Journal of Pubnursing Sciences, 2025, 03 (03): 115-120
eISSN 2988-4330; pISSN 3025-3330; https://doi.org/10.69606/jps.v3i03.275

[Original Research]

Journal of Pubnursing Sciences

Kangaroo Mother Care and Lullaby Music Intervention for Stabilizing Pulse Rate and Body Temperature in Low Birth Weight Infants

Dewi Yuliana[1], Lia Herliana[1], Novi Enis Rosuliana[1], Dini Mariani[1]

[1]Department of Nursing, Poltekkes Kemenkes Tasikmalaya, Tasikmalaya, West Java, Indonesia
*Corresponding author: dewiyuliana3006@gmail.com

Article Info:

Received: (2025-07-03)

Revised: (2025-09-02)

Approved: (2025-09-07)

Published: (2025-09-10)

Abstract

Background: Low Birth Weight (LBW) infants are a vulnerable group who have a high risk of experiencing instability of vital signs due to the imperfection of organs in the baby's body, especially the thermoregulation system and circulatory system. This instability can trigger serious complications and increase neonatal morbidity and mortality rates. Efforts to stabilize physiologically are important steps that need to be taken. **Aims:** To determine the effect of the combination of kangaroo mother care (KMC) intervention and lullaby music on the stability of pulse rate and body temperature of LBW. **Method:** This study uses a quantitative method with a quasi-experimental research design with a pretest-posttest with control group approach. The population was 94 people in October-December 2024 in the perinatology room. The research sample was 26 people using purposive sampling. The measuring instruments used include an axillary thermometer, stethoscope, timer, sound level meter, and observation sheet. **Results:** The results of the study using the paired t-test showed an increase in the average pulse rate and body temperature in the intervention group with a p value of 0.000, the control group with a p value of 0.049, while the results of the independent t-test for pulse rate after intervention with a p value of 0.012 and body temperature with a p value of 0.022. **Conclusion:** The combination of KMC and lullaby music is more effective in increasing the stability of pulse rate and body temperature of LBW. This combination intervention can be applied by nurses as suportive therapeutic nursing care for LBW.

Keywords: Body Temperature, Kangaroo Mother Care, Low Birth Weight, Lullaby Music, Pulse Rate

Cite this as: Yuliana, D., Herliana, L., Rosuliana, N. E., & Mariani, D. (2025). Kangaroo Mother Care and Lullaby Music Intervention for Stabilizing Pulse Rate and Body Temperature in Low Birth Weight Infants. *Journal of Pubnursing Sciences*, 3(03), 115–120. https://doi.org/10.69606/jps.v3i03.275

Introduction

Low Birth Weight (LBW) is defined as a birth weight of less than 2,500 grams (Merdikawati et al., 2021). The determinants of LBW can be maternal—such as age, nutritional status, parity, anemia, medical history, and level of knowledge—or fetal, including multiple pregnancies, hydramnios, and fetal distress (Rahmadani et al., 2022). Globally, the incidence of LBW is estimated at 15–20%, affecting approximately 20 million newborns annually (WHO, 2020). In Southeast Asia, the prevalence reaches 27% (Arisandhy et al., 2023). Indonesia has the second-highest LBW prevalence among ASEAN countries, with a rate of 11.1%, following the Philippines (Ananda & Wiwik, 2024).

According to the 2018 Basic Health Research (Riskesdas), the national prevalence of LBW in Indonesia was 6.2%, with West Java ranking 13th out of 34

provinces at the same rate (Riskesdas, 2018). In Tasikmalaya City, 491 LBW cases were reported in 2024 (Tasikmalaya City Central Statistics Agency, 2024). This high incidence of LBW contributes significantly to infant morbidity and mortality, as affected neonates have immature organ systems that increase their vulnerability to hypothermia, hyperbilirubinemia, fluid imbalance, infections, apnea, anemia, and even death (Sriyanah et al., 2023). Data from the 2023 Indonesian Health Profile reported 34,226 infant deaths due to LBW, a sharp increase from 21,447 cases in 2022 (Ministry of Health of the Republic of Indonesia, 2023). Among the complications, hypothermia is particularly critical in LBW infants due to immature thermoregulatory mechanisms, which can result in metabolic disorders, cardiopulmonary failure, and death (Anantasari et al., 2019).

Management strategies for stabilizing body temperature and pulse rate in LBW infants traditionally involve the use of incubators. An alternative, Kangaroo Mother Care (KMC), provides skin-to-skin contact that effectively maintains body temperature, stabilizes breathing and heart rate, promotes weight gain, and strengthens maternal-infant bonding (Sriyanah et al., 2023). Previous studies demonstrate that KMC can increase body temperature from 35.49 °C to 37.10 °C and significantly improve the vital signs of LBW infants (Matondang & Munir, 2022).

In addition to KMC, lullaby music therapy has been shown to help stabilize body temperature, pulse rate, and oxygen saturation in infants (Triana et al., 2023). However, research examining the combined effects of KMC and lullaby music therapy on pulse rate and body temperature remains limited. Therefore, this study aims to investigate the impact of combining KMC and lullaby music therapy on the stability of pulse rate and body temperature in LBW infants.

Methods

This study employed a quasi-experimental design with a pretest–posttest control group approach, comparing an intervention group (KMC combined with lullaby music) with a control group (KMC only). The study population consisted of low birth weight (LBW) infants admitted to the perinatology ward of Tasikmalaya City Hospital. The sample size was calculated using the paired-means difference (DTT) test, resulting in 12 participants per group. An additional 10% was added to account for potential dropouts, yielding a total sample of 26 respondents.

A purposive sampling technique was applied. The inclusion criteria were: infants with a birth weight <2,500 grams, gestational age between 28–42 weeks, either in or out of an incubator, and mothers willing to participate. Exclusion criteria included infants experiencing respiratory distress, clinical deterioration, or hearing impairments.

The research instruments consisted of: (1) a demographic data sheet; (2) a stethoscope and timer to measure pulse rate; (3) a digital axillary thermometer to measure body temperature; (4) a sound level meter (SLM) to ensure that music volume was maintained between 50–60 dB; and (5) a pretest–posttest observation sheet. Instrument validity was supported by the use of standard operating procedures (SOPs), while the reliability of physiological measuring devices was ensured through medical calibration. The observation sheet was adapted from previously validated research instruments.

Data collection began after obtaining institutional permission and written informed consent from the infants' parents. In the intervention group, baseline (pretest) measurements were taken, followed by 60 minutes of KMC daily, during which lullaby music was played for the first 30 minutes. The music was delivered using a music box and/or a mobile phone speaker, with sound intensity monitored using an SLM to ensure levels remained between 50–60 dB. Posttest measurements were recorded immediately afterward. The control group underwent the same procedure, except without lullaby music. The intervention was administered once per day for three consecutive days. The procedures followed the standardized SOP for kangaroo care, with the addition of lullaby music in the intervention group.

Data analysis involved the Shapiro–Wilk test for normality, followed by univariate analysis (frequency distribution, mean, and standard deviation). Bivariate analysis was conducted using paired t-tests and independent t-tests to assess the effect of the intervention on pulse rate and body temperature stability.

This study was approved by the Research Ethics Committee of the Tasikmalaya Ministry of Health Polytechnic (No.DP.04.03/F.XVIII.20/KEPK/206/2025). Ethical principles of autonomy, beneficence, non-maleficence, and justice were upheld, and respondent data were kept confidential throughout the study.

Results

Based on Table 1, the majority of the 26 respondents were male, 19 had a gestational age of 29-36 weeks, 25 had a low birth weight (LBW), and 15 had a preterm neonate.

Table 1 Distribution of Respondent Characteristics (n=26).

Variabel	n	%
Gender		
Male	15	57,7
Female	11	42,3
Gestational Age		
<28 weeks	0	0
29-36 weeks	19	73
37-42 weeks	7	27
>42 weeks	0	0
Birth Weight		
1.500-2.499 gram	25	96
1.000-1.500 gram	1	4
<1.000 garm	0	0
Infant Age		
0-7 days	15	57,7
8-28 Days	11	42,3

The intervention group experienced an average increase in heart rate of 5 beats/minute, while the control group experienced an increase of 6 beats/minute.

Tabel 2 Changes in Heart Rate Before and After Intervention (n=26).

Measurement Pulse Rate	Mean	SD	P-Value
Intervention Group			
Before	135	6,8604	0,000
After	140	4,7109	
Control Group			
Before	140	12,6974	0,049
After	146	5,3630	

Table 3 shows a significant difference in body temperature before and after the intervention (0.000) between the intervention group and the control group (0.049). The intervention group experienced an average increase in body temperature of 0.02°C, while the control group experienced an increase of 0.01°C.

Tabel 3 Changes in Body Temperature Before and After Intervention (n=26)

Measurement Body Temperature	Mean	SD	P-Value
Intervention Group			
Before	36,6	0,1336	0,000
After	36,8	0,0659	
Control Group			
Before	36,6	0,1609	0,007
After	36,7	0,1059	

Table 4 shows that the mean pulse rate difference between the two groups was -5.3590, indicating that the pulse rate in the intervention group tended to be lower than the control group. Meanwhile, the mean difference in body temperature was 0.0846.

Tabel 4 Changes in pulse rate and body temperature after intervention (n=26)

Measurement	Mean	SD	P-Value
Fulse Rate			
Before	140	4,7109	0,012
After	146	5,3630	
Body Temperature			
Before	36,8	0,0659	0,022
After	36,7	0,1059	

Discussion

The majority of respondents in this study were male. However, these results are inconsistent with research by Sriyanah et al. (2023) on the topic of KMC, which stated that male babies weigh more than female babies. The proportion of LBW cases in males was lower, at 46% compared to 54% in females. The difference in weight between males and females was more pronounced after 28 weeks of gestation.

Pregnancies less than 37 weeks carry a risk of low birth weight, i.e., babies born with a birth weight of less than 2,500 grams. Research conducted by Rosuliana et al. (2022) on gestational age and LBW found that premature pregnancies are 28.583 times more likely to experience LBW than full-term pregnancies. Gestational age and Hb levels significantly influence the incidence of LBW, and biologically, infant weight increases with gestational age (Pancawardani et al., 2022).

Based on the research results, the majority of respondents were in the early neonatal period. The neonatal period is a vulnerable period for infants due to their immature physiological state. Neonates undergo adaptation at birth, initially relying on the placenta and then becoming physiologically independent this is because neonates obtain oxygen through the respiratory system, receive oral nutrition, regulate body temperature, and can fight off infections and diseases. This transition period occurs after birth and lasts up to a month or more (for some systems). Rapid and significant transitions occur in the thermoregulatory system, glucose metabolism, and respiration (Yulianti & Hasanah, 2024).

Kangaroo Mother Care and lullaby music are a combination of nursing interventions to help maintain a baby's physiological stability, including heart rate.

Kangaroo Mother Care (KMC), based on the principle of touch between mother and baby, increases comfort for the baby, resulting in calmer, better sleep quality, and physiological stability. A comfortable position during KMC sends impulses to the hypothalamus, which then responds to the adrenal medulla, suppressing the release of epinephrine and norepinephrine, or reducing the release of catecholamines into the bloodstream, resulting in a decreased heart rate and respiratory rate (Anwar, 2024). Lullaby music, on the other hand, has simple melodies, repetitive patterns and lyrics, and minimalist harmonies (Mariyanti & Prawesti, 2024).

Lullaby music and KMC work synergistically to stabilize heart rate and body temperature. KMC stimulates tactile and thermal receptors, which maintain body temperature, and lullaby music provides calming auditory stimulation and activates the parasympathetic nervous system. The relaxation effect produced by this combination can reduce metabolic needs and energy consumption, thus supporting optimal homeostatic stability (Istikhomah & Wahyuni, 2024).

The results of the pulse rate test before and after the intervention in the intervention and control groups using a Paired Sample T-Test showed a p=0.000 for the intervention group with an increase of 5 beats/minute and a p=0.49 for the control group with an increase of 6 beats/minute. This indicates a statistically significant difference in pulse rate before and after the intervention. The intervention group had a lower and more stable increase due to the intervention, which consisted of a combination of KMC and lullaby music, which stabilizes the baby's pulse rate.

The results of this study align with those of Nurpijah & Sari (2021), which showed that heart rate increased by 13 beats/minute after the KMC intervention, with a p-value of 0.017. This study demonstrates that the combination of KMC and lullaby music can affect the stability of heart rate and body temperature in LBW infants. This finding aligns with the research of Darma et al. (2022), which showed that the combined intervention of KMC and lullaby music significantly increased heart rate stability in LBW infants. In this study, infants receiving the combined intervention experienced an increase in heart rate toward the normal physiological range. This suggests that the combination of sensory stimuli in the form of warm touch from KMC and the gentle rhythm of lullaby music can provide calm and aid in adjustment to the extrauterine environment.

Another study by Kriechbaum et al. (2025) explored the effects of music therapy during kangaroo care. The study, which included live music during KMC, demonstrated positive changes in physiological parameters, including stable heart rates and brain activity patterns suggestive of relaxation. Although the heart rate was not statistically significant, there was a trend toward a decrease in heart rate and an increase in calmness in the infants. The study noted that the combination of KMC and music can support the stability of the infant's autonomic nervous system and create a sensory environment conducive to body temperature and heart rate regulation, particularly in low birth weight (LBW) infants.

The pulse rate in premature infants increased after the intervention, possibly due to the change in position. Premature infants are prone to bradycardia, so the positive influence of KMC can stimulate the infant to beat in sync with the mother's pulse (Nurpijah & Sari, 2021). The heat transfer process that occurs during KMC is conduction. Conduction is the transfer of heat from one object to another through direct contact. When the baby's temperature is low, the mother's chest warms it, stabilizing the temperature, and vice versa (Purwaningsih & Widuri, 2019).

The results of the paired t-test for the average body temperature before and after the intervention in the intervention and control groups showed a p=0.000 for the intervention group and a p=0.007 for the control group. This indicates that the body temperature values before and after the intervention were different in both groups. This indicates that the combined intervention of KMC and lullaby music, as well as the intervention of KMC alone, had an effect. Each group experienced a significant improvement after the intervention, with a temperature increase of 0.2°C in the intervention group and 0.1°C in the control group. However, the greater improvement occurred in the intervention group due to the combination of KMC and lullaby music, resulting in more stable body temperature in LBW infants.

Research by Sriyanah et al. (2023) examined the effect of KMC on body temperature stability with a p=0.030 value, indicating a temperature increase of 0.7°C. The combination of KMC and lullaby music was significantly more effective in maintaining physiological stability in infants than KMC alone, making it suitable for LBW infants. The intervention group demonstrated more consistent and optimal stabilization results. There are limitations in the implementation of this research, namely that several respondents dropped out, the pulse frequency measuring tool is still manual so there is a risk of inaccuracy compared to digital tools.

Conclusion

The combination of Kangaroo Mother Care (KMC) and lullaby music has been shown to be more effective in improving the physiological stability of low birth weight (LBW) infants than KMC alone, as

demonstrated by a significant increase in mean body temperature and stabilization of heart rate in the intervention group. This intervention can be an alternative, applicable supportive nursing care to help reduce the risk of complications due to temperature and heart rate instability in LBW infants.

Nurses in the perinatology/NICU can integrate this intervention into routine care by continuing to monitor the infant's vital signs. Furthermore, parents should be educated so they can continue this practice at home to help maintain the infant's physiological stability.

Declaration of Conflicting Interest

No conflict of interest to declare.

Funding

Research using independent funds

Acknowledgment

The author would like to thank the respondents of this study and all parties involved in the preparation of the research.

Author's Contribution

DY played a major role in the process of compiling the thesis from the beginning to submitting this article, LH, NER, DM played a major role in providing input in compiling this manuscript

Data Availability Statement

The research data is with the principal researcher and if requested for clear reasons, I am willing to provide it.

Declaration of Use of AI in Academic Writing

The author used ChatGPT in the writing process to improve readability and remove grammatical errors. However, he took full responsibility for the content. Nothing to declare

References

Ananda, D. F., & Wiwik, A. (2024). Hubungan berat badan lahir rendah dengan kematian nonatal di Kabupaten Bangkalan. *Jurnal Imliah Multidisipline*, *2*(5), 62–71. https://doi.org/10.5281/zenodo.11300684

Anantasari, R., Sulastyawati, & Satriyani, Y. D. (2019). *Kombinasi KMC dan terapi musik mozart terhadap suhu tubuh BBLR di RS wava husada*. 75–82. https://ejournal.stikesmajapahit.ac.id/index.php/PSN/article/view/340/338

Anwar, M. (2024). Kangaroo Mother Care Pada Bayi Berat Lahir Rendah : Sistematik Review. *Public Health Journal*, *1*(2), 443–451. https://doi.org/10.56338/pjkm.v8i1.234

Arisandhy, E., Woro, D., Kusumo, K., Suhaid, D. N., Sukma, P., Purnami, L. A., Dwijayanti, L. A (2023). Dominant factors associated with low birth weight in newborn. *Jurnal Kebidanan*, *13*(1), 34–39. http://dx.doi.org/10.31983/jkb.v13i1.8487

Badan Pusat Statistik Kota Tasikmalaya. (2024). *Jumlah bayi lahir, bayi berat badan lahir rendah (BBLR), bergizi buruk dan bergizi buruk yang mendapatkan perawatan menurut kecamatan di kota Tasikmalaya, 2023*. https://tasikmalayakota.bps.go.id/id/statistics-table/1/MjAwMSMx/jumlah-bayi-lahir-bayi-berat-badan-lahir-rendah-bblr-bergizi-buruk-dan-bergizi-buruk-yang-mendapatkan-perawatan-menurut-kecamatan-di-kota-tasikmalaya-2023-.html

Darma, I. Y., Yusuf, N., Zaimy, S., & Idaman, M. (2022). Efektifitas kombinasi kangaroo mother care (KMC) dan musik lullaby terhadap perubahan suhu dan denyut jantung pada bayi berat lahir rendah. *Jurnal Medika Udayana*, *11*(8), 50–55.

Emaliyawati, E., Fatimah, S., & Lidya, L. (2018). Pengaruh terapi musik lullaby terhadap heart rate, respiration rate, saturasi oksigen pada bayi prematur. *Jurnal Keperawatan Padjadjaran*, *5*(3). https://doi.org/10.24198/jkp.v5i3.648

Heriyeni, H. (2018). Pengaruh metode kanguru terhadap stabilitis suhu tubuh bayi di ruang perinatologi rumah sakit umum daerah bengkalis. *Menara Ilmu*, *XII*(1), 86–93. https://jurnal.umsb.ac.id/index.php/menarailmu/article/download/1017/873

Ina, A. A., & Edison, M. S. I. (2019). Pengaruh pemberian terapi musik lullaby terhadap vital signs pada bayi prematur. *Jurnal Kesehatan*, *10*(1), 6. https://doi.org/10.35730/jk.v10i1.368

Istikhomah, H., & Wahyuni, S. (2024). Perbedaan Pengaruh Jahe , Aromaterapi Oil Lavender dan Musik Klasik terhadap Pengurangan Emesis Gravidarum pada Ibu Hamil Trimester I The Differences of Effect in The Ginger , Oil Lavender Aromatherapy and Classic Music on Reduction of Emesis Gravidarum i. *Jurnal Ilmiah Kebidanan*, *11*(2), 83–95. https://doi.org/10.35316/oksitosin.v11i2.3559

Kementerian Kesehatan RI. (2023). *Profil Kesehatan Indonesia*.

Kriechbaum, A. C., Csillag, B., Wenzel, C., & Haslbeck, F. B. (2025). Music Therapy with Preterm Infants During Kangaroo Care: A Mixed-Methods Feasibility Study on Physiological and Electroencephalographic Parameters and Parental

Perspectives. *Children*, *12*(3), 1–20. https://doi.org/10.3390/children12030334

Mariyanti, L., & Prawesti, I. (2024). Pengaruh pemberian musik Lullaby terhadap tingkat nyeri pada bayi. *Jurnal.Stikesbethesda.Ac.Id*, *3*(1), 346–355.

Matondang, E. R. S., & Munir, C. (2022). Pengaruh metode kangaroo mother care terhadap perubahan tanda-tanda vital pada bayi berat badan lahir rendah (BBLR) di rumah sakit sawit indah perbaungan the effect of kangaroo mother care method on changes in vital signs in heavy babies low birth body. *Jurnal Kebidanan, Keperawatan Dan Kesehatan (J-BIKES)*, *2*(1), 36–40. https://doi.org/10.51849/j-bikes.v2i1.24

Merdikawati, A., Astari, A. M., Choiriyah, M., Evi, N., Yuliatun, L., Amaliya, S., Fitri, A. A., & Raehana, N. U. (2021). Optimalisasi dukungan keluarga dalam perawatan bayi berat badan lahir rendah (BBLR) di Rumah. *Caring Jurnal Pengabdian Masyarakat*, *1*(1), 40–48. https://doi.org/10.21776/ub.caringjpm.2021.001.01.5

Nurpijah, & Sari, R. S. (2021). *Pengaruh Perawatan Metode Kangguru terhadap Stress Hemodinamik pada Bayi Berat Lahir Rendah Di RS Annisa tanggerang 2020*. *2*(7). https://doi.org/10.46799/jhs.v2i7.224

Pancawardani, R., Amelia, R., & Wahyuni, S. (2022). Usia kehamilan ibu mempengaruhi keluaran bayi dengan berat badan lahir rendah. *Midwifery Care Journal*, *3*(2), 40–47. https://doi.org/10.31983/micajo.v3i2.8312

Purwaningsih, H., & Widuri. (2019). Pengaruh Skin To Skin Contact (PMK) Terhadap Penurunan Suhu Tubuh pada Bayi Demam. *Jurnal Perawat Indonesia*, *3*(1), 79–84.

Rahmadani, D., Noflidaputri, R., & Delvina, V. (2022). Analisa faktor penyebab kejadian BBLR di wilayah kerja dinas kesehatan kota solok. *Jurnal Ilmiah Indonesia*, *2*(6), 656–667. http://dx.doi.org/10.59141/cerdika.v2i6.422

Riskesdas. (2018). Laporan riskesdas 2018 nasional. In *Lembaga Penerbit Balitbangkes* (p. hal 156). https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/1/Laporan Riskesdas 2018 Nasional.pdf

Rosuliana, N. E., Aryanti, D., & Triguna, Y. (2022). Analisis Usia Gestasi Ibu Melahirkan dengan Berat badan Bayi Baru Lahir di Rumah Sakit Daerah. *Media Informasi*, *18*(2), 67–72. http://repo.poltekkestasikmalaya.ac.id/1640/1/publikasi%20sinta%205%2C%20Analisis%20Usia%20Gestasi.pdf

Siswanti, H., Sukesih, Karyati, S., Untar, E., & Subiwati. (2023). Pengaruh Durasi Waktu Kangaroo Mother Care (KMC) pada BBLR dengan Fungsi Fisiologis Bayi dan Psikologis Ibu dengan Bayi Di RSIA Restu Ibu Sragen. *Jurnal Ilmu Keperawatan Dan Kebidanan*, *14*(2), 396–402. https://ejr.umku.ac.id/index.php/jikk/article/view/2091/1156

Sriyanah, N., Pawenrusi, E. P., & Suradi, E. (2023). Pemberian Metode Kangaroo Mother Care (Kmc) Terhadap Kestabilan Suhu Tubuh Bayi Berat Badan Lahir Rendah. *Jurnal Keperawatan*, *15*, 1787–1794.

Triana, H., Utami, N., & Sari, I. M. (2023). Penerapan Terapi Musik Lullaby Respiration Rate Pada Bayi Prematur di Ruang Perinatologi RSUD Dr. Soehadi Prijonegoro Sragen. *Jurnal Imliah Ilmu Kesehatan*, *1*(3), 149. https://journal.universitaspahlawan.ac.id/index.php/jiik/article/view/17472/13003

WHO. (2018). Low Birth Weight. *Jama*. https://doi.org/10.1001/jama.287.2.270

World Health Rangkings. (2020). *Low Birth Weight Death Rate By Country*. https://www.worldlifeexpectancy.com/cause-of-death/low-birth-weight/by-country/

Yulianti, M., & Hasanah, P. N. (2024). *Konsep Dasar dan Asuhan keperawatan Bayi Berat Lahir Rendah*. https://play.google.com/books/reader?id=veYSEQAAQBAJ&pg=GBS.PR7&hl=id

Yusuf, N., Hadisaputro, S., Runjati, R., Suwondo, A., Mashoedi, I. D., & Supriyana, S. (2017). The Effectiveness of Combination of Kangaroo Mother Care Method and Lullaby Music Therapy on Vital Sign Change in Infants With Low Birth Weight. *Belitung Nursing Journal*, *3*(4), 352–359. https://doi.org/10.33546/bnj.161