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THE EFFECT OF MOTHER VOICE TOWARD BABY WEIGHT AND DURATION OF DEEP SLEEP AMONG PREMATURE INFANT

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ABSTRACT
Prematurity is the primary cause of newborn mortality due to complications. Good sleep quality is essential to prevent delay development. Low sucking reflex will cause aspiration and effected to nutrition absorption. However, preterm baby experienced stress would influence birth weight and deep sleep. One of the non-pharmacological intervention is using mother voice. Objective. The purpose of this study was to determine to determine the effect of mother voice toward baby weight and duration of deep sleep among premature infant Methods: This research is a quasi-experiment with a two-group pre-test and post-test design approach using control and intervention groups. The instrument used in this study is form observation, weight digital record and mobile phone. Data analysis using Independent Sample T-Test Results: There is no statistically significant difference of demographic data between the two groups' intervention and control of preterm babies (p-value > 0.005). There is an increase of baby weight and the duration of deep sleep at two groups of intervention and control. There is statistical significant difference in post-test toward weight and deep sleep duration among two group (p-value = 0.00) Conclusion Nurses can enhance their quality and ability to administer developmental care for premature babies, particularly through music therapy, which includes mother's voice intervention.

Keywords: baby weight; deep sleep; mother voice premature infant

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INTRODUCTION

Prematurity is prevalent among babies admitted to the perinatal room (Hockenberry & Wilson, 2019). Prematurity is the primary cause of newborn mortality due to complications, contributing to 35% of neonatal deaths worldwide (WHO, 2021). The increasing prevalence of preterm birth represents a significant global health challenge, with rates ranging from 5% to 18% of all births internationally (WHO, 2022). In Indonesia, the premature birth rate remains high, fluctuating between 7% and 14%, and reaching up to 16% in certain regions (Wahyuni, N.S. 2022). Premature babies often have problems related to short- or long-term complications; therefore, they need as much nutritional support as possible (Manuaba, I.B, 2015). Premature babies' weight gain is influenced by providing adequate food. Especially in premature neonates there are still undeveloped sucking and swallowing reflexes, causing a lack of synchronization of these two reflexes and will puts premature babies at risk of aspiration (Kemenkes RI. (2014).

Sleep is the primary behavioral state in newborns and is essential for normal brain development during childhood, especially for memory and learning functions (Gogou, M., Haidopoulou, K., & Pavlou, E., 2019). The deep sleep stage in premature babies usually has a short duration due to the disturbing care environment, so the duration of time in the sleep stage is related to the environment that supports or disturbs rest (Levy, J, et al, 2017). The short duration of quiet sleep in premature babies is one of the challenges for nurses to be able to use non-pharmacological therapy as the main intervention in supporting the baby's sleep quality in getting longer periods of quiet sleep.

Premature babies are exposed to many stressors, including high levels of ambient noise, poor lighting, frequent medical procedures, and separation between mother and baby (Smith, 2011; Palazzi, A., Meschini, R., Dal Magro Medeiros, M., & Piccinini, C. A. (2020). To increase comfort and reduce stress in premature infants, interventions such as listening to music, white noise, and the mother's voice are options in this case (Akiyama, et al, 2021; Van der Heijden, M. J., et al, 2016). Mother's voice or a mother's voice has the same effect as music; positive effects of a mother's voice on premature babies, such as better weight gain, feeding behavior, increased sleep efficiency, stable vital signs, earlier discharge from the NICU, and reduced hearing loss in the cortex, have been reported in several studies (Bergman, H., et al. 2020; Filippa, M., et al, 2022; Provenzi, L., Broso, S., & Montirosso, R. (2018). Based on explanation above, this study aim was to determine the effect of mother voice toward baby weight and duration of deep sleep among premature infant

METHOD

This study employed a quasi-experimental approach with two groups: a control group and an intervention group. It utilized a pre-test and post-test design. Convenience sampling was applied. The study was conducted at one of the largest referral hospitals in Indonesia over a one-month period from February to July 2023. The inclusion criteria were premature babies with a gestational period of 32-36 weeks, birth weight between 100 and 2500 grams, hospitalization of at least one week, and stable condition without chronic diseases or other complications.A total of 26 premature babies, divided into two groups, agreed to participate. Instruments included observation forms to record weight and deep sleep duration daily, digital weight records, and a mobile phone for recording mother voice. The intervention lasted for 20 minutes, three times a day, for four days. Inform consent was obtained before data collection. Researcher gained data from observation at baby in supine position at incubator or at baby bed. Researcher record baby with mobile phone at 30 minutes every day. Data were analyzed using Independent T-Test. Ethical permission for this research was obtained from the Ethics Committee of the University of Muhammadiyah Jakarta (Approval Number: 0936/F.9-UMJ/VI/2023, June 28, 2023).

RESULTS

Table 1.
Demographic Characteristics of Preterm Baby (n= 36)

Variables	Intervention (n=18)	Control (n=18)	p-value
Gender			0.73
Boys	10 (55.55)	11 (61.11)	
Girls	8 (44.45)	7 (38.89)	
Age,days (Mean ± SD)	18.39 ± 5.54	22.3 ± 11.66	0.2
Weight (gram)	1487.67 ± 395.31	1439.67 ± 272.55	0.8
Gestasion (week)	34.06 ± 1.39	33.78 ± 1.39	0.55

Table 1 shows no statistically significant difference between the two groups' intervention and control of preterm babies (p-value > 0.005). The population of boys is higher (n: 10, 55.55) percentage compared to girls in both groups. The mean age of respondents is older in the control group (22.3 ± 11.66) and birth weight is heavier (1439.67 ± 272.55). However, from gestation period in the control group (33.78 ± 1.39) is younger rather in the intervention group (34.06 ± 1.39)

Table 2.
The difference in weight and duration of deep sleep among intervention and control

Variables	Intervention		Control	
	Mean ± SD	Min-Max	Mean ± SD	Min-Max
Weight (gram)				
Pre-test	1599 ± 299.14	1146 - 2282	1521.39 ± 264.52	1162 - 1999
Post-test	2071.78 ± 240.73	1738 - 2651	1681 ± 253.23	1450 - 2073
Deep Sleep (Minutes)				
Pre-test	12.72 ± 2.92	9 - 19	12.5 ± 2.33	7 - 16
Post-test	22.28 ± 5.87	11 - 30	13.78 ± 4.52	7 - 22

Table 3.
The Effect of Mother Voice Toward Weight and Duration of Deep Sleep

Variables	Mean Difference	T-Test	95% CI	p-value
Weight (gram)				
Pre-test	-77.61	- 0.82	-268.88 - 113.66	0.42
Post-test	-390.78	- 4.75	-558.14 – (-223.42)	0.00*
Deep Sleep Duration (minutes)				
Pre-test	- 0.22	- 0.25	-2.01 - 1.57)	0.8
Post-test	- 8.5	- 4.87	- 12.04 – (-4.94	0.00*

Table 2 shows that there is an increase of baby weight and the duration of deep sleep at two groups of intervention and control. However, the heaviest weight of preterm baby is in the intervention group (2071.78 gram ± 240.73) and longest deep sleep duration after post test (22.28 minutes ± 5.87). From Independent T-Test analysis in Table 3, there is statistical significant difference in post-test toward weight and deep sleep duration among two group (p-value = 0.00)

DISCUSSION

Most premature babies are more susceptible to health problems than girls (Verburg, P. E et al, 2016). Boys are 24% more likely to be born at 30-33 weeks and have a 17% higher risk of being born between 34 and 36 weeks. This means that boys tend to be at risk of being born prematurely. Birth weight greatly influences long-term growth and development. Premature babies have the potential to experience neurological disorders, which can result in impaired growth and development (Borah & Baruah, 2014). Premature babies with low birth have different sleep patterns and duration than full-term babies. They often experience problems with the gastrointestinal system putting them at a higher risk of disorders that can influence weight gain (Theodore, D.B, 2020). Listening to music stimulation can influence the limbic system (hypothalamus), which affects emotions and behavior. Thus, playing music or a mother's voice can affect the brain's metabolism and physiological abilities, including the sucking reflex in babies, and improve gastrointestinal function in premature babies (Wahyuningsri & Eka, 2014)

Providing adequate nutrition without compromising tolerance is crucial for premature babies. Gradually introducing feeding to stable premature infants can lead to significant weight gain, as evidenced by minimal residual volumes. Supplementing with additional therapies, such as maternal voice stimulation, further enhances comfort and overall well-being in premature infants ((Wahyuningsri & Eka, 2014) According to this study, the control group received regular care according to their needs and developmental care (positioning and gentle therapy), which can help premature babies adapt to the environment. These results align with previous studies (Shellhaas, R. A., Burns, J. W., Barks, J. D., Hassan, F., & Chervin, R. D. (2019). However, the increase in weight gain in the intervention group that received mother's voice intervention was much greater than in the control group. A well-designed environment that prioritizes developmental care will greatly influence the quality of development in premature babies. Minimizing sound and light, designed according to decibel and light standards in the perinatology room, is crucial. Furthermore, babies are more likely to remain asleep during recordings of their mother's voice in the intervention group compared to the group that did not hear their mother's voice and would easily wake up with a little sound stimulation around.

CONCLUSION

Nurses can enhance their quality and ability to administer developmental care for premature babies, particularly through music therapy, which includes mother's voice intervention. This intervention can be integrated into routine nursing care for premature babies, serving as educational material for continued care at home.

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