definition of Variables

Baby massage was a massage performed by mothers who have been given baby massage training twice for 15 minutes every day, mentoring by enumerators for the first 5-7 days, which is then carried out independently by the mother for 30 days.

Bonding attachment was a relationship of affection and attachment between parents and their babies.

The quality of a baby's sleep was a certain physiological condition that is obtained during a baby's sleep to restore body processes that occur when the baby wakes up. Rated for 30 consecutive days..

5. Study instrument

Bonding attachment was collected by Maternal Attachment Inventory (MAI) checklist. The quality of a baby's sleep was collected by Brief Infant Sleep Questionnaire (BISQ) questionnaire. Other data was collected using a set of questionnaire.

6. Data Analysis

Univariate analysis to describe the characteristics of each variable based on the results of the study. Bivariate analyses to determine the differences before and after the baby massage treatment using the Mann-Whitney test.

7. Research Ethics

Research ethics in this study include approval sheets, anonymity, confidentiality, and ethical feasibility. Ethical feasibility in this study came from the Health Research Ethics Committee of Dr. Hospital. Moewardi Surakarta with the number: 318/ III / HREC / 2019.

RESULTS

1. Univariate Analysis

The results of univariate analysis in this study were conducted to determine the characteristics of each study variable which included the age of the baby, age of the mother, bonding attachment, infant sleep du-

ration, number of awakenings, and duration of waking between massage groups and

non massage group, before and after treatment.

Table 1. The characteristics of sample (continuous data)

Variables	n	Mean	SD	Min	Max
Age of Infants (months old)	120	4.30	1.15	3	6
Maternal Age (years old)	120	31.75	5.02	20	45
Bonding attachment					
Before treatment					
Massage	60	88.15	2.20	84	95
Non massage	60	88.20	2.23	84	95
After treatment					
Massage	60	99.60	1.15	96	102
Non massage	60	88.80	2.18	86	94
Sleep duration					
Before treatment					
Massage	60	8.42	0.56	7	10
Non massage	60	8.38	0.48	8	10
After treatment					
Massage	60	9.21	0.15	9	9.6
Non massage	60	8.83	0.12	8.6	9.1
Number of awakenings					
Before treatment					
Massage	60	3.58	0.85	2	6
Non massage	60	3.52	0.81	2	5
After treatment					
Massage	60	2.13	0.34	2	3
Non massage	60	3.32	0.50	2	4
Duration of awakenings					
Before treatment					
Massage	60	41.08	19.42	10	90
Non massage	60	41.17	21.71	20	120
After treatment					
Massage	60	22.17	9.22	10	50
Non massage	60	34.33	19.53	15	90

2. Bivariate Analysis

Table 2. The Mann-Whitney test of the difference in bonding attachment scores in the massage group and non massage group, before and after treatment

Group	N	Mean	Median	SD	p
Before treatment					
Non massage	60	88.20	88.00	2.20	0.876
Massage	60	88.15	88.00	2.23	
After treatment					
Non massage	60	88.80	88.00	2.18	<0.001
Massage	60	99.60	100.00	1.15	
Effect Size = 3.56					

Based on Table 2, the Mann-Whitney test results showed a significant difference in the attachment bonding score in the massage group and non massage between

before and after the baby massage treatment. Baby massage effectively increased bonding attachments between mother and baby ($p < 0.001$; $d = 3.56$).

Table 3. The Mann-Whitney test of the difference in the duration of a baby's night sleep in the massage group and non massage, before and after treatment

Group	N	Mean	Median	SD	p
Before treatment					
Non massage	60	8.38	8.00	0.48	0.509
Massage	60	8.42	8.25	0.56	
After treatment					
Non massage	60	8.83	8.82	0.12	<0.001
Massage	60	9.21	9.17	0.15	
Effect Size = 2.79					

Based on Table 3, the Mann-Whitney test results showed that there were significant differences in the duration of the baby's night sleep in the massage group and non

massage between before and after the baby massage treatment. Baby massage effectively increased the duration of baby's sleep ($p < 0.001$; $d = 2.79$).

Table 4. The Mann-Whitney test of the difference in the number of awakenings in groups of massage and non massage, before and after treatment

Group	N	Mean	Median	SD	p
Before treatment					
Non massage	60	3.52	4.00	0.81	0.910
Massage	60	3.58	4.00	0.85	
After treatment					
Non massage	60	3.32	3.00	0.50	<0.001
Massage	60	2.13	2.00	0.34	
Effect Size = -2.78					

Based on Table 4, the Mann-Whitney test results showed that there were significant differences in the number of babies waking up in the massage group and non massage

between before and after the treatment of infant massage. Baby massage was effective in reducing the number of baby awakenings ($p < 0.001$; $d = 2.78$).

Table 5. The Mann-Whitney test of the different duration of awakening in the massage group and non massage, before and after treatment

Group	N	Mean	Median	SD	p
Before treatment					
Non massage	60	41.17	40.00	21.71	0.678
Massage	60	41.08	40.00	19.42	
After treatment					
Non massage	60	34.33	30.00	19.53	0.001
Massage	60	22.17	20.00	9.22	
Effect Size = -0.80					

Based on Table 5, the Mann-Whitney test results showed significant differences in the duration of awakening in the massage group and non massage between before and after the baby massage treatment. Baby massage effectively decreased the duration of baby awakenings ($p = 0.001$; $d = -0.80$).

DISCUSSION

1. The Effect of Baby Massage on Bonding Attachment

The results of this study showed that there were significant differences in bonding attachment scores in the massage group and non massage group between before and after the baby massage treatment and showed that infant massage was effective to in-

crease bonding attachments between mothers and infants ($d= 3.56$; $p<0.001$).

Engagement was a close and intimate relationship with people such as mothers, fathers, siblings, spouses, children and close friends. Parental attachment was defined as a series of inner behaviors that would make babies develop intimate relationships with their primary caregivers (Salehi et al., 2019).

Interaction between mother and baby was the first intrapersonal interaction of the baby and plays an important role in building trust. This has a major influence on infant language development, emotional regulation, and cognitive development. Meanwhile, children whose mothers regularly engage in quality interactions with them tend to show a high index of mental development at 2 years of age (Chung et al., 2018). The quality of the initial dyadic interaction between the primary caregiver and the baby was very important for the social and emotional, cognitive, language and brain development of the child (Parfitt et al., 2013). A responsive attitude on the part of mothers played an important role in developing strong and effective attachments between mother and baby (Lai et al., 2016).

Quality interaction behavior between mother and baby can facilitate the baby's social-emotional, behavioral and cognitive development which then occurred and was even related to the child's physical health. Babies need reciprocal interaction with parents to become interested in social interaction and develop secure attachment relationships in older age. Based on the quality of interactions between parents and babies, they would form an attachment style during the first year of life. The baby attachment model directed children's behavior in social relations in the future (Korja et al., 2012)

Prasetyono (2013) stated that touch is the first form of communication parents

have with babies. Touch on baby means talking. Baby massage combined aspects of closeness, namely eye contact, smiling, and other facial expressions. Regular baby massage twice a day can help parents to understand the baby's wishes through the sign language provided. Baby massage was one approach that made an important contribution to the psychological and physiological welfare of infants and mothers and helped to form harmonious relationships (Vicente et al., 2017).

This study was in accordance with the study of Lindensmith (2018) which showed the results that infant massage was effective in improving the relationship between mother and baby in mothers who experience post-partum anesthesia. Baby massage can increase attachment through a baby's touch. Maternal attitude to the baby, maternal sensitivity, and infant's response to the mother showed an increased score after a baby massage intervention. Oxytocin is a hormone that plays a key role in maternal behavior, which can therefore have an impact on mother-baby interactions. Massages given to the neonate by the mother every day can increase and maintain the emotional bond between mother and baby (Shoghi et al., 2018).

Mothers who did baby massage reported that they were able to adapt better and have a greater level of confidence in caring for their babies (Vicente et al., 2017). Other studies have found that mothers who massage their babies have a faster decline in symptoms of depression and lower stress (Holditch-Davis et al., 2013).

Another study conducted in Turkey by Gürol and Polat (2012) stated that baby massage increased the attachment between mother and baby. Massage can increase maternal care for babies, which in turn can increase positive interactions between mother and baby. Baby massage made inter-

action between mother and baby more active so that it can build emotional bonds between mother and baby (Lee, 2017). Massage the baby positively influenced the mother's mood. It showed that baby massage can increase the interaction between mother and baby for mothers with postpartum depression (Cooke, 2015).

2. The Effect of Baby Massage on Quality of Sleep

In this study, there were significant differences in the duration of sleep of infants in the massage group and non massage between before and after treatment ($d = 2.79$; $p < 0.001$).

The results of this study showed a significant difference in the number of infants in the massage and non-massage groups between before and after the baby massage treatment ($d = -2.78$, $p < 0.001$)

The results of this study showed a significant difference in the duration of waking in the massage group and non-massage group between before and after the baby massage treatment ($d = -0.80$; $p = 0.001$).

This study was in line with the study of Kusumastuti et al., (2016) based on Mann Whitney Test different tests on sleep quality showed that $p < 0.001$, it showed that babies who got massage have better sleep quality than babies who did not get massage.

Sleep disorders was one of the most difficult problems for parents and babies during the first months of life. Study from Israel documented an increase in sleep and

melatonin levels after 2 weeks of massage. Melatonin levels have an inverse relationship with eye movements. This showed that babies who were massaged would experience more restful/restorative sleep (Field, 2018).

Baby massage also enhanced the adjustment of the circadian rhythm in infant sleep to the nocturnal period of term infants (Field, 2017). Baby massage can reduce baby crying (Serrano et al., 2010)

Study of Bennett (2013) mentioned that babies did not wake up significantly in the massage group rather than the non-massage group after intervention. The duration of infant night awakening was far less in the massage group compared to the non-massage group. The non-massage group had an average duration of waking at night by 16 minutes longer after the intervention than the massage group.

Kulkarni et al. (2010) reported that infants born with gestational age less than 36 weeks with birth weight < 2.5 kg received massage until the age of 8 months old experienced improvement in sleep quality and a reduced number of awakenings. Babies were more active during the day and make babies sleep faster. Baby massage done for two weeks showed that sleep time became easier and babies experienced fewer waking nights (Mindell et al., 2018). Study done by Field (2017) reported that infants in the massage group had more regular sleep cycles than infants in the non massage group.

AUTHOR CONTRIBUTION

Ainurrizma Tri Hartanti, the main author, has role in collecting and processing the data. Harsono Salimo examined the framework of study concepts and methodologies. Vitri Widyaningsih reviewed study manuscript.

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This study used the authors' own fund.

CONFLICT OF INTEREST

The authors do not have any conflict of interest.

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