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RESEARCH ARTICLE

# Influence of Infant Massage on the Quality of Sleep of Infants Aged 0-6 Months in the Working Area of the North City Health Centre, Gorontalo City, Indonesia

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**ABSTRACT**

Sleep quality is a certain physiological state obtained when a person sleeps. The importance of sleep time in the development of infant growth and development, it is recommended that the quality and quantity of infant sleep must be fulfilled properly. One of the stimuli and stimulation that is recommended so that babies feel comfortable while sleeping is by doing baby massage can stimulate and optimize infant growth and development. This study used a quantitative research design method with a type of quasi experiment with a pre-test post-test research method of non-equivalent control group design, which is a design that provides a pretest before being subjected to treatment, as well as a posttest after being subjected to treatment in each group. This research was conducted in the work area of the North City Health Centre, Gorontalo City in October-November 2024. The sample in this study were 56 infants aged 0-6 months. The intervention sample was taken as many as 28 babies and the control sample was taken as many as 28 babies. The study showed that at the beginning of the assessment of sleep quality before the massage intervention and after the massage intervention, the Mcnemar test value was $p<0.000$, meaning that there was a significant effect on the quality of infant sleep before and after infant massage. In the nutritional status variable, the Mcnemar test value is $p<0.043$, meaning that good nutritional status affects the quality of infant sleep and in the variable type of breastfeeding with sleep quality, the Mcnemar test value is $p>0.152$, meaning that there is no effect of breastfeeding type on the quality of infant sleep. Furthermore, Binary Logistic Regression test was conducted to see which variable is the most dominant, the results obtained that the most influential variable on the quality of infant sleep is infant massage with an odd ratio value (OR = 8.783) compared to nutritional status (OR = 0.313) and type of breastfeeding (OR = 2.093). Based on the results of this study, it can be concluded that there is a significant effect on the quality of infant sleep before and after infant massage and the variable that has the most effect on the quality of infant sleep is infant massage compared to nutritional status and type of breastfeeding.

## INTRODUCTION

Good sleep quality is seen by the number of hours a baby sleeps enough, the baby can fall asleep easily at night, when waking up the body becomes fit and not fussy. One way that can be used to fulfil these needs is with baby massage. [1. Infant massage is an external stimulation including health art

therapy that has been practised for hundreds of years in the form of smooth strokes through *soft and gentle massage* stimulation on the surface of the baby's skin. [2] Currently, massage techniques have been widely used for health which can provide positive benefits, especially the improvement of infant sleep quality. [3].

Infancy is a golden and critical period in a person's development. Every baby has potential that must be developed as a basis for growth and development both physically, psychologically and socially in preparation for the next period. [4]. Infant health is very sensitive to the surrounding environment to support the growth and development process. [5]. According to WHO, complex problems that often affect infant health include sleep disorders (81%). [6]. Unicef (2020) states that 63% of infants in Indonesia face sleep quality problems caused by fatigue and improper parenting in putting children to sleep. [2]. The quality of infant sleep is a satisfaction with sleep that can easily initiate sleep and maintain sleep, the quality of sleep itself is described by looking at the length of sleep time, soundness during sleep, and feeling refreshed when waking up, while sleep quality can also affect the overall health of the baby. [7]. As supported by research [3] which states that one of the factors that affect the growth and development of infants is the fulfilment of sleep needs. One of the stimuli for brain development is the adequacy and quality of sleep. When the baby sleeps, growth hormone will be released from the body about 75%, because when the baby is asleep, the cell renewal process will be faster than when he wakes up. [8].

In the first year of birth, a baby's brain will grow three times its size after birth. Sleep disturbance in infants is a problem because it can affect the emotions and comfort of the baby. If the baby feels comfortable, the physical and emotional growth will be good and the baby is calmer. [2]. However, according to [9] > 72% of parents do not consider infant sleep disturbances as a problem in infant development, even though sleep problems can interfere with infant growth, weaken immune function, disrupt endocrine system regulation and interfere with weight gain. According to the World Healthy Organisation (WHO) 2022 in [6] one of the stimulation and stimulation that is recommended for babies to feel comfortable is baby massage. Baby massage can maintain health and is able to stimulate and optimise baby's growth and development.

Indonesia addresses the needs of children under a framework of commitments and planning systems designed to protect the interests and rights of children. The government in this case has given attention to infants through the role of midwives as stated in the Decree of the Minister of Health of the Republic of Indonesia Number 369 / MENKES / SK / III / 2007 concerning Professional Standards for Midwives stating that midwives have the authority to carry out monitoring and stimulate the growth and development of infants and children. One form of growth and development stimulation that has been done is baby massage (Kepmenkes RI, 2007) in [5].

The importance of sleep during the development of infant growth and development, the quality and quantity of sleep in infants must be fulfilled so as not to adversely affect their development. Sleep quality is a certain quality or physiological state obtained when a person sleeps, restoring processes in the body that occur when a person wakes up from sleep. If the quality of sleep is good, the physiology of the body in brain cells, for example, recovers back to normal when a person wakes up. Good sleep quality is seen by the number of hours a baby sleeps enough, the baby can fall asleep easily at night, when waking up the body becomes fit and not fussy. One way that can be used to fulfil these needs is with baby massage. [1].

A preliminary study conducted by researchers at the North City Health Centre in Gorontalo City found 128 infants aged 0-6 months. Based on the results of random interviews with 10 mothers who have babies, 70% of respondents do not know about massage and 30% of respondents know about baby massage. Then 100% of respondents have never done baby massage.

## METHODS

**Research design:** This study uses a quantitative research design method with a type of quasi experiment with a pre-test post-test research method of non-equivalent control group design.

**Population and research samples:** The population in this study were all babies aged 0-6 months in the working area of the North City Health Centre, Gorontalo City, which amounted to 128 babies. After calculating the sample, the sample size was 56 babies. The intervention sample was taken as

many as 28 babies and the control sample was taken as many as 28 babies.

The sampling technique is *purpose sampling*.

**Data analysis:** Data analysis began with univariate analysis in the form of descriptive tests including the characteristics of respondents before and after the intervention. Then bivariate analysis was carried out using the *Mc Namer* method as a requirement for nonparametric analysis which has a 95% confidence level with a significance level (α) of 0.05. and continued with multivariate analysis using the *binary logistic regression* test to analyse what factors were most influential on the quality of infant sleep.

## RESULTS AND DISCUSSION

### Respondent characteristics

**Table 1: Characteristics of Infants aged 0-6 months in the working area Puskesmas Kota Utara Gorontalo City**

| Characteristics Infants 0-6 months | Group Intervention | | Group Control | | Total | | *p-value* |
|---|---|---|---|---|---|---|---|
| | n | f | n | f | n | f | |
| **Gender** | | | | | | | |
| **Male** | 13 | 23.2% | 10 | 17.9% | 23 | 41.1% | 0.587 |
| **Female** | 15 | 26.8% | 18 | 32.1% | 33 | 58.9% | |
| **Age of baby** | | | | | | | |
| **0-3 months** | 15 | 26.8% | 14 | 25.0% | 29 | 51.8% | 1.000 |
| **4-6 months** | 13 | 23.2% | 14 | 25.0% | 27 | 48,2% | |
| **Body Weight (Kg))** | | | | | | | |
| **2-5 Kg** | 13 | 23.2% | 8 | 14.3% | 21 | 37.5% | 0.269 |
| **>5 Kg** | 15 | 26.8% | 20 | 35.7% | 35 | 62.5% | |
| **Body Length (cm)** | | | | | | | |
| **50-60 cm** | 16 | 28.6% | 19 | 33.9% | 35 | 62.5% | 0.582 |
| **61-70 cm** | 12 | 21.4% | 9 | 16.1% | 21 | 37.5% | |
| **Nutritional Status** | | | | | | | |
| **Good Nutrition** | | | | | | | |
| **(-2 SD sd +1 SD)** | 20 | 35.75% | 24 | 42.9% | 44 | 78.6% | 0.329 |
| **Undernourished** | | | | | | | |
| **(-3 SD sd <-2 SD** | 8 | 14.3% | 4 | 7.1 % | 12 | 21.4% | |
| **Types of Breastfeeding** | | | | | | | |
| **Breast Milk** | 21 | 37.5% | 19 | 33.9% | 40 | 71.4% | 0.768 |
| **Formula Milk** | 7 | 12.5% | 9 | 16.1% | 16 | 28.6% | |
| Total | 28 | 50% | 28 | 50% | 56 | 100% | |

**Primary data 2024 *Chi Square test*

Table 1. shows that of the 56 respondents who were used as samples, in the intervention group and control group the dominant female respondents were 33 people (58.9%), for the dominant age of 0-3 months as many as 29 people (51.8%), the dominant body weight was those who weighed >5 kg as many as 35 people (62.5%), the dominant body length was 35 people (62.5%) and the dominant nutritional status was good nutrition as many as 44 people (78.6%) and for the type of breastfeeding the dominant breastfeeding was 40 people (71.4%).

Based on analysis using the *chi square test* obtained for the gender group p=0.587>0.05. While in the age group the value of p = 0.000> 0.05, for the weight group the value of p = 0.269> 0.05, in the length of the body the value of p = 0.582> 0.05, while in the nutritional status the value of p = 0.329> 0.05 as well as in the type of breastfeeding group the value of p = 0.768> 0.05. Thus, the six variables of respondent characteristics have no influence between the intervention group and the control group.

### Effect of infant massage on sleep quality before and after the intervention

**Table 2: Effect of infant massage on sleep quality before and after intervention**

| | Post Sleep quality | Total | *p-value* |
|---|---|---|---|

| | | Good | Less | | |
|---|---|---|---|---|---|
| **Pre sleep quality** | Good | 9 (16.1%) | 1 (1.8%) | 10 (17.9%) | <0.000 |
| | Less | 23 (41.1%) | 23 (41.1%) | 46 (82.1%) | |
| **Total** | | 31 (57.1%) | 24 (42.9%) | 56 (100%) | |

Source: Primary Data 2024 **McNamer test*

Based on table 2. shows that at the beginning of the assessment of sleep quality before massage intervention and after massage intervention, the *McNemar* test value is p=0.000 <0.05, statistically there is a significant effect on the quality of infant sleep before and after infant massage.

## Influence of nutritional status on infant sleep quality

**Table 3: Effect of nutritional status on infant sleep quality**

| | | Sleep quality | | total | *p-value* |
|---|---|---|---|---|---|
| | | Good | Less | | |
| **Nutritional Status** | Good (-2 SD sd + 2 SD) | 23 (41.1%) | 21 (37.5%) | 44 (78.6%) | <0.043 |
| | Less (-3 sd < -2 SD) | 9 (16.1%) | 3 (5.4%) | 12 (21.4%) | |
| **Total** | | 32 (57.1%) | 24 (42.9%) | 56 (100%) | |

Source: Primary data 2024 **McNamer test*

Based on table 3. shows that good nutritional status with good sleep quality is 23 babies (41.1%) and poor nutritional status with poor sleep quality is 3 (5.4%). The *McNemar* test value is p=0.043 <0.05, meaning that good nutritional status affects the quality of infant sleep.

## Influence of breastfeeding type on infant sleep quality

**Table 4: Effect of breastfeeding type on infant sleep quality**

| | | Sleep quality | | Total | *p-value* |
|---|---|---|---|---|---|
| | | Good | Less | | |
| **Types of Breastfeeding** | Breast Milk | 24 (42.9%) | 16 (28.6%) | 40 (71.4%) | >0.152 |
| | Formula Milk | 8 (14.3%) | 8 (14.3%) | 16 (28.6%) | |
| **Total** | | 32 (57.1%) | 24 (42.9%) | 56 (100%) | |

Source: Primary data 2024 **McNamer test*

Table 4 shows that the type of breastfeeding with good sleep quality is 24 (42.9%) and the type of breastfeeding with poor quality is 8 babies (14.3%). The *McNemar* test value found that p=0.152 or >0.05, meaning that there is no effect of breastfeeding type on the quality of infant sleep.

Thus, based on the results of *McNemar*'s analysis in table 2, the *p* value = 0.000, table 3, the *p* value = 0.043 and table 4, the p value = 0.152, meaning that the three *Mcnamer* p values are more than <0.25, so the *Binary Logistic Regression* test was carried out to see the most dominant variable in infant sleep quality.

## Binary logistic regression mutivariate results

**Table 5: Results of binary logistic regression mutivariate analysis of infant massage, nutrition staus and breastfeeding type**

| | Coefficient | S.E | Wald | df | *p-value* | OR | CI (95%) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Min | Max |
| **Baby massage** | 2.173 | 0.648 | 11.226 | 1 | 0.001 | 8.783 | 2.464 | 31.305 |
| **Nutritional Status** | -1.160 | 0.984 | 1.390 | 1 | 0.238 | 0.313 | 0.046 | 2.157 |
| **Types of Breastfeeding** | 0.738 | 0.797 | 0.859 | 1 | 0.354 | 2.093 | 0.439 | 9.977 |
| **Constant** | -.276 | 0.839 | 0.108 | 1 | 0.742 | 0.759 | | |

Source: Primary data 2024 **binary logistic regression test*

Table 5 shows that the most dominant variable on sleep quality is infant massage, where the strength of *the odd ratio* value is OR = 8.783 with a 95% confidence interval (CI) (min = 2.464 mak = 31.305).

As for nutritional status, the OR value is 0.313 with a 95% confidence interval (CI) (min = 0.046 mak = 2.157) and the type of breastfeeding, the OR value is 2.093 with a 95% confidence interval (CI) (min = 0.439 mak = 9.977), meaning that nutritional status and type of breastfeeding do not significantly affect the quality of infant sleep.

Babies are the golden period, a time when the physical and brain are experiencing growth and development that must receive special attention from an early age. Sa one factor that can affect baby's growth and development is sleep. So sleeping with enough time is highly recommended for babies because it can affect the quality of baby's sleep. Good baby sleep quality can be recommended by doing baby massage. [10]. According to modern research, regular infant massage will help the baby's physical and emotional growth and development, in addition to maintaining their health. The benefits of infant massage are not only felt by the baby, but also by the mother. [11].

This research was supported by Sri Wahyuni et al in 2020 that there was a significant effect of giving baby massage on the quantity of sleep of infants aged 3-6 months at the Tirawuta Health Centre, East Kolaka Regency. [12]. The results of other studies also show that there is an effect of infant massage on the quality of infant sleep with a *p value of* 0.000. This shows a significant difference before and after the baby is massaged and there are other benefits felt including after the baby is massaged the baby is fit when waking up, not fussy, improves the quality of baby sleep, helps the baby's growth and development process, increases the bond of affection and increases knowledge to the baby's mother so that she can do baby massage to the baby [10]. [10]. Massage stimulates muscles and makes babies feel comfortable and sleepy. Most babies sleep for a long time after a massage. In addition to sleeping for a long time, the baby will also sleep soundly. This indicates that the baby is calmer after the massage. This is why mothers do baby massage. [13]

Other results showed that before giving baby massage, the highest frequency of sleep quality was poor, namely 22 babies (73.3%) and the lowest was good sleep quality, namely no babies with good sleep quality (0%). After giving baby massage, almost all 28 babies (93.3%) were found with good sleep quality and as many as 2 babies (6.7%) with moderate sleep quality. From the results of the *Paired T Test test, the* p value = 0.000 <0.05, which means that there is an effectiveness of giving baby massage to the quality of sleep of infants aged 5-6 months.[14].

Baby massage treatment is proven to have an effect on the quality of infant sleep both before and after treatment, *baby* massage has an impact on increasing the quality of infant sleep. Baby massage will make babies sleep more soundly and increase alertness or concentration. This is because massage can change brain waves[15]. This change occurs by decreasing alpha waves and increasing beta and tetha waves, which can be proven by the use of EEG (electro encephalogram) (Roesli, 2016) in [16]

Babies who are massaged will be able to sleep soundly, while when they wake up, their concentration will be fuller because infant massage is one of the non-pharmacological therapies that can overcome problems in infant sleep (Anggraini & Sari, 2020) in [17]. This baby massage is given in order to provide stimulation to the nervous system and also the respiratory system and improve blood circulation. Massage can provide stimulation to hormones in the body, which can affect the body's work system such as sleep patterns and can help babies who have difficulty sleeping soundly. [2]. In addition, infant massage can stimulate the secretion of serotonin in the hypothalamus which encourages the secretion of growth hormone, increases endurance, helps children focus, improves their sleep quality, improves parent-child bonding. [5]. Infant massage is needed to provide comfort to babies, so babies who are often massaged for 15 minutes have the opportunity to have better sleep quality than those who do not get infant massage. [18].

Infants who had frequent night wakings at 6 months of age were more likely to have frequent night wakings at 12 months of age (OR = 2.2; 95% CI: 1.6, 2.9). Sleep is common among infants in Nepal, and very few mothers reported sleep problems in their infants. Infants aged 6 and 12 months had similar patterns for both sleep duration and night wakings. For infants, there is an increased likelihood of having similar sleep duration and night wakings at 6 and 12 months of age. [19].

Another study showed an improvement in the quality of infant sleep after being given infant massage, poor sleep quality in infants will cause low endurance, children are more easily fussy and cry and can

interfere with the growth and development of the baby. [16].

Infant massage is more influential on infant sleep quality compared to nutritional status and type of breastfeeding, as evidenced by research in [17] massage can provide stimulation for the release of endorphin hormones which have an impact on reducing pain levels. This makes the baby feel calmer and the frequency of crying decreases. Thus massage also improves the quality and quantity of infant sleep. Babies who are massaged for more than 15 minutes will be more relaxed and sleep better, their growth and development will also improve. With massage there is also an increase in the release of serotonin levels which results in an increase in the quality of infant sleep more optimally, serotonim has the content of the main transmitter substance that helps the formation of sleep by suppressing the activity of the activating system and other brain activities. The positive influence of touch on the process of child development has long been recognised by humans. The skin is an organ of the human body that functions as the widest receptor that humans have. Touch sensation is a sense that is actively functioning from an early age. [10]. Poor sleep quality in infants will cause low endurance, children are more easily fussy and cry and can interfere with the growth and development of the baby [16]. [16]. Therefore, it is important for the quality and quantity of infant sleep to be maintained to be optimal. Assessment of sleep quality in infants can be seen from whether or not the baby wakes up frequently in one sleep cycle. Through infant massage, the quality and quantity of infant sleep improves [20].

## CONCLUSIONS

a. There is an effect of infant massage on the sleep quality of infants aged 0-6 months.
b. The most influential variable on infant sleep quality was infant massage with an *odds ratio* (OR=8.783) compared to nutritional status (OR=0.313) and type of breastfeeding (OR=2.093).

The suggestions given are:

### For institutions

a. The Health Center should educate parents about the importance of baby massage on the quality of infant sleep because baby massage can be done by parents at home.
b. The results of this study can be a reference for health workers as one of the development of midwifery care and standard operating procedures (SOP) for performing infant massage that can improve the quality of infant sleep.

### For further researchers

a. Further research needs to be done using a large sample size.
b. It is expected to further develop research related to baby massage for parents of infants

**Author contribution's:** RRN was involved in the concept and planning of the study, SA and ANU performed the data acquisition/collection, RRN and ANU calculated the experimental data and performed the analyses, RRN drafted the manuscript and designed the figures, MA and YS, ARE, KK, WN interpreted the results. All authors participated in critical revision of the manuscript.

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