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## The effect of Qur'an recitation and kangaroo mother care on vital signs among low birth weight infants

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### Abstract

**Background:** Infants with low birth weight require intensive care to prevent potential hypothermia, which increases the risk of pain and death. Kangaroo mother care, involving skin-to-skin contact, can reduce the risk of hypothermia and strengthen the bond with their mothers.

**Purpose:** To observe the effect of the simultaneous application of Qur'an recitation and kangaroo mother care on the vital signs of low birth weight infants.

**Method:** The study involved 17 stable low birth weight infants chosen through non-probability accidental sampling. The intervention consisted of playing recorded Qur'an recitation and administering kangaroo mother care for 45 minutes daily over a period of 3 days. The recitation was played at a volume of 40-50dB, maintaining at least 30 cm distance from the infants' ears.

**Results:** The Shapiro-Wilk normality test showed that the data for oxygen saturation, heart rate, and temperature were normally distributed, with values exceeding  $\alpha$  (0.05). According to the Wilcoxon test, the oxygen saturation data had a p-value of 0.001, with pre-test and post-test means of 94.29% and 98.53%, respectively. The heart rate data had a p-value of 0.011, with a pre-test mean of 139.8 beats per minute and a post-test mean of 132.4 beats per minute. The body temperature data had a p-value of 0.140, with pre-test and post-test means of 36.8°C and 36.7°C, respectively.

**Conclusion:** Combining kangaroo care with playing recorded Qur'an recitation in the treatment and care of low birth weight infants significantly enhances physiological parameters, including oxygen saturation and heart rate.

**Keywords:** Kangaroo Mother Care; Low Birth Weight; Qur'an Recitation; Vital Signs.

### INTRODUCTION

Infants born with low birth weight (LBW) and prematurely often face physical challenges that hinder their ability to survive outside the womb independently, and they are prone to illnesses that can affect them throughout adulthood. Hypothermia risk arises from insufficient fat reserves under the skin and the underdeveloped heat regulation center in the brain. The likelihood of premature death for LBW infants is 70 times higher compared to full-term babies (Pujiadi, Pulungan, Supriyatno, Sjarif, Gatot, Hidayati, Ifran, Oswari, Puspongoro, Satari,

Rundjan, Wahyuni, Karyanti, Djer, Dwipoerwantoro, Tahir, Mutiara, Rohsiswatmo, Sekartini, Putranto, Tambunan, & Munasir, 2013; World Health Organization, 2004). In 2019, Indonesia recorded a total of 111.827 births across 25 provinces, with 3.4% classified as low birth weight (Ministry of National Development Planning, 2020; Ministry of Health of the Republic of Indonesia, 2020). In Jakarta in the year of 2020, approximately 2.145 infants were observed to have low birth weight, marking an increase from the 2018 figure of around

1.381 infants with low birth weight (Health Office of DKI Jakarta Province, 2020).

Issues related to LBW may manifest during the physiological adaptation phase. Challenges frequently encountered during this period can affect various systems including respiratory, neurological, cardiovascular, hematological, gastrointestinal, renal, and thermoregulatory systems (Hockenberry, Wilson, & Rodgers, 2021; Rahman, Chowdhury, Hoque, Jahan, & Shaha, 2017). Short-term effects on LBW development involve factors such as oxygen saturation levels, reduced respiratory capacity, hypothermia, hypoglycemia, hyperglycemia, brain bleeding, and immunological issues. Meanwhile, in the long run, a history of LBW birth can lead to developmental issues, retinopathy affecting vision, hearing impairment, and chronic lung conditions (Cutland, Lackritz, Mallett-Moore, Bardaji, Chandrasekaran, Lahariya, & Brighton Collaboration Low Birth Weight Working Group, 2017; Stevens, & Glass, 2002).

Traditionally, interventions for LBW infants have primarily involved using costly incubators. However, a more recent innovation for LBW treatment that promotes closeness between the baby and mother is Kangaroo mother care (KMC). This method involves direct skin-to-skin contact between the baby and mother, providing gentle and effective care that helps alleviate the various stresses premature babies may experience during treatment in intensive care units (Yuliana, 2024; World Health Organization, 2023). A baby finds the safest refuge in its mother's arms, where the embrace brings immense comfort, inducing relaxation and a sense of ease. Establishing a strong bond between mother and baby is crucial during the initial stages of the baby's life.

Providing a cozy posture, gentle touch, and comforting sounds activates neurological pathways, promoting relaxation and tranquility in low birth weight babies, potentially stabilizing their physiological functions. Exposure to the melodious recitation of Quranic verses can trigger the release of endorphins, affecting the brain and promoting alpha wave activity, thus reducing stress, alleviating negative emotions, inducing relaxation, and enhancing the immune system. Listening to Qur'an recitation may contribute to increased oxygen

saturation and stabilized vital signs in premature babies undergoing treatment in the NICU (Damayanti, Ismail, & Warsiti, 2018; Mirghafourvand, Shafaie, Charandabi, & Jabbari, 2016; Vaghefi, Nasrabadi, Golpayegani, Mohammadi, & Gharibzadeh, 2015). Sound therapy is also effective for eliminating or improving life difficulties, physical, psychological, social and spiritual stress and increasing comfort.

Observing the unfolding phenomena, the authors became intrigued by investigating the impact of utilizing kangaroo mother care along with recitations from the Qur'an on the vital signs of LBW infants. This approach is anticipated to enhance the treatment process within hospitals. Moreover, mothers are likely to feel empowered, thereby assuming a more engaged role in breastfeeding and nurturing their infants, potentially leading to a reduction in infant morbidity and mortality rates, ultimately enhancing the quality of life for the babies.

## RESEARCH METHOD

The study used a pre-experimental approach employing a one-group pre-test post-test design. The target population comprised all LBW infants receiving care in the perinatology unit of Kojal Regional General Hospital. Sampling was conducted using nonprobability accidental sampling, with inclusion criteria specifying that the family or guardian of the participant adheres to the Islamic faith, the infant's birth weight falls between 1500 - 2500 grams, the infant is in stable condition (not requiring significant respiratory support like CPAP), and approval has been obtained from the attending physician. Seventeen infants were enrolled as participants.

The instruments included kangaroo mother care (KMC) and an audio player for reciting Qur'an, maintaining a noise level between 40-50dB. The intervention consisted of administering Qur'an recitations to the participants, ensuring they were positioned at least 30 cm away from the infant's ear, and lasted for 45 minutes. KMC entailed direct skin-to-skin contact between the mother and baby, with the mother holding the baby against her chest supported by a specialized KMC carrier.

Data collection involved recording variables both before the intervention (pre-test data) and after the

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intervention (post-test data). Following this, the data underwent analysis using the Shapiro-Wilk test and the Wilcoxon test to evaluate the impact of Qur'an recitation and kangaroo mother care on the vital signs of low birth weight infants. This study received

approval and recommendation letter from the Health Research Ethics Committee of the Faculty of Medicine and Health, Universitas Muhammadiyah Jakarta, number: 162/PE/KE/FKK-UMJ/VII/2022, dated July 27, 2023.

**RESEARCH RESULTS**

**Table 1. Characteristics of Participants (N=17)**

Variables	Results
<b>Gender</b>	
Male	8/47.1
Female	9/52.9
<b>Birth Weight</b>	
1500 – 1999 grams	6/35.3
2000 – 2450 grams	11/64.7
<b>Current Body Weight</b>	
1500 – 1999 grams	7/41.2
2000 – 2450 grams	10/58.8

Table 1 shows that male participants accounted for 47.1% and female participants accounted for 52.9% of the total. Furthermore, participants with a Birth Weight of 1500 – 1999 grams comprised 35.3%, while those with a Birth Weight of 2000 – 2450 grams comprised 64.7%. Regarding Current Body Weight, participants weighing between 1500 – 1999 grams constituted 41.2%, whereas those weighing between 2000 – 2450 grams constituted 58.8%.

**Table 2. Frequency of Vital Signs (N=17)**

Variables	Pre-test	Post-test	Z	P value
	(Mean±SD)(min-max)	(Mean±SD)(min-max)		
Oxygen saturation (%)	(94.29±3.33)(88.0-99.0)	(98.53±0.80)(99.0-100.0)	-3.414	0.001
Heart rate (/minute)	(139.8±11.32)(117-167)	(132.4±7.01)(120-145)	-2.535	0.011
Body temperature (°C)	(36.8±0.28)(36.2-37.4)	(36.7±0.16)(36.3-37.0)	-1.474	0.140

*Shapiro Wilk test & Wilcoxon test*

In Table 2, the Wilcoxon test results show that the p-value for oxygen saturation data was 0.001, with a Z-value of -3.414. This was calculated from the examination of pre-test data, which had an average of 94.29% and a standard deviation of 3.33%, ranging from 88.0% to 99.0%. In contrast, post-test data had an average of 98.53% and a standard deviation of 0.80%, ranging from 99.0% to 100.0%.

Regarding heart rate data, the p-value was 0.011, with a Z-value of -2.535. These figures were computed from the analysis of pre-test data, which showed an average heart rate of 139.8 beats per minute and a standard deviation of 11.32 beats per minute, ranging from 117 to 167 beats per minute. Conversely, post-test data exhibited an average heart rate of 132.4 beats per minute and a standard

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deviation of 7.01 beats per minute, ranging from 120 to 145 beats per minute.

Additionally, for body temperature data, the p-value was 0.140, with a Z-value of -1.474. These results were derived from the assessment of pre-test data, which had an average temperature of 36.8°C and a standard deviation of 0.28°C, ranging from 36.2°C to 37.4°C. In contrast, post-test data had an average temperature of 36.7°C and a standard deviation of 0.16°C, ranging from 36.3°C to 37.0°C.

## DISCUSSION

The oxygen saturation level increased from before the intervention (pre-test) to after the simultaneous intervention of Qur'an recitation and KMC (post-test). The increase or change observed in oxygen saturation remains within normal limits. The analysis findings employing the Wilcoxon test demonstrate a significant value ( $\alpha < 0.05$ ) in oxygen saturation levels ( $\alpha = 0.001$ ) following the implementation of interventions involving listening to Qur'an recitation and KMC. The implementation of Quranic recitation intervention significantly contributes to enhancing oxygen saturation levels over a period of three days in premature infants (Damayanti et al., 2018). The increase in oxygen saturation by 0.3% observed before and after listening to Qur'an recitation for 10 minutes among neonates in the NICU (Qolizadeh, Myaneh, & Rashvand, 2019).

Kangaroo mother care also demonstrates a significant increase in oxygen saturation levels. There are significant disparities in the oxygen saturation levels of LBW babies before and after receiving KMC, with a p-value of 0.000 (Purwandari, Tombokan, & Kombo, 2019). The rise in oxygen saturation levels each day over a span of three days yielded a p-value of 0.000 (Trianingsih, & Sasanti, 2018). The alteration in oxygen saturation is affected by reduced metabolic activity stemming from the comfort and relaxation induced by listening to Qur'an recitations and KMC. KMC also fosters a more tranquil state for infants, allowing them to rest in a position reminiscent of their time in the womb, thereby diminishing potential anxiety and promoting longer periods of sleep (American College of Nurse-Midwives, 2015; Mellis, 2016). Qur'an recitation serves as a form of sound therapy utilized by

Muslims as a non-medical treatment option. The melodious recitation of the Quranic verses by the reciter induces a sense of tranquility and inner peace in those who listen, fostering a state of calm and comfort (Al-Kaheel, 2011; Vaghefi et al., 2015). The rise in oxygen saturation is affected by a decline in metabolic activity stemming from the sense of ease and relaxation experienced while using the nest and listening to the recitation of Qur'an. Additionally, the completion of the hemoglobin accumulation phase persists until the respondents' nutritional needs are met.

The analysis of heart rate post-intervention with listening to Qur'an recitation and KMC yielded significant result ( $\alpha = 0.011$ ). There were significant disparities in the heart rates of LBW infants before and after receiving KMC, with a resulting p-value of 0.000. Premature babies exhibit fluctuations in their heart rates daily while undergoing sound therapy (classical music), including both decreases and increases (Alipour, Eskandari, Hossaini, & Sangi, 2013). Premature babies who listen to their mother's lullabies will show an increase in heart rate every day. This situation occurs because gestational age will affect the level of maturity of the baby's organs, which will also affect the baby's physiological values (Jabraeili, Sabet, Gharebaghi, Jafarabadi, & Arshadi, 2016; May, & Mahlmeister, 1994). Variations in heart rate readings are impacted by physical exertion and various other factors such as age, gender, activity level, health condition, hydration status, and medication usage.

Listening to Qur'an recitation operates by enhancing the function of the myelinated vagus nerve system (parasympathetic nerves) while inhibiting the function of the unmyelinated sympathetic and vagus nerves (also parasympathetic nerves) (Porges, Bazhenova, Bal, Carlson, Sorokin, Heilman, & Lewis, 2014). The sensory input derived from listening to the Qur'an recitation and the tactile sensation from a mother's touch during kangaroo care can impact cognitive processes within the central nervous system. This, in turn, redirects motor stimuli to the peripheral nervous system to restore the body's homeostatic balance as a compensatory mechanism. This compensation can be observed through vital signs like oxygen saturation, heart rate, and body temperature.

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## CONCLUSION

The combination of kangaroo care treatment method and the use of Quran recitation sound has a significant impact on physiological improvements in oxygen saturation and heart rate in the care and management of low birth weight infants.

## SUGGESTION

The results of this study are expected to provide innovative care or new interventions for the care of low birth weight infants that can be easily implemented by parents in the continued care of low birth weight infants at home following intensive care at the hospital.

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