# The Effects of Murotal Stimulation on the Waking States and Body Weight of Premature and Low Birth Weight Infants

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*Abstract*— **Low birth weight babies (LBW) are newborns whose weight at birth is less than 2,500 grams. LBW does not only occur to premature babies, but also to full term infants who experience growth barriers during pregnancy. The impact of LBW itself is very serious for the quality of future generations. Long-term problems that might occur as a result of LBW include growth disorder, vision disorder (retinopathy), hearing disorder, chronic lung disease, increased morbidity, frequent congenital abnormalities, and frequent hospital admission. The purpose of this study was to analyze the differences in the effects of murotal (Al-Qur'an recital) stimulation on waking states and body weight in premature and LBW infants at PKU Muhammadiyah Hospital in Yogyakarta. The type of the research was quantitative with Pre-Test and Test Control Group Design. To enhance the research, the results of the impact / outcome of the care of premature and LBW infants in PKU Muhammadiyah Hospital Yogyakarta were described. The findings of this study revealed that murotal stimulation is able to improve the waking states of babies, reduce anxiety / stress in infants, increase body weight faster, reduce baby's hospital stay period, and reduce the expenses incurred by the family to care for the baby.**

*Keywords:  murotal stimulation, waking status, body weight on premature baby, low baby weight*

## I. INTRODUCTION

Child health care is essential in preparing healthy, intelligent, and quality future generations. It is also expected to reduce child mortality. According to Indonesia Demographic and Health Survey (SDKI) in 2012, the NMR in Indonesia was 19 per 1,000 live births in 2012. The number was the same as NMR in 2007 according to the data obtained from SDKI and only dropped 1 point compared to SDKI data in 2002-2003, which was 20 per 1,000 live births [1].

Infant body weight is the body weight measured within the period of one hour after birth. LBW are newborns whose weight at birth is less than 2,500 grams. LBW does not only occur to premature babies, but also to full term infants who experience growth barriers during pregnancy. According to Health Office of D. I. Yogyakarta (2012), The main cause of infant deaths was LBW and asphyxiation with the number of live births at 45,796 and the number of underweight newborns at 44,896. The number of LBW cases in 2012 in 4 districts 8 in D. I. Yogyakarta was 2,012 (4,48%) [2].

The impacts of LBW are very serious for future generations. Long-term problems that may happen due to LBW include growth disorder, vision disorder, (retinopathy), hearing disorder, chronic lung disease, increased morbidity, higher frequency of congenital abnormalities, and hospital admission. The direct complications that occur to LBW infants are hypothermia, fluid and electrolyte disorder, hyperbilirubinemia, intraventricular apnea of prematurity hemorrhage syndrome, and anemia (Depkes RI, 2008).

## II. METHOD

The type of the research was quantitative enhanced by qualitative data [3]. This study aimed to describe a phenomenon that happened in a certain population and could also be generally used to assess the condition and organization of a program at present time and to design a plan for the improvement of the program [4].

The quantitative research design for the study was Pre-Test and Test Control Group Design. The design was used to find the cause and effect of the control group and experimental group. The research design is as follows:
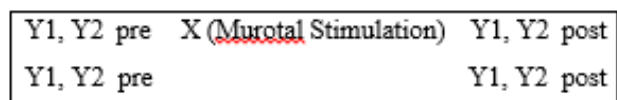


Fig 1. Research Design

Description:
Y1pre: The first observation of infant waking states (pre-test) in premature and LBW infant group
Y2pre: The second observation of body weight (pre-test) in premature and LBW infant group
X: Murotal stimulation treatment (intervention)
Y1post: The first observation of infant waking states (post-test) in premature and LBW infant group
Y2post: The second observation of body weight (post-test) in premature and LBW infant group

## III. RESULT

TABLE I. THE FREQUENCY DISTRIBUTION OF RESPONDENTS (MOTHER) BASED ON THE CHARACTERISTICS OF EDUCATION, PARITY, CHILDBIRTH METHOD, AND PREMATURITY HISTORY

| No | Respondent Characteristic | Frequency (f) | Percentage (%) |
|----|---------------------------|---------------|----------------|
| 1 | Mother Age | | |
| | < 20 years | 0 | 0% |
| | 20-35 year | 4 | 100% |
| | >35 year | 0 | 0% |
| 2 | Education | | |
| | - Junior High School | 2 | 50% |
| | - Senior High School | 1 | 25% |
| | - Higher Education | 1 | 25% |
| 3 | Parity | | |
| | - Primipara | 3 | 75% |
| | - Multipara | 1 | 25% |
| 4 | Childbirth Method | | |
| | - SC | 1 | 25% |
| | - Normal Spontaneous | 3 | 75% |
| 5 | Prematurity History | | |
| | - Ever | 0 | 0% |
| | - Never | 4 | 100% |

Table 1 shows that most respondents were in the productive age group. 4 people were 35 years old (100%). There was not any respondent who was below 20 or over 35 years old. In terms of education, the level of respondents' education included junior high school, senior high school, and higher education. Most respondents were junior high school graduates with a total of 2 people (50%). There was one respondent who was a senior high school graduate (25%) and one respondent who graduated from higher education institution (25%).

The parity was divided into two categories, i. e. primipara and multipara. From Table 1, 3 respondents (75%) gave birth for the first time or were categorized as primipara. There was one respondent (25%) who was categorized as multipara. The childbirth method was categorized into sectio caesarea (SC) and spontaneous. 3 respondents (75%) gave birth normally, and one respondent (25%) gave birth through sectio caesarea (SC). From Table 1, we can see that all respondents (100%) did not have a history of premature birth.

TABLE II. THE FREQUENCY DISTRIBUTION OF RESPONDENTS (INFANT) BASED ON THE CHARACTERISTICS OF GESTATIONAL AGE AND BODY WEIGHT

| No | Respondent Characteristic | Frequency (f) | Percentage (%) |
|----|---------------------------|---------------|----------------|
| 1 | Gestational Age | | |
| | - < 37 weeks | 0 | 0% |
| | - > 37 weeks | 4 | 100% |
| 2 | Body Weight | | |
| | - < 1,500 grams | 0 | 0% |
| | - 1,500-2,000 | 0 | 0% |
| | - 2,000-2,500 | 4 | 100% |

We found that the gestational age of all respondents was less than 37 weeks. The range of the respondents' gestational age was between 34 weeks and 35 weeks. As shown in Table 2, all respondents weighed 2,000-2,500 grams. Inferential analysis result with Friedman test was used to test the difference between two or more mean scores from before and after the treatment. The results are presented in Table 3.

TABLE III. THE WAKING STATES OF INFANTS BEFORE AND AFTER BEING INTERVENED WITH MUROTAL IN RS PKU MUHAMMADIYAH OF YOGYAKARTA

| Waking Status | Day 1 Intervention 1 | Day 1 Intervention 2 | Day 2 Intervention 1 | Day 2 Intervention 2 | Day 3 Intervention 1 | Day 3 Intervention 2 |
|---------------|---------|---------|---------|---------|---------|---------|
| Deep Sleep | 2 (50%) | 4 (100%) | | 3 (75%) | 3 (75%) | 3 (75%) |
| Light Sleep | 2 (50%) | | 4 (100%) | 1 (25%) | | 1 (25%) |
| Drowsiness | | | | | 1 (25%) | |
| Quiet Alert | | | | | | |
| Active Alert | | | | | | |
| Crying | | | | | | |
| Total respondents | 4 (100%) | 4 (100%) | 4 (100%) | 4 (100%) | 4 (100%) | 4 (100%) |
| Chi Square | 4.000 | | | | | |
| Asymp. sig | 0.046 | | | | | |

| Waking Status | Day 4 Intervention 1 | Day 4 Intervention 2 | Day 5 Intervention 1 | Day 5 Intervention 1 | Day 6 Intervention 2 | Day 6 Intervention 1 |
|---------------|---------|---------|---------|---------|---------|---------|
| Deep Sleep | 2 (50%) | 4 (100%) | 3 (75%) | 2 (50%) | 4 (100%) | 3 (75%) |
| Light Sleep | 2 (50%) | | | 2 (50%) | | |
| Drowsiness | | | 1 (25%) | | | 1 (25%) |
| Quiet Alert | | | | | | |
| Active Alert | | | | | | |
| Crying | | | | | | |
| Total respondents | 4 (100%) | 4 (100%) | 4 (100%) | 4 (100%) | 4 (100%) | 4 (100%) |
| Chi Square | 4.000 | | | | | |
| Asymp. sig | 0.046 | | | | | |

Table 3 shows the waking states of infants before and after intervention. Generally, in the first intervention, from day one to day six, the infants had various sleeping phases, but they tended to get light sleep. However, in the second intervention, the infants gradually experienced deep sleep. On the first day, the waking states of the babies were varied. In the first intervention, the babies who had light sleep was 50%. In the second intervention, all babies could get deep sleep.

The waking states of the babies on the second day was still dominated by light sleep with 4 respondents (100%) for the first intervention. In the second intervention, 3 respondents (75%) could get deep sleep. On the third day, there were 3 respondents (75%) who experienced deep sleep for the first intervention and only 1 respondent (25%)

experienced drowsiness. On the fourth day, the four babies' waking states were varied. In the first intervention, there were 2 respondents (50%) who experienced light sleep. In the second intervention, all the babies could experience deep sleep.

On the fifth day, 3 respondents (75%) got light sleep and 1 respondent (25%) experienced drowsiness in the first intervention. In the second intervention, 100% or 4 respondents could get deep sleep. On the sixth day, all four babies (100%) could get deep sleep both in the first and second intervention. Table 3 suggests that the value of Chi Square = 4.000 and asymp sig. = 0.046. From Chi Square significance test, we obtained sig < 0.05. Thus, it can be concluded that there was a significant result from before and after the intervention was made.

## IV. DISCUSSION

There was a significant change on the waking states of infants with LBW during intervention. This was proven by the value of Chi Square = 4.000 and asymp sig. = 0.046, meaning that statistically there was a waking states difference on LBW babies before and after murotal. Before the intervention was administered, most babies either had light sleep or drowsiness. After the intervention was made, most babies, or even all babies on the sixth day, could get deep sleep.

Babies with optimum growth and development will be able to control the stimulus and change their various waking states. The majority of babies experience light sleep when they cannot be fast asleep. On this stage, the growth and development of LBW babies would not be optimum compared to full term babies who can spend most of their time getting deep sleep. Deep sleep is a sleep phase that facilitates optimum growth and development. Murotal influenced the waking states of a baby through hormonal change that lowered stress in babies. Murotal sound induced a sense of safety that lowered stress hormones. This condition helped babies to achieve deep sleep state.

The amount of sleeping time influences the behavior of baby. This is in line with a study conducted by Browne and Graven (2008) who found that the 2-3 sleeping cycle could help the growth and development of a baby [5]. On the observation conducted on the first through the fourth day, there were still many babies who experienced light sleep in the first intervention. According to Davis (2010), premature or LBW babies mostly experienced light sleep rather than deep sleep [6]. This was also shown on the second intervention where most babies experienced deep sleep. This result was similar to a study on Al-Qur'an recital therapy in a hospital, proving that it could reduce anxiety and speed up the healing process. According to Asrin, Mulidah, & Triyanto (2007), there was a significant effect on the heart rate and systolic and diastolic heart pressure, indicating that there was a relaxation in the physiological response when murotal treatment was administered [7]. This result is also in line with the study conducted by Cassidy (2009) who proved that premature babies who listened to music for 20 minutes

experienced a significant effect on the growth of head circumference and lower heart rate. Moreover, in a study by Eskandari, Keshavars, Ashayeri, Jahdi, & Hosseini (2012), premature babies who were exposed to Al-Qur'an Surah Yusuf recital through headphones for 20 minutes with a volume of 50-60 db showed significant improvement on respiratory level, oxygen saturation, and heart rate [8].

According to Upoyo, Ropi, & Sitoru (2012), Al-Qur'an murotal stimulation improved the GCS of ischemic stroke patients with a murotal duration of 30 minutes for 3 days [9]. In addition, Nani & Dewi (2012) stated that the collected data on the third day showed more significant result than that on the sixth day of the administration of Mozart music therapy.

The effects of Al-Quran recital therapy include: effect in blood circulation, heart rate, and blood level in skin. Beside the calming effect, reciting and letting babies listen to Al-Qur'an will generate love towards Allah SWT that will be beneficial for them when they grow up to be a moslem both in the world and the afterlife. When listening to correct recital of Al-Qur'an that is in accordance with tajwid and makhraj, the brain nerves in babies will be stimulated.

One of the functions of neuron is to control supporting life factos such as heart rate and respiration [10]. A study by Nurhayati according to Gusmiran (2005) in Hady, Wahyuni, & Purwaningsih (2012) that was presented in an Islamic counseling and psychotherapy seminar on the effects of Al-Qur'an recital in improving the IQ of a newborn baby showed that babies who were 48 hours old would directly show responses by smiling and becoming calmer after listening to Al-Qur'an recital [11].

## V. CONCLUSION

The treatment for babies with LBW needs to be developed and improved for more optimum baby growth. Premature and LBW baby care has helped decreasing the anxiety level and improve the waking states of babies. The effects/ outcomes of the premature and LBW baby care in PKU Muhammadiyah Hospital of Yogyakarta include improving the waking states of babies, reducing anxiety/ stress in babies, increasing baby body weight faster, reducing hospital stay period of a baby, and reducing the expenses incurred by the family for the baby treatment [12].

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