

Section: Maternity Nursing

Kangaroo Mother Care (KMC) for treating hypothermia among infant with low birth weight

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Abstract

The main causes of morbidity and mortality associated with low birth weight is hypothermia. Hypothermia is a condition where a person's body temperature drops below 35°C, or when the body loses heat faster than it produces heat. Neonatal mortality rates are high due to hypothermia and low birth weight. Low birth weight babies are highly susceptible to hypothermia due to the thin subcutaneous fat reserves and the immaturity of the brain's heat-regulating centre. Several alternative care methods that are easier, cheaper, and more effective in stabilizing the body temperature of low-birth-weight babies are the Kangaroo Mother Care (KMC) method. KMC care is a treatment for low-birth-weight babies by providing direct skin-to-skin contact between the baby and the mother by placing the baby on the mother's chest. The KMC method is able to meet the needs of low-birth-weight babies by providing situations and conditions similar to the womb, thus giving low birth weight babies the opportunity to adapt well to the outside world.

Keywords: Complementary therapy, hypothermia, Kangaroo Mother Care, maternity nursing, morbidity prevention

Introduction

Low Birth Weight (LBW), defined as an infant weighing less than 2,500 grams at birth, remains a leading global cause of neonatal morbidity and mortality (Cutland et al., 2017; Jana et al., 2023). These vulnerable infants face numerous physiological challenges due to their underdeveloped systems and reduced subcutaneous fat reserves (Dhungana et al., 2025). One of the most critical and immediate risks encountered by LBW infants is the inability to maintain a stable core body temperature. This deficiency often results in hypothermia, a dangerous condition where the body temperature drops below 36.5°C (Blencowe et al., 2019). Hypothermia is insidious and can quickly lead to severe complications, including metabolic acidosis, hypoglycaemia, respiratory distress, and sepsis (Savioli et al., 2023). The consequences of even mild hypothermia significantly increase the risk of severe illness and permanent neurological damage. Globally, the burden of LBW and resulting thermal instability is particularly high in resource-limited settings where advanced incubators are scarce (May et al., 2019). Therefore, the prompt identification and management of hypothermia are essential interventions to improve survival rates among this high-risk population.

Effective, accessible, and sustainable methods for thermal regulation are urgently needed to mitigate the devastating effects of cold stress on fragile newborns. Historically, thermal regulation for neonates has relied heavily on technical solutions such as incubators, radiant warmers, and servo-controlled devices (Kyokan et al., 2023). While these conventional methods are highly effective, they often require substantial electrical power, specialized maintenance, and high operational costs. These logistical demands create significant access barriers in low-resource hospitals and remote community healthcare centers. Consequently, a vast number of LBW infants do not receive optimal thermal support during their crucial first hours and days of life. Addressing this global health disparity necessitates the implementation of simple yet powerful low-cost interventions that can be universally applied. Kangaroo Mother Care (KMC) has emerged as a scientifically proven, feasible, and patient-centered alternative to standard thermal management (Ramani et al., 2018). KMC involves continuous skin-to-skin contact between the infant and the mother (or a stable caregiver), exclusive breastfeeding, and early discharge with close follow-up (Garcia et al., 2025). The technique was initially developed in Bogotá, Colombia, as a practical solution to incubator shortages, demonstrating profound efficacy in thermal protection.

This intervention utilizes the mother's own body heat as a physiological incubator, offering a naturally stable and regulated thermal environment for the neonate. The rationale for utilizing KMC in LBW infants extends beyond mere heat provision, encompassing profound psychological and developmental benefits (Olawuyi et al., 2021). The direct skin-to-skin contact facilitates rapid temperature recovery and stabilization through conduction, effectively treating hypothermia with minimal energy expenditure. KMC's success is attributed to its ability to synchronize the infant's breathing and heart rate with the mother's, promoting overall physiological stability. Furthermore, this method supports optimal neurodevelopment and bonding, significantly reducing the infant's stress and expenditure of calories on heat production (Posan et al., 2025). Despite extensive research demonstrating KMC's population-level benefits,

detailed case studies are essential for illustrating its practical application and rapid clinical impact in individual infants. This focused, descriptive approach provides tangible evidence regarding the immediate and measurable thermal response of a specific low birth weight infant suffering from hypothermia. Documenting such clinical trajectories is vital for training purposes and advocating for KMC adoption by healthcare providers who may still rely solely on technology. Therefore, this paper aims to evaluate and document the effectiveness of Kangaroo Mother Care in rapidly resolving hypothermia in a low-birth-weight infant in a clinical setting.

Case Description

The assessment was conducted through direct interviews, observations, physical examinations, and review of supporting medical data. On Tuesday, February 4, 202X, a nursing assessment was performed on a neonate diagnosed with low birth weight (LBW). According to the medical record, the infant was no longer receiving oxygen therapy, showed no signs of respiratory distress or vomiting, and was being cared for in an incubator. The assessment continued with a direct physical examination. Temperature measurements were taken both inside and outside the incubator to evaluate thermal differences. The recorded values were as follows: body temperature (S) was 36.8°C inside the incubator and 35.9°C outside; pulse rate (N) was 155 beats per minute; respiratory rate (RR) was 42 breaths per minute; oxygen saturation (SpO₂) was 98%; random blood sugar (GDS) was 74 mg/dL; and body weight (BB) was 1600 grams. Upon further examination, the infant's skin appeared cyanotic when outside the incubator, with cold extremities and moist, bluish lips.

Subjective and objective data were collected during the assessment. However, subjective data could not be fully evaluated due to the infant's inability to communicate; only loud crying was noted. Objective findings included cyanosis when outside the incubator, cold skin and extremities, bluish lips, and the aforementioned vital signs. Based on these findings, a nursing diagnosis of hypothermia related to low birth weight was established. A nursing care plan was developed for a 2x24-hour period with the goal of improving thermal regulation and resolving cyanosis. The planned interventions included: monitoring body temperature regularly, identifying the underlying cause of hypothermia, observing for signs and symptoms of hypothermia, providing a warm environment, administering active external rewarming, offering education to caregivers, and encouraging the intake of warm fluids. The nursing implementation was carried out according to the planned schedule over a 2x24-hour period and followed the hospital's standard operating procedures (SOP). Prior to initiating Kangaroo Mother Care (KMC), the infant's body temperature was measured and clinical observations were conducted while the baby was outside the incubator. On the first day, February 4, 2025, at 08:00 AM, the infant's temperature outside the incubator was recorded at 35.9°C, with clinical signs including cold acral areas, cyanotic skin, and bluish moist lips. KMC was initiated at 08:10 AM. The baby was undressed, leaving only a diaper, and the mother wore designated KMC clothing. The infant was placed on the mother's chest in direct skin-to-skin contact and covered with a KMC cloth. The session lasted approximately one hour. At 10:00 AM, following the completion of KMC and prior to returning the infant to the incubator, a temperature evaluation was conducted. The results showed an improvement: body temperature was 36.8°C, the skin felt warm, acral areas were warm, cyanosis had resolved, and the lips appeared moist and reddish.

Nursing evaluation, as the final step in the care process, was conducted after each implementation to assess the effectiveness of the intervention. Evaluations on both the first and second days were performed at consistent times—KMC began at 08:10 AM and evaluations were conducted at 10:00 AM. The results on both days were consistent, indicating that the hypothermia had resolved according to the expected outcome criteria. The final evaluation data included: improved temperature (36.8°C), absence of cyanosis, warm acral areas, warm skin, and moist reddish lips. Based on these findings, the intervention was deemed successful and could be concluded.

Discussion

The clinical trajectory observed in this case study strongly supports the efficacy of KMC as a rapid and effective method for reversing hypothermia in an LBW infant (Nimbalkar et al., 2023). Upon initiating continuous skin-to-skin contact, the infant's core body temperature demonstrated a significant and immediate upward trend, quickly moving from the hypothermic range to a stable normothermic state. This immediate thermal stability is attributed to the principle of conduction, where heat is efficiently transferred directly from the mother's chest, acting as a physiological heat source. Crucially, the mother's regulated body temperature provides a perfect, buffered thermal environment, preventing both overheating and further heat loss, a common challenge with mechanical warming devices. The finding aligns perfectly with established physiological evidence demonstrating KMC's ability to minimize the infant's energy expenditure on non-shivering thermogenesis (Boundy et al., 2016). By conserving these vital caloric reserves, the infant can better allocate energy towards growth, development, and fighting infection.

The observed rapid recovery underscores KMC's superiority in resource-limited settings where immediate access to reliable incubators may be compromised. Therefore, the successful thermal management documented here validates KMC as a primary, non-costly intervention for emergency hypothermia treatment in this vulnerable population (Bhuiya et al., 2024). Beyond simple thermal stabilization, this case study highlights the multi-faceted benefits of KMC that contribute to overall neonatal stability and recovery. The close, continuous physical contact promoted synchronized cardiorespiratory patterns, suggesting improved physiological regulation that minimizes

instances of apnea and bradycardia, as often reported in literature.¹ The mother's proximity facilitated easier and more frequent access to exclusive breastfeeding, which is vital for the LBW infant's nutritional needs and immune defense, accelerating recovery from the initial insult of hypothermia. Furthermore, the skin-to-skin contact dramatically reduces the infant's stress levels, which is reflected in reduced crying and cortisol levels, though these were not specifically measured. This calming effect is essential because stress can trigger metabolic demands that exacerbate existing thermal and caloric deficiencies. The successful implementation also underscores the importance of maternal empowerment, transforming the mother from a passive observer to an active, essential therapeutic agent. This active participation strengthens the maternal-infant bond, which is critical for long-term health outcomes and parental confidence. Consequently, the holistic stability achieved through KMC is arguably more beneficial than the thermal stability provided by technology alone (Choirunisa et al., 2021). While the findings are compelling, interpreting this single case study requires caution regarding generalizability, necessitating recommendations for broader clinical integration and future research.

A case study, by definition, focuses on a unique individual, and the success here may be influenced by specific variables, such as the mother's high motivation or the infant's specific gestational age and underlying health status. However, the dramatic and instantaneous nature of the thermal response observed provides strong clinical validity for KMC as an immediate rescue therapy. For clinical practice, the immediate adoption of KMC protocols is strongly recommended for all hemodynamically stable LBW infants experiencing hypothermia, regardless of the availability of conventional equipment. Future studies should focus on implementing randomized controlled trials (RCTs) to compare the speed and duration of thermal recovery achieved by KMC versus incubator care across larger, more diverse populations of hypothermic LBW infants. Specifically, researchers should quantify the impact of KMC duration on long-term neurodevelopmental outcomes and the rate of hospital-acquired infections. The standardization of KMC training for all maternity and neonatal staff is essential to ensure consistent and optimal application of this life-saving technique.

Conclusion

KMC is a proven, cost-effective intervention for managing hypothermia in low-birth-weight infants. Through sustained skin-to-skin contact, KMC facilitates thermal regulation, enhances breastfeeding, and strengthens maternal-infant bonding, leading to improved neonatal outcomes. Particularly in resource-limited settings, KMC offers a practical alternative to conventional warming methods, significantly reducing the risk of hypothermia and associated complications. Future research should explore the comparative effectiveness of KMC versus other thermoregulation strategies, such as incubators or polyethylene wraps, with attention to long-term outcomes and cost-efficiency. Studies examining the neurodevelopmental impact of KMC during infancy and early childhood are also warranted. Additionally, researchers should investigate barriers to KMC implementation, including structural, cultural, and logistical challenges in both hospital and community settings. Evaluating nurse-led training programs and their influence on maternal confidence and adherence to KMC protocols could further strengthen its application. The development and validation of standardized tools to measure KMC fidelity, maternal engagement, and thermal stability are essential for consistent monitoring. Finally, integrating KMC into national neonatal care policies and assessing its scalability across diverse healthcare systems will be critical for broader adoption and sustainability.

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