INDOGENIUS

ISSN 2828-1365

Special Issue (2025) : 173 – 179

The Application of Nesting Therapy on Thermoregulation Changes in Premature Infants in the NICU

Marlia Afifah[1], Erida Fadila[1]
[1]*Institut Teknologi dan Kesehatan Mahardika, Cirebon, Indonesia*

Article Info

Keywords :
Nesting Therapy, Premature, Thermoregulation, Hypothermia

Corresponding Author :
Marlia Afifah
E-mail :
marlia.afifah31@gmail.com
Phone Number : 088224414770

ABSTRACT

Background & Objective: A preterm infant is defined as a baby born before 37 weeks of gestation (Kemenkes, RI, 2024). The *World Health Organization* (WHO), 2023 , categorizes preterm births based on gestational age: ≤28 weeks is *extremely preterm*, ≤32 weeks is *very preterm*, and 37 weeks is *moderately preterm*. According to (Kemenkes, RI, 2024), the WHO estimates that 13.4 million babies were born prematurely in 2020. Indonesia ranks fifth highest in the world for premature births, with approximately 657,700 cases. One of the issues faced by premature infants is metabolic disorders, where premature infants are at risk of experiencing a decrease in body temperature due to low body fat reserves and incomplete brain maturation in regulating the infant's body temperature (Rufaindah et al., 2022). The objective is to analyze the effect of nesting therapy on changes in thermoregulation in premature infants in the NICU of Kardinah General Hospital, Tegal City. **Method:** descriptive study using case study results with a nursing care process approach. Instruments: pediatric nursing care format, digital thermometer. **Result:** The application of *nesting* therapy for three days on premature infants with hypothermia resulted in changes in body temperature within the normal range for premature infants. **Conclusion:** *Nesting* therapy is effective in increasing body temperature in premature infants, as their minimal movement contributes to energy conservation. This study is expected to enhance the application of *developmental care*, particularly in premature infants.

DOI: https://doi.org/10.56359/igj.v4i2A.700

Introduction

One of the goals of SDG 3 is to focus on healthy and prosperous lives by ensuring healthy lives and improving the well-being of all people of all ages. According to the United Nations Development Programme (UNDP), one of the nine targets of SDG 3 is in the field of infant and child health, with the goal of ending neonatal and child mortality by reducing the neonatal mortality rate to 12 per 1,000 live births and the child mortality rate to 25 per 1,000 (UNDP, 2021) (Ramadhan et al., 2023).

Based on the underlying causes, neonatal deaths can be classified into several categories: infant-related factors, maternal factors, healthcare-related factors, and geographical or environmental factors. According to *World Health Organization* (WHO) data from 2015, the main causes of neonatal mortality include preterm birth (34%), intrapartum complications (24%), sepsis (15%), and congenital anomalies (11%) (Predani et al., 2024). Prematurity is defined as a live birth before 37 weeks of gestation (*World Health Organization*, 2023). Preterm birth is categorized based on gestational age: ≤28 weeks is *extremely preterm*, ≤32 weeks is *very preterm*, and 37 weeks is *moderately preterm* (World Health Organization, 2023).

The *World Health Organization* estimates that 13.4 million babies were born prematurely in 2020. According to the Basic Health Research (RISKESDAS) 2018, the prevalence of premature births in Indonesia in 2018 was 29.5% per 1,000 live births. According to (Ministry of Health, RI, 2024), Indonesia ranks fifth highest in the world for premature birth rates, with approximately 657,700 cases annually.

Premature babies have a lower birth weight than expected, also known as Low Birth Weight (LBW). In addition to being small in size, premature babies have underdeveloped organ functions. Metabolic disorders are one of the common issues encountered in premature babies. According to (Rufaindah et al., 2022), premature babies are at risk of hypothermia, which is caused by insufficient fat reserves in the body and incomplete brain maturation for regulating the baby's body temperature. Therefore, this condition requires special care, such as intensive care. One form of care for premature infants is developmental care. Developmental care is an intervention aimed at minimizing stress during neonatal intensive care. Some developmental care interventions include controlling external stimuli (vestibular, auditory, visual, tactile), reducing noise and light, and positioning the premature infant to provide a sensation similar to the intrauterine experience (Ministry of Health, Indonesia, 2022).

One form of developmental care intervention is nesting positioning or body positioning. The benefits of *nesting positioning*, according to Altimier & Phillips (2013) in Julianti et al. (2024), include optimizing neuromotor and musculoskeletal growth, stability, physiological function, skin integrity, and temperature regulation in neonates. This is evidenced in the study by Ginting et al. (2023) at Dr. Pringadi General Hospital in Medan, which found that the use of nesting and prone positioning can influence temperature, oxygen saturation, and heart rate in premature infants and low birth weight infants. This is also consistent with a study (Kahraman et al., 2018) in the NICU ward of a hospital in Turkey, which found that the prone position has a pain-reducing, calming, and stress-relieving effect on premature infants during *heel lance* procedures.

Objective

Based on the above phenomena and issues related to one of the developmental care interventions, namely the application of nesting in relation to temperature

changes, the author is interested in conducting a case study entitled "The Application of Nesting Therapy on Thermoregulation Changes in Premature Infants in the NICU."

Method

The design used is a descriptive method with the application of case study results. This study employs a nursing care process approach, which includes assessment, nursing diagnosis, nursing intervention, nursing implementation, and nursing evaluation, containing the final outcomes of nursing actions.

The data collected were primary data obtained through literature review journals and the application of therapy using nursing care sheets.

From the data presented, the data were discussed and compared with previous research results and theoretically with health behavior. Conclusions were drawn using the inductive method.

Results

Ms. Z was admitted to the hospital on December 16, 2024. She is female and was born on December 16, 2024. She was born spontaneously at Palaraya Tegal Hospital with an indication of G2P1A0, 32-33 weeks pregnant, with premature rupture of membranes. Ms. Z is 2 days old and is being treated in an incubator in the NICU with a diagnosis of Respiratory Distress Syndrome (RDS) + BBLR. Ms. Z is the second child of Ms. Z, who is 32 years old with a high school education. The guardian of Ms. Z is her biological father, Mr. F, who is 35 years old, has a high school education, works as a private employee, and resides in Talang, Tegal, Central Java. The results of the assessment conducted on December 17, 2024 (2:00 PM WIB) are as follows: Birth weight: 1,690 grams, current weight: 1,561 grams, length: 42 cm, head circumference: 28 cm, chest circumference: 17 cm, abdominal circumference: 18 cm, appears to be short of breath, respiratory rate: 44 breaths per minute, oxygen saturation: 96%, chest wall retractions present, nasal flaring present, cyanosis when oxygen is removed. Currently, the infant is on CPAP oxygen with FIO2 30% and PEEP 6. Heart rate: 130 beats per minute. No fever, cold extremities, body temperature 35.8°C, incubator temperature 32°C. An IV is in place on the left hand. Weak sucking reflex, and the infant is on an OGT.

Based on the data obtained, the diagnosis is "ineffective thermoregulation related to inadequate subcutaneous fat supply, characterized by a body temperature of 35.8°C and cold skin." After nursing interventions for 3x24 hours, it is expected that body temperature regulation will improve with the following criteria: improved body temperature, improved skin temperature, and improved capillary refill. The planned intervention is Temperature Regulation (I.14578), which includes: Observation: monitor body temperature, skin temperature, and skin color. Therapeutic: Modify the environment to prevent a decrease in body temperature (using nesting therapy). Education: Demonstrate the kangaroo care method (KCM).

Actions already taken include monitoring the infant's body temperature, skin temperature, and skin color; monitoring the incubator temperature; providing nesting therapy by rolling a cloth into a U-shape and wrapping it around the infant's body; and educating the family about kangaroo mother care on the first day. Results on the first day: body temperature 36.5°C, skin color red and dry, still feels cold to the touch, incubator temperature 32°C, the baby appears comfortable during nesting therapy, the family understands the information provided. The results of the second day's

actions were a body temperature of 36.7°C, red and dry skin, still feeling cold to the touch, incubator temperature of 32°C, *nesting* therapy continued, and the baby's body temperature began to stabilize. The results of the third day's actions were a body temperature of 36.9°C, red and dry skin, feeling warm to the touch, and incubator temperature of 32°C.

The evaluation stage of the case study conducted on December 17, 2024 (21:00 WIB) yielded the following data: Subjective: none, Objective: body temperature 36. 50°C, skin color red and dry, still feels cold, incubator temperature 32°C, baby given nesting therapy. *Assessment:* ineffective thermoregulation issue not yet resolved. *Plan*: continue intervention by monitoring the baby's body temperature, monitoring skin temperature and color, monitoring incubator temperature, and providing nesting therapy.

On the second day of evaluation in the case study conducted on December 18, 2024 (14:00 WIB), the following data was obtained: Subjective: none, Objective: body temperature 36. 70°C, skin color red and dry, still feels cold to the touch, incubator temperature 32°C, infant received *nesting* therapy. *Assessment*: ineffective thermoregulation partially resolved. *Plan*: continue intervention by monitoring the infant's body temperature, skin temperature, skin color, incubator temperature, and providing nesting therapy.

On the third day of evaluation in the case study conducted on December 19, 2024 (2:00 PM WIB), the following data was obtained: Subjective: none, Objective: body temperature 36.90°C, skin color red and dry, skin feels warm, incubator temperature 32°C, baby received *nesting* therapy, *Assessment*: ineffective thermoregulation issue resolved, *Plan*: intervention discontinued.

Discussion

The findings of the journal article indicate that nesting therapy was administered for 30 minutes, with body temperature measured before and after the therapy. In the study (Suryani et al., 2023), *nesting* therapy was administered for three consecutive days, with body temperature measured before and after the therapy. The results of the study (Suryani et al., 2023) on the post-test on day 3, conducted on 15 respondents, showed normal body temperatures of 36.50°C–37.50°C in 14 respondents (93.3%), meaning that 1 respondent (6.7%) experienced hypothermia (<36.50°C). Similar findings were also reported in the study by Azzahraa et al. (2022) involving 50 participants, where 3 participants experienced a decrease in body temperature after the nesting method was applied.

In incubator care, the baby's body undergoes heat loss through conduction, convection, evaporation, and radiation. This heat loss can occur more quickly if the baby's skin is wet, the room temperature is cold, and there is increased air movement. If the infant is exposed to excessive heat, it can cause hyperthermia, while insufficient heat exposure can lead to hypothermia. This can also occur if the infant is exposed to direct sunlight. Therefore, temperature regulation in the baby incubator is important to maintain stable and controlled body temperature (Ministry of Health, 2018) in (Purbasari, 2025).

Physiological changes in temperature in premature babies occur due to increased evaporation caused by a lack of subcutaneous fat and a larger body surface area compared to full-term babies. This occurs because the body's temperature regulation system is not yet functioning properly and heat production is reduced due to

insufficient *brown fat*. A decrease in temperature can stimulate the release of norepinephrine from sympathetic nerve endings, which in turn stimulates brown fat cells. The strong effect of norepinephrine is supported by the release of catecholamines from thyroxine (T4) and the adrenal medulla of the thyroid gland, with a decrease in body temperature due to increased oxygen consumption and metabolic rate. Lipolysis of fat cells, ATP, and glucose contribute to heat production. (Bobak et al., 2005; Coad & Dunstall, 2007; Scanlon & Sunders, 2007; Ferrari et al., 2018).

It can be concluded that the results of the journal articles indicate that *nesting* therapy has an effect on changes in thermoregulation (body temperature). The application of *nesting* therapy was conducted on cases of hypothermia and administered for three consecutive days, with body temperature measurements on the first day at 36.50°C, the second day at 36.70°C, and the third day at 36.90°C. This indicates that the infant did not experience hypothermia after *nesting* therapy, and it can be concluded that *nesting* therapy is effective in reducing body temperature in premature infants with hypothermia.

The researchers assume that the effect of *nesting* therapy on body temperature changes is due to the minimal movement of the infant, who is in a position of shoulder and elbow adduction flexion, hip and knee flexion, and the head on the midline. This position is one form of energy conversion. *Nesting* also supports the infant's body and increases comfort.

Conclusion

Based on the application of the results of the previous case study conducted on December 17-19, 2024, on premature infants in the NICU, the following conclusions can be drawn:

1. After reviewing previous research journals, it was found that *nesting* therapy has an effect on changes in thermoregulation (body temperature) in premature infants.
2. Physiological changes in body temperature in premature infants occur due to increased evaporation caused by insufficient subcutaneous fat tissue and a larger body surface area compared to full-term infants.
3. *Nesting* therapy has an effect on reducing body temperature in premature infants experiencing hypothermia, as the infant's limited movement contributes to energy conversion.

Based on the results of this study, it is hoped that families can apply *nesting* therapy to infants to maintain their body temperature.

References

Amaliya, S., Kartika, A. W., & Azizah, N. (2023). *Asuhan Keperawatan Bayi Risiko Tinggi*. UB Press.

Efendi, D., Sari, D., Riyantini, Y., Novardian, N., Anggur, D., & Lestari, P. (2019). PEMBERIAN POSISI (POSITIONING) DAN NESTING PADA BAYI PREMATUR: EVALUASI IMPLEMENTASI PERAWATAN DI NEONATAL INTENSIVE CARE UNIT (NICU). *Jurnal Keperawatan Indonesia*, *22*(3), 169–181. https://doi.org/10.7454/jki.v22i3.619

Ekaputri, M., Susanto, G., & Paryono. (2024). *Proses Keperawatan: Konsep,Implementasi, Evaluasi*. Tahta Media Group.

Ginting, C. N., Sari, M. P., Ginting, M., Tobing, M. L., Sigalingging, M., & Suri, M. (2023). Efektivitas Penggunaan Nesting dan Posisi Prone terhadap Suhu Tubuh,

Saturasi Oksigen dan Frekuensi Nadi Bayi Prematur dan BBLR di RSU Dr.Pringadi Medan. *Malahayati Nursing Journal*, *5*(7), 2259–2266. https://doi.org/10.33024/mnj.v5i7.9037

Ismail, Basri, M., & Rahmatia, S. (2024). *BUKU AJAR FALSAFAH DAN TEORI KEPERAWATAN*. Nasmedia.

Julianti, E., Mardiyah, A., & Zulkifli. (2024). *Implementasi Developmental Care di Ruang NICU*. Sonpedia Publishing Indonesia.

Kahraman, A., Başbakkal, Z., Yalaz, M., & Sözmen, E. Y. (2018). The effect of nesting positions on pain, stress and comfort during heel lance in premature infants. *Pediatrics & Neonatology*, *59*(4), 352–359. https://doi.org/10.1016/j.pedneo.2017.11.010

Kemenkes, RI. (2022). *Developmental Care di Unit Neonatal*. https://sardjito.co.id/2022/08/31/developmental-care-di-unit-neonatal/

Kemenkes, RI. (2024). *Merawat Bayi Prematur*. https://sehatnegeriku.kemkes.go.id/baca/blog/20240124/5344836/merawat-bayi-prematur/

Morrison, S. F., & Nakamura, K. (2019). Central Mechanisms for Thermoregulation. *Annual Review of Physiology*, *81*(1), 285–308. https://doi.org/10.1146/annurev-physiol-020518-114546

Nova Eka Ramadhani & Maryatun Maryatun. (2024). Penerapan Terapi Nesting Terhadap Perubahan Fisiologis Pada Bayi Berat Lahir Rendah di RSUD Wonogiri. *Protein : Jurnal Ilmu Keperawatan Dan Kebidanan.*, *2*(4), 133–144. https://doi.org/10.61132/protein.v2i4.707

Osilla, E. V., Marsidi, J. L., & Sharma, S. (2023). *Physiology, Temperature Regulation*. StatPearls. https://www.ncbi.nlm.nih.gov/books/NBK507838/

Prawesti, A., Emaliyawati, E., Mirwanti, R., & Nuraeni, A. (2019). The Effectiveness of Prone and Supine Nesting Positions on Changes of Oxygen Saturation and Weight in Premature Babies. *Jurnal Ners*, *14*(2), 137–143. https://doi.org/10.20473/jn.v14i2.7755

Predani, N. L. P. D., Bikin Suryawan, I. W., & Suryaningsih, P. S. (2024). Analisis Faktor-Faktor yang Memengaruhi Kematian Neonatus: Studi Retrospektif di Rumah Sakit Wangaya Denpasar. *Sari Pediatri*, *25*(5), 322. https://doi.org/10.14238/sp25.5.2024.322-7

Purbasari, D. (2025). Studi Korelasi antara Suhu Inkubator dan Intensitas Cahaya dengan Klasifikasi Suhu Tubuh pada Bayi Prematur. *Jurnal Kesehatan Amanah*, *9*(1), 145–160. https://doi.org/10.57214/jka.v9i1.831

Ramadhan, M. G., Karima, U. Q., Yuliana, T., & Herbawani, C. K. (2023). Faktor-Faktor Terjadinya Kematian Neonatal di Indonesia: Analisis Data SDKI 2017. *Jurnal Biostatistik, Kependudukan, Dan Informatika Kesehatan*, *Volume 3*.

Rufaindah, E., Muzayyana, & Mariyam. (2022). *Tatalaksana Bayi Baru Lahir*. CV Media Sains Indonesia.

Saprudin, N., & Sari, I. K. (2018). Pengaruh Penggunaan Nesting Terhadap Perubahan Suhu Tubuh Saturasi Oksigen Dan Frekuensi Nadi Pada Bayi Berat Badan Lahir Rendah di Kota Cirebon. *Jurnal Ilmu Kesehatan Bhakti Husada: Health Sciences Journal*, *9*(2), 16–26. https://doi.org/10.34305/jikbh.v9i2.63

Sukmawati, A. S., Isrofah, & Suryati. (2023). *BUKU AJAR PEMENUHAN KEBUTUHAN DASAR MANUSIA*. Sonpedia Publishing Indonesia.

Suryani, S. I., Shifa, N. A., & Yuliza, E. (2023). Efektivitas Terapi Sentuhan dan Penggunaan Nesting terhadap Suhu Tubuh Bayi Berat Badan Lahir Rendah: The Effectiveness of Touch Therapy and the Use of Nesting on the Body Temperature of Low Birth Weight Infants. *Open Access Jakarta Journal of Health Sciences*, *2*(3), 623–630. https://doi.org/10.53801/oajjhs.v2i3.121

Tansey, E. A., & Johnson, C. D. (2015). Recent advances in thermoregulation. *Advances in Physiology Education*, *39*(3), 139–148. https://doi.org/10.1152/advan.00126.2014

Todurkar, N. (2022). Neonatal thermoregulation. *Canadian Premature Baby Foundation*. https://www.cpbf-fbpc.org/post/neonatal-thermoregulation

UNDP. (2021). *Goal 3: Good health and wellbeing*. https://www.undp.org/content/undp/e

World Health Organization. (2023). *Preterm Birth*. https://www.who.int/news-room/fact-sheets/detail/preterm-birth