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SURAT KEPUTUSAN
DEKAN FAKULTAS ILMU KESEHATAN UNIVERSITAS GALUH
NOMOR : 006/401/SK/AK/D/I/2024
Tentang
PENGANGKATAN PEMBIMBING KARYA ILMIAH AKHIR NERS (KIAN)
PROGRAM PENDIDIKAN PROFESI NERS TAHUN AKADEMIK 2023-2024

DEKAN FAKULTAS ILMU KESEHATAN UNIVERSITAS GALUH CIAMIS

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1. Bahwa untuk kelancaran dan kesesuaian penulisan Karya Ilmiah Akhir Ners (KIAN) perlu diangkat Dosen Pembimbing;
2. Bahwa untuk legalitas pembimbing dalam melakukan kegiatan bimbingan penulisan Karya Ilmiah Akhir Ners (KIAN) perlu di terbitkan Surat Keputusan Dekan.

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1. Undang-undang Nomor 12 Tahun 2012 tentang Sistem Pendidikan Nasional;
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3. Surat Keputusan Yayasan Pendidikan Galuh Ciamis Nomor 1 Tahun 2017 tanggal 18 Juli 2017 tentang Statuta Universitas Galuh;
4. Keputusan Rektor Universitas Galuh Nomor 037A/4123/SK/AK/R/II/2017 tentang Pemberlakuan Pedoman Akademik Universitas Galuh;
5. Surat Keputusan Rektor Universitas Galuh Nomor : 262/4123/SK/G/VIII/2023 Tanggal 26 Agustus 2023 tentang Pemberhentian dan Pengangkatan Dekan Fakultas Ilmu Kesehatan Universitas Galuh Masa Jabatan 2023-2027;

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MENETAPKAN :

PERTAMA :
Nama : **Wulan Nur Amalia**
Nomor Pokok : **1490123096**
Program Studi : Pendidikan Profesi Ners

KEDUA : Mengangkat Pembimbing Karya Ilmiah Akhir Ners mahasiswa seperti yang tertulis pada diktum pertama sebagai berikut:
Pembimbing I : **Daniel Akbar Wibowo,S.Kep.,Ners., M.M., Mkep**
Pembimbing II : **H.Asep Wahyudin, S.Kep.,Ners., M.Kep**

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JBI Critical Checklist for Quasy Experimental Studies
(non-randomized experimental studies)

Reviewer : Wulan Nur Amalia Date 06 Mei 2024

Author _ : Ika Nur Saputri Year : 2019 Record Number

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?			✓	
2. Were the participants included in any comparisons similar?	✓			
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?		✓		
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?		✓		
7. Were the outcomes of participants included in any comparisons measured in the same way?		✓		
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

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1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?			✓	
2. Were the participants included in any comparisons similar?	✓			
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8. Were outcomes measured in a reliable way?	✓			
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Author _ : Makmuriana, dkk. ..... Year : 2022 ..... Record Number_____

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2. Were the participants included in any comparisons similar?	✓			
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?		✓		
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?			✓	
7. Were the outcomes of participants included in any comparisons measured in the same way?	✓			
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

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Reviewer : Wulan Nur Amalia Date : 06 Mei 2024

Author _ : Alpanamayi Bera, et.al Year : 2014 Record Number

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2. Were the participants included in any comparisons similar?	✓			
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?			✓	
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?			✓	
7. Were the outcomes of participants included in any comparisons measured in the same way?	✓			
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

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Author _ : Aziz & Azeeze Year : 2020 Record Number

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3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?		✓		
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
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7. Were the outcomes of participants included in any comparisons measured in the same way?	✓			
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

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Author _ : Bety Mayasari Year Record Number

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2. Were the participants included in any comparisons similar?	✓			
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?		✓		
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?			✓	
7. Were the outcomes of participants included in any comparisons measured in the same way?			✓	
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

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Comments (Including reason for exclusion)

Layak dilakukan review : 55%

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Reviewer : Wulan Nur Amalia Date : 06 Mei 2024

Author _ : Feny Fernando, dkk Year : 2016 Record Number

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1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?			✓	
2. Were the participants included in any comparisons similar?	✓			
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?	✓			
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?			✓	
7. Were the outcomes of participants included in any comparisons measured in the same way?	✓			
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

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Reviewer : Wulan Nur Amalia Date : 06 Mei 2024

Author _ : Shabir Sedia, et.al Year : 2021 Record Number

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2. Were the participants included in any comparisons similar?	✓			
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?		✓		
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?			✓	
7. Were the outcomes of participants included in any comparisons measured in the same way?	✓			
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

Overall appraisal: Include ✓ ☐ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

Layak dilakukan review : 77%

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Reviewer : Wulan Nur Amalia Date : 06 Mei 2024

Author _ : Ihidarat Ekserinimit, et.al Year : 2022 Record Number

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?			✓	
2. Were the participants included in any comparisons similar?	✓			
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or interventionof interest?	✓			
4. Was there a control group?		✓		
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	✓			
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7. Were the outcomes of participants included in any comparisons measured in the same way?	✓			
8. Were outcomes measured in a reliable way?	✓			
9. Was appropriate statistical analysis used?	✓			

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Short Communication

Effect of Kangaroo Mother Care on Vital Physiological Parameters of The Low Birth Weight Newborn

Alpanamayi Bera, Jagabandhu Ghosh[1], Arun Kumarendu Singh, Avijit Hazra[2], Tapas Som, Dinesh Munian

Departments of Neonatology, [1]Pediatrics, [2]Pharmacology, Institute of Post-Graduate Medical Education & Research (IPGME&R) and Seth Sukhlal Karnani Memorial Hospital (SSKM) Hospital, Kolkata, West Bengal, India

ABSTRACT

Objectives: Low birth weight (LBW; <2500 g), which is often associated with preterm birth, is a common problem in India. Both are recognized risk factors for neonatal mortality. Kangaroo mother care (KMC) is a non-conventional, low-cost method for newborn care based upon intimate skin-to-skin contact between mother and baby. Our objective was to assess physiological state of LBW babies before and after KMC in a teaching hospital setting. **Materials and Methods:** Study cohort comprised in-born LBW babies and their mothers - 300 mother-baby pairs were selected through purposive sampling. Initially, KMC was started for 1 hour duration (at a stretch) on first day and then increased by 1 hour each day for next 2 days. Axillary temperature, respiration rate (RR/ min), heart rate (HR/ min), and oxygen saturation (SpO_2) were assessed for 3 consecutive days, immediately before and after KMC. **Results:** Data from 265 mother-baby pairs were analyzed. Improvements occurred in all 4 recorded physiological parameters during the KMC sessions. Mean temperature rose by about 0.4°C, RR by 3 per minute, HR by 5 bpm, and SpO_2 by 5% following KMC sessions. Although modest, these changes were statistically significant on all 3 days. Individual abnormalities (e.g. hypothermia, bradycardia, tachycardia, low SpO_2) were often corrected during the KMC sessions. **Conclusions:** Babies receiving KMC showed modest but statistically significant improvement in vital physiological parameters on all 3 days. Thus, without using special equipment, the KMC strategy can offer improved care to LBW babies. These findings support wider implementation of this strategy.

Keywords: India, kangaroo mother care, low birth weight, newborn, physiological parameter, preterm

Introduction

Low birth weight (LBW; <2500 g regardless of gestational age), which is often associated with preterm birth, is an important predictor of infant death within 28 days of birth.[1] It is estimated that globally, out of 139 million live births, more than 20 million LBW babies are born each year-over 95% of them in developing countries, mainly of South Asia and sub-Saharan Africa.[2] It is also estimated that, in developing countries, LBW infants are approximately 13 times more likely to die than normal birth weight counterparts.[3] Medical cost is also significantly higher in caring for preterm and other LBW babies. LBW occurs in about 20-30% of all live births in India.[4]

A major problem with such babies is their inability to control body temperature — a preventable cause of their morbidity and mortality. A World Health Organization (WHO) supported study in Nepal showed that hypothermia was common in newborn infants soon after birth; increased mortality was noted across all grades of hypothermia, and the risk was 12

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times higher among preterm babies.[5] A study from India[6] revealed that 2.9% intramural babies and 45% babies born at home developed mild to moderate hypothermia.

Kangaroo mother care (KMC) implies placing the newborn baby in intimate skin-to-skin contact with the mother's chest and abdomen coupled with frequent and preferably exclusive breast-feeding. This is similar to marsupial care-giving, where the premature baby is kept warm in the maternal pouch and close to the breasts for unlimited feeding. KMC has emerged as a non-conventional low cost method for newborn care that provides warmth, touch, and security to the newborn and is believed to confer significant survival benefit. An updated Cochrane review has reported that KMC benefits breastfeeding outcomes and cardio-respiratory stability in infants without negative effects.[7]

Indian data on outcome of KMC are limited, though it has been found to be an effective and feasible method of care of LBW babies in hospital setting.[8] With this background, the objective of our study was to assess the physiological state of LBW babies during KMC in a teaching hospital setting. The broader intention is to generate data to recommend wider implementation of the strategy.

Materials and Methods

The study design was quasi-experimental with subjects serving as their own control. The study cohort comprised LBW babies born at Institute of Postgraduate Medical Education & Research (IPGME&R), Kolkata and its associated SSKM Hospital, and mothers of these babies. This is a tertiary care teaching hospital with level III neonatal intensive care unit (NICU) facility. The study protocol was approved by the institutional ethics committee, and formal written informed consent of willing mothers was obtained. Babies with sick mothers or gross congenital malformations were not included.

At first, the mothers were counseled regarding breastfeeding and KMC and their benefits. Then, breastfeeding and KMC were demonstrated with the help of volunteer mothers. After motivation, formal written informed consent of willing mothers was obtained for participation in the study. Three hundred mother-baby pairs were selected through purposive sampling over a period of 3 years. Babies requiring NICU admission were also included provided they became hemodynamically stable.

For implementing KMC, mothers were asked to use any front open light dress. Babies were dressed with cap, socks, and nappy and no other garments. After placing into a custom-made KMC bag, the baby was placed upright inside mother's clothing against bare skin of the chest and abdomen. Head was turned to one side and placed in a slightly extended position and eye to eye contact between mother and baby was encouraged. The hips were kept flexed and abducted in a 'frog' position; the arms were also flexed. The baby was allowed to suck on the breast as often as it wanted. On the first day, KMC was provided for 1 hour at a time, second day 2 hours, third day 3 hours, and subsequently, the at-a-stretch duration was increased to as long as the mother felt comfortable. Counseling and demonstration were repeated for initially hesitant mothers till they were able to offer KMC confidently and correctly. Mothers who failed to execute KMC correctly despite repeated demonstrations were withdrawn from the study, although they were made conversant with the KMC technique ultimately.

Four vital physiological parameters of the baby, namely temperature, respiration rate, heart rate, and oxygen saturation, were assessed immediately before and after KMC for 3 consecutive days. Axillary temperature was measured (in °C) by digital thermometer. Respiration rate was assessed by observing chest movements for full one minute. Heart rate and oxygen saturation were recorded with the help of pulse-oximeter.

Statistical analysis

Data have been summarized by mean and standard deviation; 95% confidence interval (CI) values have been stated where deemed relevant. All 4 physiological variables were normally distributed. Boxplots have been used to depict the range of values encountered for individual parameters. Mean values before and after KMC were compared (two-tailed analysis) by Students' paired *t* test; $P < 0.05$ has been considered statistically significant. Statistica version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001] software was used for analysis.

Results

Complete data was available for 265 cases out of the 300 mother-baby pairs recruited. Data from those 35 cases where the mother could not implement KMC correctly or for the scheduled duration on all 3 days were not included. The age of the mothers was 25.7 ± 5.19 years (mean ± standard deviation). The gestational age of the babies at birth was 33.2 ± 3.30 weeks and birth weight was 1450.9 ± 311.19 g. Table 1 depicts the physiological variables on the 3 successive days and [Table 2] summarizes the changes with their 95% CI and statistical significance. There were no deaths in these babies.

Table 1: Range of values for the four physiological parameters recorded in the study

Physiological parameter		Day 1		Day 2		Day 3	
		Before KMC	After KMC	Before KMC	After KMC	Before KMC	After KMC
Temperature (°C)	Minimum	35.8	36.5	36.1	36.5	35.6	36.6
	Maximum	37.1	37.4	37.0	37.3	38.0	37.3
	Mean±SD	36.5±0.12	36.9±0.15	36.5±0.13	36.9±0.15	36.5±0.12	37.0±0.13
Respiration rate (per minute)	Minimum	26	30	26	32	26	32
	Maximum	60	60	56	60	66	60
	Mean±SD	39.7±5.75	42.3±4.80	39.4±5.16	42.8±4.90	40.1±4.91	43.7±4.63
Heart rate (bpm)	Minimum	91	120	92	110	85	110
	Maximum	180	168	170	160	188	164
	Mean±SD	140.5±10.62	145.3±7.64	141.3±9.92	145.9±7.77	141.5±9.39	146.5±6.72
O_2 saturation (%)	Minimum	78	90	77	90	78	94
	Maximum	100	100	100	100	100	100
	Mean±SD	91.9±3.47	97.6±1.88	92.9±3.37	98.5±1.46	93.5±3.19	99.5±0.78

bpm: Beats per minute, KMC: Kangaroo mother care, SD: Standard deviation

Table 2: Changes in physiological parameters before and after KMC in the study cohort

Difference between post-KMC and pre-KMC value with respect to	Statistics of paired differences (change)		
	Mean ± SD	95% CI	*P* value
Temperature (°C)-Day 1	0.34±0.17	0.320-0.36	<0.001
Temperature (°C)-Day 2	0.39±0.15	0.370-0.41	<0.001
Temperature (°C)-Day 3	0.43±0.20	0.40-0.45	<0.001
Respiration rate (per minute)-Day 1	2.6±3.49	2.2-3.0	<0.001
Respiration rate (per minute)-Day 2	3.3±3.75	2.9-3.8	<0.001
Respiration rate (per minute)-Day 3	3.7±3.73	3.2-4.1	<0.001
Heart rate (per minute)-Day 1	4.8±8.22	3.8-5.8	<0.001
Heart rate (per minute)-Day 2	4.6±7.99	3.6-5.5	<0.001
Heart rate (per minute)-Day 3	5.0±7.35	4.1-5.9	<0.001
O_2 saturation (%)-Day 1	5.7±3.06	5.4-6.1	<0.001
O_2 saturation (%)-Day 2	5.6±3.23	5.2-6.0	<0.001
O_2 saturation (%)-Day 3	6.0±3.06	5.6-6.4	<0.001

CI: Confidence interval, KMC: Kangaroo mother care,SD: Standard deviation

Temperature showed a small rise during KMC, and the changes were statistically significant on all 3 days. During initiation of the KMC session, some babies had mild hypothermia. During KMC, most babies showed steady rise in temperature and none developed hypothermia.

No baby had respiratory distress at baseline. The mean change in respiration rate during KMC was 2.6 ± 3.49 ($P < 0.001$) on day 1, 3.3 ± 3.75 ($P < 0.001$) on day 2, and 3.7 ± 3.73 ($P < 0.001$) on day 3. During KMC sessions, the babies showed regular respiration and often fell asleep. No baby developed apnea during KMC. From the standard deviation figures in Table 2, it is evident that the variability in respiration rate was also brought down by KMC.

Heart rate showed a rise during KMC, and the mean changes were modest but statistically significant on all 3 days - 4.8 ± 8.22 on day 1 ($P < 0.001$), 4.6 ± 7.99 on day 2 ($P < 0.001$), and 5 ± 7.35 on day 3 ($P < 0.001$). Few babies had bradycardia (< 100 bpm) at baseline - 2 babies on day 1, and 1 each on day 2 and 3 - but during KMC session, all babies achieved normal (between 100-170 bpm) and stable heart rates.

Mean oxygen saturation also improved by about 5% on all 3 days, the change being statistically significant along with distinct reduction in the dispersion of this parameter. Below 90% saturation at start of the KMC session was present in 64, 47, and 32 babies respectively on the 3 days, but all recovered following the session. Even babies on oxygen had their oxygen requirement reduced within 15 minutes of starting KMC.

Figures 1 and 2 depict the range of values encountered for body temperature and oxygen saturation in the study cohort over the 3 successive study days.

Overall, it can be said that babies receiving KMC showed statistically significant improvement in all the 4 vital physiological parameters, of which the extent of rise in respiration rate and oxygen saturation were also clinically significant. This was seen on all 3 days.

Discussion

KMC is a simple and low-cost intervention for the care of LBW infants. It enhances both infant and maternal well-being and can be practiced in any situation without needing special equipment (e.g. special cots, heaters, incubators). Although initially conceived for use in developing countries with limited resources, its use has expanded worldwide as caregivers, parents, and administrators become increasingly familiar with the physiological, psychological, and cost benefits associated with the practice.[9-11]

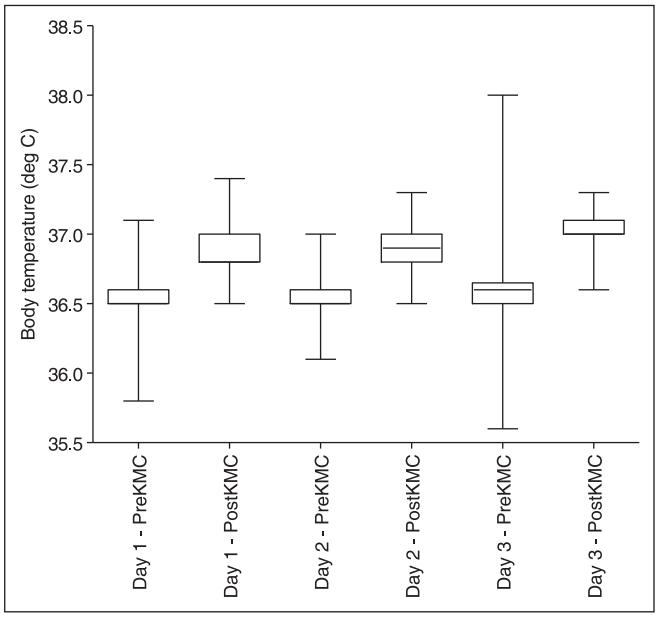

Figure 1: Temperature changes induced by kangaroo mother care sessions on the three successive study days

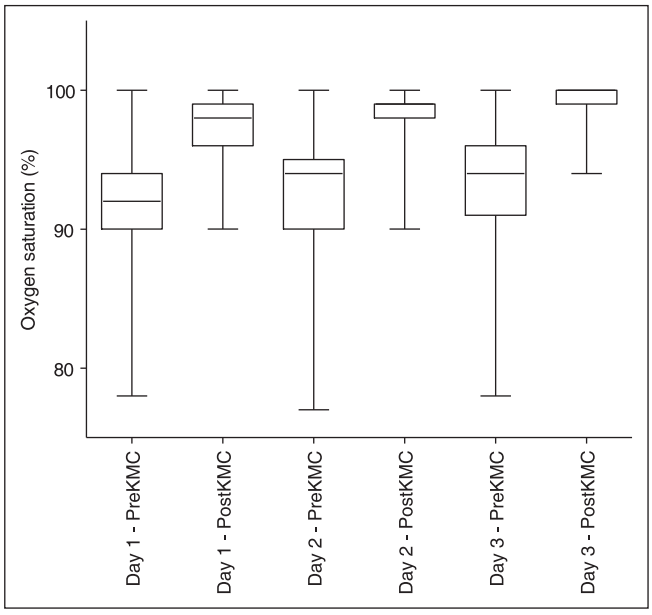

Figure 2: Changes in O_2 saturation brought about by kangaroo mother care sessions on the three successive study days

Our study results are broadly in agreement with earlier studies. Although not a marked rise, the smooth upward trend in temperature during KMC sessions should protect the newborn against temperature fluctuations and cold stress. Jothipriya J has reported that mean axillary temperature and mean heart rate were higher during KMC than during routine care.[12] If nothing else, KMC achieves the goal of 'keeping baby warm,' which is one of the most cost-effective interventions to protect babies during the critical neonatal period.[13] Ludington-Hoe *et al*. have reported that kangaroo care promotes stability of physiological function.[14] In their study,[15] heart rate remained stable (mean 143.9), respiratory rate ranged from 20 to 72 (mean 41.2), and apnea episodes did not occur during KMC. After placing babies in KMC position, their temperature never fell below 36.8°C and remained at a mean of 37.1°C.

There was distinct improvement in oxygen saturation during the KMC sessions. This is relevant for sick newborns, particularly those requiring oxygen supports. Earlier studies also report decrease in apnea and improvement in oxygen saturation in mechanically ventilated babies able to tolerate transfer and position changes.[16,17]

A meta-analysis of 23 studies of 190 term and 326 preterm infants (gestational age 26 to 36 weeks) concluded that there was an increase in body temperature of 0.22°C, no change in heart rate, and a statistically but not clinically significant decrease in oxygen saturation of 0.60% during periods of skin-to-skin contact.[18] Prematurity did not affect the stability of these parameters. Our study found a similar rise of temperature, a small but statistically significant rise in heart rate, and a definite improvement in oxygen saturation. These improvements are unlikely to have been due to chance alone since similar improvements were noted on all 3 days, even with as little as 1 hour of kangaroo care on the first day.

The reasons for the beneficial effects of KMC are yet to be fully explored. Heat transfer from mother to baby is obvious. The intimate and early skin-to-skin contact between mother and baby, with repeated nutritive and non-nutritive suckling, possibly also evokes neuropsychological responses that program physiology and behavior. Further, during KMC, the infant experiences maternal heart sounds, rhythmic maternal breathing, warmth and prone positioning, all of which offer gentle stimulation across auditory, tactile, vestibular, and thermal sensory systems, which may in sum total have a tranquilizing effect on the baby, allowing physiological parameters to stabilize.[19]

This study had its share of limitations. It was observational in nature rather than a randomized controlled trial. Despite being motivated, several mothers failed to provide KMC correctly, even after repeated demonstrations, and their data had to be excluded. This emphasizes the need for perseverance for both mothers and nursing staff towards proper KMC technique.[20] The study was conducted in the postnatal ward and NICU setting where healthcare providers are strongly motivated and maintain close supervision. Similar close supervision may not be possible in general ward and domiciliary settings. Therefore, we cannot claim that improvement of physiological parameters, with its attendant clinical implications, would be obtainable in any setting. Indeed,

implementation of KMC requires organized planning and effort, and lack of these are barriers towards extending the benefits to all babies in need of such care.[21,22]

Notwithstanding these limitations, it can be stated that low birth weight babies receiving KMC show modest but statistically significant rise in temperature, respiration rate, heart rate, and oxygen saturation through kangaroo care, without the need for any special equipment. This can help to avoid complications and the need for more elaborate interventions. There is a case for making KMC the standard of care for the LBW newborn in our setting. However, adequate planning and manpower would be needed to motivate and train mothers to undertake KMC and to monitor that they do so satisfactorily.

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EFEKTIFITAS METODE KANGURU TERHADAP SUHU PADA BAYI BERAT LAHIR RENDAH (BBLR)

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ABSTRAK

BBLR masih terus menjadi masalah kesehatan masyarakat yang signifikan secara global mencapai 15% bayi di seluruh dunia (lebih dari 20 juta jiwa). Sangat penting Terapi pendamping menggunakan metode kangguru yang bisa digunakan untuk mencegah terjadinya hipotermi karena tubuh ibu dapat memberikan kehangatan kepada bayinya secara terus menerus dengan cara kontak antara kulit ibu dengan kulit bayi.Tujuan penelitian ini mempelajari pengaruh metode kangguru terhadap peningkatan suhu pada bayi BBLR. Jenis penelitian ini *quasi eksperimen* ,dengan rancangan studi rancangan yang berupaya untuk mengungkapkan hubungan sebab akibat dengan melibatkan kelompok kontrol Bayi BBLR yang melakukan perawatan dengan inkubator dan kelompok eksperimen Bayi BBLR yang melakukan perawatan dengan metode kanguru dengan rancangan *post test only*. Penelitian dilakukan pada Bulan Juni sampai dengan November 2018. Penelitian dilaksanakan di RSUD D.Rasidin dan RS TK III Dr.Reksdiwiryo Populasi adalah Seluruh ibu yang melahirkan bayi BBLR terdata di rekam medis RSUD D.Rasidin dan RS Tk III.Reksodiwiryo berjumlah 26 Bayi. Sampel berjumlah 26 BBLR yang diambil dengan teknik *consecutive sampling*. Data dianalisis menggunakan *uji Wilcoxon*, dan nilai $p < 0,05$ dianggap bermakna secara statistik. Rerata suhu aksila kelompok metode kanguru 36,8 ±0,3 dan rerata suhu aksila pada kelompok inkubator 36,4±0,1. Rerata total kehilangan panas kering pada kelompok metode kanguru dsan inkubator sebesar 29,66 ± 0,53 J dan pada kelompok inkubator 34,28 ± 0,77 J. Hasil penelitian menyimpulkan bahwa ada pengaruh metode kangguru terhadap suhu aksila pada bayi BBLR. Disarankan hasil penelitian ini dapat dijadikan bahan perbandingan apabila dilakukan penelitian lebih lanjut mengenai perawatan yang tepat pada BBLR.
Kata Kunci : BBLR, Metode Kangguru dan Inkubator

THE EFFECTIVENESS OF KANGAROO METHOD ON TEMPERATURE AND HEAT LOSS IN LOW BIRTH WEIGHT BABIES (LBW)

ABSTRACT

Low Birth Weight still continues to be a significant public health problem globally that reached until 15% of babies worldwide (more than 20 million people). The therapy of using the Kangaroo method can be used to prevent hypothermia because the mother's body can provide warmth to the baby continuously by contact the mother's skin with the baby's skin. The purpose of this study was to study the effect of kangaroo method on increasing temperature in Low Birth Weight. The type of research was quasi-experimental, with a design study to reveal a causal relationship between control group of Low Birth Weight infants who cared for an incubator and an experimental group for LBW infants who were treated with Kangaroo methods. This research used a post test design only. The study have done in June untill

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November 2018. The study was carried out in Dr.Rasidin Hospital and Dr.Reksodiwiryo Hospital. The population was all mothers who gave birth to low bith weight were recorded in the medical records of Dr.Rasidin Hospital and Reksodiwiryo Hospital. The sample amounted to 26 low birth weight taken by consecutive sampling technique. Data were analyzed using Wilcoxon Test, and p <0.05 was considered statistically significant. The mean axillary temperature of the kangaroo method group was 36.8 ± 0.3 and the mean axillary temperature in the incubator group was 36.4 ± 0.1. The average total dry heat loss in the kangaroo method was 29.66 ± 0.53 J and in the incubator group 34.28 ± 0.77 J. The results concluded that there the kangaroo method on axillary temperature in low birth weight. It is suggested that the results of this study can be used as a comparison for the next research.

Keyword: Low Birth Weight, Kangaroo methode,incubator methode

PENDAHULUAN

World Health Organization (WHO) mendefinisikan Berat Badan Lahir Rendah (BBLR) sebagai bayi yang terlahir dengan berat kurang dari 2500gram. BBLR masih terus menjadi masalah kesehatan masyarakat yang signifikan secara global karena efek jangka pendek maupun panjangnya terhadap kesehatan (WHO, 2014)WHO (2014). Pada tahun 2011, 15% bayi di seluruh dunia (lebih dari 20 juta jiwa), lahir dengan BBLR (UNICEF, 2013). Sebagian besar bayi dengan BBLR dilahirkan di negara berkembang termasuk Indonesia, khususnya di daerah yang populasinya rentan (WHO, 2014).

Angka kematian bayi merupakan salah satu indikator dalam menentukan derajat kesehatan suatu bangsa. Berdasarkan data hasil Survei Demografi dan Kesehatan Indonesia SDKI angka kematian bayi 2012-2013 adalah 32 kematian per 1.000 kelahiran hidup angka kematian bayi tinggi terutama disebabkan karena Bayi Berat Lahir Rendah (BBLR), infeksi, diare, dan pneumonia. Di Provinsi Sumatera barat data kematian bayi sudah mengalami penurunan dari 1047 orang pada tahun 2014 menjadi 721 orang pada tahun 2015 (Profil Kesehatan Indonesia, 2016)

Indonesia masih terdapat 10,2 % bayi dengan BBLR, yaitu kurang dari 2.500 gram. Persentase ini menurun dari Riskesdas 2010 (11,1%). Data profil kesehatan provinsi Sumatra Barat dengan BBLR 1,802 orang dari bayi BBLR sebanyak 64. Pda tahun 2018 dari bulan januari sampai mei bayi diruangan perinatologi terdapat 93 bayi. Bayi dengan BBLR sebanyak 43 bayi (DINKES, 2014).

Dari data rekam medik RSUD Dr. Rasidin Padang tercatat pada tahun 2016 bayi di ruangan perinatologi sebanyak 172, dan bayi BBLR sebanyak 61 bayi. Pada tahun 2017 tercatat bayi diruangan perinatologi sebanyak 223 dan bayi BBLR sebanyak 64 bayi. Pada tahun 2018 dari bulan januari sampai mei bayi diruangan perinatologi terdapat 93 bayi , bayi dengan BBLR sebanyak 43 bayi. Sedangkan angka kejadian BBLR di RS Rekso Diwiryo dari bulan juli sampai September 2018 berjumlah 21 bayi.

Pencegahan *hipotermi* di rumah sakit dilakukan dengan mengunakan inkubator. Namun dalam penggunaannya dihadapkan pada masalah kekurangan tenaga terampil, biaya pemeliharaan alat serta, logistik. Selain itu penggunaan inkubator dinilai menghambat kontak dini antara ibu dan bayi dan menghambat dalam pemberian ASI. Serta berakibat buruk juga bagi ibu karena dapat menurunkan rasa percaya diri ibu dan tidak terampil dalam merawat anaknya (PERINASIA, 2013)

Pada metode kanguru tidak terjadi proses kehilangan panas baik melalui radiasi, konveksi, evaporasi, maupun konduksi, sedangkan dengan inkubator masih dapat terjadi proses kehilangan panas melalui radiasi yang dapat mencapai >50%.10 Penggunaan inkubator di negara berkembang memerlukan perhatian khusus terutama terhadap ketersediaan sumber listrik

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yang memadai, tenaga terlatih untuk supervisi, pemeliharaan, dan perbaikan alat, sterilisasi inkubator, dan jumlah inkubator. Seringkali dijumpai satu inkubator digunakan untuk lebih dari satu bayi karena jumlahnya terbatas, hal ini meningkatkan risiko terjadinya infeksi nosokomial (WHO, 2012)

Manfaat perawatan metode kanguru (PMK) dapat mencegah terjadinya hipotermi karena tubuh ibu dapat memberi kehangatan kepada bayinya secara terus menerus dengan cara kontak antara kulit ibu dengan kulit bayi. Selain itu manfaat Perawatan Metode Kanguru (PMK), dapat meningkatkan ikatan kasih sayang antara ibu dan bayi, memudahkan bayi dalam memenuhi kebutuhan nutrisi, mencegah infeksi dan memperpendek masa rawat inap sehingga dapat mengurangi biaya perawatan (PERINASIA, 2013)

Berdasarkan dari data rekam RSUD DR.Rasidin angka kejadian BBLR Januari sampai Mei 2018 berjumlah 43 BBLR dan RS Dr.Reksodiwiryo berjumlah 21 BBLR, maka peneliti tertarik untuk meneliti Efektifitas Metode Kanguru Terhadap Suhu Pada Bayi Berat Badan Lahir Rendah (BBLR).

BAHAN DAN METODE

Jenis penelitian yang digunakan dalam penelitian ini adalah *quasi eksperimen* yaitu rancangan yang berupaya untuk mengungkapkan hubungan sebab akibat dengan cara melibatkan kelompok kontrol Bayi BBLR yang melakukan perawatan dengan inkubator dan kelompok eksperimen Bayi BBLR yang melakukan perawatan dengan metode kanguru dengan rancangan *post test only* (Nursalam, 2012)

Populasi pada penelitian ini adalah Seluruh ibu yang melahirkan bayi BBLR terdata di rekam medis RSUD D.Rasidin dan RS Tk III.Reksodiwiryo di padang berjumlah 26 Bayi. Teknik pengambilan sampel dilakukan dengan teknik *consecutive sampling* yaitu semua subjek yang datang secara berurutan dan memenuhi kriteria inklusi dimasukkan kedalam penelitian sampai jumlah subjek yang diperlukan terpenuhi. Kriteria insklusi dalam penelitian ini adalah bayi baru lahir dengan berat badan lahir rendah ≥ 1500 gr dengan KU bayi baik. Kriteria Ekslusi adalah bayi demam, bayi dengan kelainan dan bayi yang < 1500 gr. Sampel diambil dengan menggunakan rumus rerata dua populasi independent yaitu :

$$n_1=n_2= 2\left\{\frac{(z_\alpha + z_\beta)\, s}{(x_1 - x_2)}\right\}^2$$

(Sastroasmoro, dkk., 2010).

Keterangan :

s : Simpangan baku = 13,7

$x_1 - x_1$: Perbedaan klinis yang diinginkan

x_1 : 40,3

x_2 : 66,4

Kesalahan tipe-1 (α) sebesar 5% = 1,96

Kesalahan tipe-2 (β) sebesar 10% = 1,282

Maka jumlah sampel pada penelitian ini adalah : 12Untuk mengantisipasi subyek yang *droup out*, maka dilakukan perhitungan : (Sastroasmoro*et al*, 2010).

n = n/ (1-f)

Keterangan:

n : Besar sampel yang dihitung (12)

f : Perkiraan proporsi droup out = 10% = 0,10 (ketetapan)

n = 12/ (1-0,10) = 13, 3 atau 13

Dengan demikian, total seluruh sampel yang diperlukan dalam penelitian ini berjumlah 26 orang. (kelompok BBLR dengan metode kangguru sebanyak 13 orang, da kelompok BBLR dengan metode inkubator sebanyak 13 orang).

Instrumen dalam penelitian yang digunakan pada penelitian ini adalah (1) Lembar observasi yang berisi data tentang ibu dan bayi, dan hasil pengukuran suhu tubuh bayi, (2)Termometer aksila, (3)Pengukur panjang badan, (4)Timbangan berat badan.

Pengukuran yang dilakukan pada kelompok intevensi yaitu setelah 24 jam bayi

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dilakukan metode PMK kemudian dilakukan pengukuran yaitu suhu aksila,. Pengukuran berat badan dan panjang bayi dilakukan pada saat setelah satu jam bayi baru lahir. Pada kelompok kontrol mengunakan inkubator dan cara pengukuran sama dengan metode PMK.

Pada ruangan dipasang termometer dinding sehingga dapat dipantau suhu ruangan. Metode PMK pakaian bayi popok dan topi dan mengunakan baju PMK yang sudah desain sepraktis mungkin agar mudah dalam pengunaannya.sedangkan dengan kelompok inkobator pakaian bayi hanya mengunakan pampers saja.

Analisis data yang digunakan pada penelitian ini adalah analisis univariat dan analisa bivariat dengan menampilkan rerata dan standar deviasi untuk melihat variasi dari variabel yang akan diteliti dan melihat pengaruh metode kanguru terhadap kenaikan suhu dan kehilangan panas pada bayi berat badan lahir rendah. Uji yang digunakan adalah dengan Uji Wilcoxon. Semua data yang diperoleh diolah menggunakan program komputerisasi

HASIL

Tabel 1 Karakteristik Responden

Karakteristik	Kelompok	
	Metode Kangguru Mean±SD	**Metode Inkubator Mean±SD**
Berat Badan (BB)	1,9±335,51	1,8±281,02
Panjang Badan (PB)	45,15±0,8	44,6±1,3
Body Surface Area (BSA)	0,2±0,15	0,2±0,21
Suhu Kulit	35,33±3,9	34,2 ±0,77
Suhu Aksila	36,77±0,34	36,4±0,15

Berdasarkan karakteristik rerata berat badan responden bayi BBLR dengan metode kangguru 1,9 kg dan rerata berat badan responden bayi BBLR dengan metode inkubator adalah 1,8 kg, untuk panjang badan rerata responden bayi BBLR dengan metode kangguru 45,15 cm dan rerata panjang badan responden bayi BBLR dengan metode inkubator adalah 44,6 cm, untuk *Body Surface Area (BSA)* rerata responden bayi BBLR dengan metode kangguru 0,2 m^2 dan rerata *Body Surface Area (BSA)*responden bayi BBLR dengan metode inkubator adalah 0,2 m^2, untuk Suhu Kulit rerata responden bayi BBLR dengan metode kangguru 35,3^{o}c dan rerata Suhu Kulit responden bayi BBLR dengan metode inkubator adalah 34,2^{o}c, untuk Suhu Aksila rerata responden bayi BBLR dengan metode kangguru 36,7^{o}c dan rerata Suhu Aksila responden bayi BBLR dengan metode inkubator adalah 36,4,^{o}c.

Penelitian Adam, Nelson & Egoavil Tahun 2015 didapatkan rata-rata suhu udara di inkubator adalah 31, ± 1,9 ^{o}C kisaran 29,7-34,7 untuk semua bayi. Dua bayi mengalami rata-rata suhu udara dinkubator tertinggi 34,7-34,4 ^{o}C.bayi tersebut diteliti dengan inkubator dalam mode kontrol suhu kulit. Suhu udara inkubator juga lebih bervariasi untuk bayi ini, dengan jarak > 1,0 ^{o} C. Selebihnya bayi diteliti dengan inkubator dalam kontrol suhu udara, varibilitas suhu udara menurun dengan kisaran , 0,6 ^{o} C. Rata-rata suhu dinding inkubator adalah 30,2 ± 0,9 ^{o} C untuk semua bayi dan kurang bervariasi dari suhu udara. Kelembapan relatif sama untuk semua bayi, dengan rata-rata 29,6%. Tingkat aktivitas sama diantara bayi, dengan sebagian

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besar skor aktivitas yaitu <-2 (rata-rata -2,4 ±0,5)

Tabel 2 Pengaruh Metode Kanguru Terhadap Suhu Aksila

	Rerata ± SD °C 24 jam Kelahiran	*P`*
Metode Kanguru	36,77±0,34	0,01
Inkubator	36,47±0,15	

Berdasarkan tabel 2 diperoleh Rerata suhu aksila pada kelompok intervensi setelah dilakukan metode kanguru adalah 36,7 dengan SD 0,34 sedangkan pada kelompok kontrol rerata suhu adalah 36,4 dengan SD 0,15 Hasil uji statistik didapatkan nilai *p a*dalah 0,01 maka dapat disimpulkan bahwa ada perbedaan yang signifikan rerata suhu aksila setelah dilakukan metode kanguru pada kelompok intervensi dan kelompok kontrol.

PEMBAHASAN

Pada penelitian ini Hasil uji statistik didapatkan nilai *p a*dalah 0,01 maka dapat disimpulkan bahwa ada perbedaan yang signifikan rerata suhu aksila setelah dilakukan metode kanguru pada kelompok intervensi dan kelompok kontrol.

Terdapat beberapa cara untuk menjaga suhu tubuh bayi tetap hangat yaitu dengan metode kanguru, ruangan hangat, botol yang dihangatkan, radiant warmer, tempat tidur berisi air yang dihangatkan, dan inkubator. Ditinjau dari segi efektivitas, keamanan dan higiene metode kanguru sama dengan inkubator tipe 3 yang paling canggih, namun dari segi biaya berbeda jauh. Metode kanguru tanpa biaya, kecuali cinta kasih orangtuanya (Adams, Adams, Nelson, Bell, & Egoavil, 2015)

Suatu fenomena menarik tentang pengaturan suhu tubuh ibu yang menggunakan metode kanguru 32 Sari Pediatri, Vol. 2, No. 1, Juni 2000 ditemukan oleh Ludington–Hoe, dkk. Didapatkan bahwa suhu ibu akan meningkat bila bayi mulai ‘dingin’ dan bila bayi telah ‘hangat’ maka suhu ibu menurun kembali. Hal ini tanpa disadari oleh ibu tersebut. Mereka menyebut fenomena ini sebagai maternalneonatal thermal synchrony (Ludington Hoe SM, 2012)

Christenson K dkk. melakukan penelitian terhadap 80 bayi yang berisiko rendah terhadap hipotermia di RS Pendidikan di Lusaka, Zambia. Secara acak bayi-bayi tersebut dibagi menjadi dua kelompok, kelompok I mendapat perawatan metode kanguru (skin-to-skin / STS) dibandingkan dengan kelompok II yang dirawat di inkubator dengan suhu 35ºC; kemudian suhu rektal diukur secara berkala. Hasilnya pada menit ke-240 didapatkan bahwa 90% bayi kelompok I (metode kanguru) mencapai suhu normal (36,5ºC), sedangkan pada kelompok II (inkubator) hanya 60% (Christensson K, 2000).

Dari hasil penelitian elabbassi (2011) Berat badan dan luas permukaan tubuh mempengaruhi total kehilangan panas kering pada bayi baru lahir, dimana total kehilangan panas kering lebih tinggi pada bayi dengan berat badan lahir rendah dan luas permukaan tubuh yang rendah, dibandingkan dengan bayi baru lahir dengan berat badan lahir dan luas permukaan tubuh yang lebih besar (Elabbassi EB, Bach V, Makki M, Delanaud S, 2004).

Pada penelitian ini didapatkan hasil bahwa setelah dilakukan perawatan metode kanguru diperoleh rata-rata suhu aksila pada bayi BBLR ±36,7 °C sedangkan kelompok control dengan metode inkubator rata-rata suhu

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aksila ±36,4 ^{o}C. Ada perbedaan ±0,4 ^{o}C antara suhu aksila pada metode kanguru dan metode inkubator. Pada kelompok intervensi tidak ada bayi yang mengalami hipotermi setelah PMK dilakukan 24 jam dan seluruh bayi suhunya 36,5 ^{o}C – 37 ^{o}C. Namun pada kelompok control ada 7 bayi yang suhu tubuhnya dibawah 36,5 ^{o}C.

Pelaksanaan metode kanguru topi digunakan untuk menutup bagian kepala bayi dan skin to skin ibu kepada bayi menyebabkan suatu fenomena bahwa suhu ibu akan meningkat bila bayi kedinginan dan bayi telah hangat maka suhu ibu akan menurun kembali berbeda dengan inkubator yang suhunya sudah diatur. Pada umumnya inkubator memilki geometri dan dimensi sederhana dengan dinding tunggal. Dinding tersebut terbuat dari kaca sehingga kurang mampu membantu tercapainay NTE (*Neutral Thermal Environment)*karena aliran udara dapat langsung mengenai tubuh bayi sehingga tubuh bayi dapat kehilangan panas.

KESIMPULAN DAN SARAN

Penelitian ini dapat disimpulkan bahwa nilai *p* (0,01) dengan bermakna ada pengaruh metode kanguru terhadap suhu aksila pada BBLR Diharapkan hasil penelitian ini dapat dijadikan bahan perbandingan apabila dilakukan penelitian lebih lanjut mengenai perawatan yang tepat pada BBLR dan pihak Rumah Sakit agar rutin melakukan perawatan pada BBL dengan metode kanguru untuk mencegah terjadinya Hipotermi.

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ORIGINAL RESEARCH

THE EFFECT OF KANGURU MOTHER CARE METHOD TO CHANGE OF BODY TEMPERATURE IN LBW (LOW BODY WEIGHT) BABIES

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ABSTRACT

Introduction: Low Birth Weight Babies (LBW) are babies with birth weight less than 2500 grams regardless of gestation. Babies who have low birth weight tend to experience hypothermia; this is due to the thin subcutaneous fat in the baby so that ambient temperature very easily influences it. Infants with low birth weight (LBW) require proper care so that no dangerous things happen, one of them is the Kangaroo mother care method Treatment. The purpose of this study was to determine the effect of kangaroo mother care method treatment on changes in body temperature in LBW infants. Method: The research design used was pre-experimental with the design category (One group pretest-Post). The sampling technique used was the consecutive sampling technique. The independent variance in this study was the maintenance of the kangaroo mother care method. The dependent variable in this study was a change in body temperature. Data was collected through analytical observation with the Wilcoxon test to determine whether there were differences between the two samples. Results: Observation results of measurements of body temperature changes in LBW infants showed changes that were given to treatment interventions in kangaroo mother care method of body temperature with an average body temperature of 36.30C, and two babies experienced a decrease in body temperature after being given intervention. Kangaroo mother care method treatment with a value of Z -3,114 with a significant level of 0.002. Conclusion: From the results of the above studies, it is proven that the treatment of kangaroo mother care method can increase body temperature in infants who experience LBW, so the treatment of kangaroo mother care method can be a substitute for the incubator in overcoming hypothermia in LBW infants.

Keywords

Kangaroo mother care method, body temperature, LBW

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INTRODUCTION

Low birth weight babies are risk factors that contribute to the death and birth of a baby, especially during the perinatal period (Indonesia Ministry of Health, 2007) . Premature babies who have low birth weight tend to experience hypothermia; this is due to the thin subcutaneous fat in infants so that it is very easily influenced by ambient temperature (Gil, 1996). Babies with low birth weight (LBW) need proper care so that no harmful things happen, one of which is the Care of the Kangaroo mother care method. Besides that, this is very practical and can not be necessary to require high costs. So far incubator care has been provided for babies who have low birth weight from Wahidin Sudirohusodo Hospital in Mojokerto regency, according to the Nurse in the Baby Room the care of the kangaroo mother care method has not been done because it is not effective in using this PMK method.

Kangroo method treatment was first intoduced by Ryan and Martinez in Bogata, Columbia in 1979 as an alternative method of LBW care amid the high rates of low birth weight and the health facilities are limited. This method imitate of animals kangaroos have pouches whose baby is born prematurely, and after the kangaroo's baby was born treated in the pouch kangaroo mother to prevent the baby kangaroo out of cold and get the nutriens from the mother kangaroo.

KMC is an alternative methods of replacement incubator on the care of LBW with some effective ways to meet the basic need of the baby such as baby's skin contact to the mother skin, where the mother's body as a thermoregulator for the baby, so that the baby gets warmth (ovoiding the baby from hipothermia) if the mother's body temperature decrease, then the baby's body temperature also decrease (Rulina, Primpim, 2000). KMC makes breastfeeding easier, protection from infection, stimulation, safety and affection. Kangaroo method is a continuous method of offering early by touching the skin to the skin between mother and baby LBW in a position like kangaroo (Hadi, 2005).

WHO data in 2013 shows the number of babies born in Indonesia in 2010 there were 4,371,800 people. While of this amount 15.5 / 100 live births or as many as 675,700 born premature, Indonesia is ranked 9th in the world with an LBW percentage of more than 15.5% of births each year (Pramono, 2009). Based on the results of research conducted by Worku B and Kassie A by A randomized controlled trial was conducted over a 1-year period (November 2001–November 2002) in Addis Ababa to study the effectiveness of early Kangaroo mother care before stabilization of low birthweight infants as compared with the conventional method of care. There were 259 babies weighing less than 2000 g during the study period and a total of 123 (47.5 per cent) low birthweight infants were included in to the study.The study showed that 14/62 (22.5 per cent) of KMC vs. 24/63 (38 per cent) CMC babies died during the study ($p<0.05$ and CI of 95 per cent.) The majority of deaths occurred during the first 12 h of life. Survival for the preterm low birthweight infants was remarkably better for the early kangaroo mother care group than the babies in the conventional method of care in the first 12 h and there after. More than 95 per cent of mothers reported that they were happy to care for their low birthweight babies using the early Kangaroo mother method. It was recommended to study the feasibility and effectiveness of Kangaroo mother care at the community level.

LBW is a major factor in increased mortality, morbidity and disability of neonates, infants, and children, and has a long-term impact on their future lives. The low birth weight which is not handled properly can lead to problems in all organ systems of the body including respiratory problems (meconium aspiration, neonatal asphyxia), impaired systemic digestion (small stomach), urinary system disorders (rudimentary kidney), nervous system disorders (stimulation response slow). Besides, that LBW can experience mental and physical disorders, also develop and grow (Indonesia Ministry of Health, 2007).

One of the non-incubator treatments for the incidence of LBW infants using Kangaroo mother care method Treatment. Treatment of the Kangaroo mother care method in LBW infants is very useful in increasing body temperature in LBW infants (PN, APX, & JRD, 2010).

The purpose of this study was to analyze the effect of kangaroo mother care method treatment on changes in body temperature in LBW infants.

RESEARCH METHOD

The research design used was pre-experimental with the design category (One group pretest-Post). The selection of one group using consecutive sampling technique. Following sampling is sampling based on research criteria, each respondent who meets the research criteria is included in the study for a certain period.

Table 1.1 Research design Effect of Kangaroo mother care method Treatment on Changes in Body Temperature in LBW Infants

Subject	Pretest	Treatment	Posttest
	O	I	OI
A	time 1	Time 2	Time 3

Information :
A: Subject (LBW).
O: Observe body temperature before PMK.
I: Intervention (care for kangaroo mother care methods)

RESULT

Table 1.3 Effect of Kangaroo mother care method Treatment on Changes in Body Temperature in LBW Infants.

Temperature	Frequency	Percentage (%)
Increase body temp	10	58,82
Stable body temp	4	23,52
Decrease body temp	3	17,64
Jumlah	17	100

At the measurement of body temperature before and after treatment of the kangaroo mother care method showed an increase in body temperature there were ten frequencies with a percentage of 58.82%, body temperature remained there were four frequencies with a percentage of 23.52%, and body temperature decreased there were three frequencies with a percentage of 17.64 %. According to the Wilcoxon statistical test calculation shows p 002 there is an effect of the treatment of kangaroo mother care methods on changes in body temperature in LBW infants

DISCUSSION

The Measurement Results of Body Temperature Before Kangaroo Mother Care Method.

Body temperature before the treatment intervention for kangaroo mother care method was obtained with an average body temperature of 360 C in LBW infants. Cold stress can increase death and inhibit growth, while hypothermia and fluctuating temperatures can cause apnea (Pulmonology & Syndrome, 2002).

The research conducted by Raudatul Hikmah contained in e-journal 2016 said LBW babies due to infant birth weight <2500 grams, were susceptible to problems in increasing heat loss and inability to maintain the temperature of the baby's body due to little heat or even has not been formed so that complications can occur such as hypothermia.

Body Temperature After Kangaroo Mother Care Method

After being treated with the kangaroo mother care method the body temperature of LBW babies increased by an average of 36.20C, and three babies experienced a decrease in body temperature. By research conducted by Hj. Nurlaila et al. in the journal Husada Mahakam in 2015 showed that there were significant differences in the baby's body temperature both in the group of mothers who performed FMD well and the group of mothers implementing. PMK was not good it can be seen from the average score of the mothers who carried out PMK well. It is 37,082 which shows that the average baby's body temperature in the group of mothers who perform PMK well. It does not have anyone suffering from hypothermia, i.e., when the baby's temperature is <36.50 while the group of mothers who do PMK is not good as an average value 35,508 which shows that in the group of mothers who carry out PMK is not good, the baby experiences hypothermia because the baby's temperature is <36.5°. This is consistent with research conducted by Verma, p and Verma V was published on 29th Nov 2013. they were stated It's evident that before KMC 82.5% of babies were hypothermic but after KMC 96.2% babies became normothermic within half an hour which was found highly significant (p-value <0.0001).

Based on the other result research of Almeida Cm Et Al About Effects Of Kangaroo Mother Care On The Vital Signs Of Low-Weight Preterm Newborns, they got results there were no significant changes in mean arterial pressure (p> 0.05) or heart rate (p> 0.05) after applying kangaroo mother care.

However, there were significant increases in axillary temperature (p< 0.05) and peripheral oxygen saturation (p< 0.05), and a significant decrease in respiration rate (p< 0.05). It's the mean Kangaroo mother care promotes improvement in body temperature, increased peripheral oxygen saturation (thus improving tissue oxygenation), and decreased respiration rate (thus providing greater respiratory comfort for the newborns). therefore it's recommended that kangaroo mother care contributes towards beneficial alterations in the low-weight newborns' vital signs.

The mechanism of action for kangaroo encoded treatments is the same as the sophisticated treatment in the incubator that functions as a thermoregulatory providing a thermoneutral environment for babies every neonate through conduction heat and radiation. The terminal environment is the temperature environment so that the baby can maintain optimal (36,5-37,50C) by releasing minimal energy/calories, especially LBW babies whose supply of calorie sources is very limited. Heat flow through conduction is identical to maternal-infant skin contact as in the incubator of heat conduction from the incubator body to the baby's skin. Radiation heat is warm air inside the incubator like warm air in/between blankets/baby kangaroo clothes(Thukral, Chawla, Agarwal, Deorari, & Paul, 2008) .

Effect of Kangaroo Mother Care Method Treatment to the Change of in Body Temperature in LBW Babies

Based on the Wilcoxon test the value: based on negative rank -3.114a with p 002 significant means that there is an effect of the treatment method for changes in body temperature in LBW infants.

Treatment of the Kangaroo mother care method is one way to increase body temperature in infants who experience hypothermia, heat flow through conduction is identical to maternal skin contact as an incubator of heat conduction from the incubator. Blankets. This method is very practical without side effects and does not need to pay a high cost (Sharma, Murki, & Oleti, 2016).

Kangaroo care method is normal and even has no longer experienced hypothermia. Also, there is a decrease in body temperature; this is because of the mother's body temperature decreases, so the baby's

body temperature is treated by the kangaroo mother care method decreases. Based on the rate of speed of heat loss in the baby's body which is carried out by the care of the kangaroo mother care method, the mother's body temperature can affect the decrease in body temperature in the baby.

This is consistent with research conducted by(Ryabikov et al., 2007). Namely in the group of mothers who carried out FMD well. There were no babies who suffered from hypothermia on the contrary in mothers who did not carry out FMD suitably most of the babies experienced hypothermia. so this confirmed that mothers who did FMD were not better at risk the baby suffered hypothermia compared to the mother who carried out FMD well. The other research conducted by (Worku, 1999) in Department of Pediatrics and Child Health, University of Gondar, Gondar, Ethiopia almost 84% of infants in our study continued KMC at home, and those that continued KMC were more likely to survive. Our study adds to the fact that KMC is still very important intervention survival after discharge in the low-income country setting.

Conde-Agudelo A, Diaz-Rossello JL were also stated in their firts published research on 23 Agust 2016 that's compared with conventional neonatal care, KMC was found to reduce mortality at discharge or at 40 to 41 weeks post menstrual age and at lates folloe up, severy infection / sepsis, nosocomial infection/sepsis, hipotermia, severy illness, and lower respiratory tract disease. Based on the main result that were twenty -one studies, including 3042 infants, fulfilled inclusion criteria. 19 studies evaluated KMC in LBW infants after stabilization, one evaluated KMC in LBW infants before stabilization, and one compared early - onset KMC with late - onset KMC in relatively stable LBW infants. Sixteen studies evaluated intermittent KMC, and five evaluated continuous KMC.

CONCLUSION

The results of this study indicate that Kangaroo mother care method Treatment can increase body temperature in infants who experience hypothermia because it is identical to heat flow through conduction, which is maternal-baby skin contact as in incubator heat conduction from the incubator body such as warm air in/between kangaroo blankets.

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PENGARUH PERAWATAN METODE KANGURU TERHADAP PENINGKATAN SUHU TUBUH BAYI BERAT LAHIR RENDAH DI NICU RUMAH SAKIT GRANDMED LUBUK PAKAM TAHUN 2018

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Abstract

Babies with low birth weight have a temperature that is unstable and prone to hypothermia (temperature <36,5ºC). Cold stress can increase mortality and hamper growth. The warmth of the mother's body or a known method of kangaroo care proved to be an effective heat source for infants born at term or low birth weight. This study aims to determine whether there is influence kangaroo care method to your body temperature low birth weight infants. This type of research is pre experiment with models (one group pre-post test design). The population of this research is all low birth weight babies. Sampling techniques in use purposive sampling, that the sampling technique was based on sample criteria specified by the researchers themselves. In this case the samples found as many as 22 people. Data analysis using paired sample t-test with a level of 95%. The results of this study gained an average prior to 34.7 kangaroo care method, after doing kangaroo care method 36.9. The mean before and after kangaroo care method 2.2273. Based on the analysis results showed pvalue (0.004) <α (0.05), It can be concluded no treatment effect kangaroo method to your body temperature low birth weight infants. Recommendations from this research is the kangaroo care method can be used as one LBW care that can be done by the mothers in raising and maintaining body temperature.

Keywords ***:*** *Kangaroo Mother Care, Body Temperature*

1. PENDAHULUAN

Kualitas hidup manusia dapat ditingkatkan dan sangat tergantung kepada kesejahteraan ibu termasuk kesehatan gizi dan dimulai sedini mungkin sejak janin didalam kandungan. Masalah kekurangan gizi bagi ibu hamil menjadi penyebab tingginya presentasi kasus berat bayi lahir rendah (BBLR). BBLR merupakan salah satu faktor penyebab kematian bayi khususnya pada masa perinatal sehingga memrlukan perawatan khusus.

Menurut data WHO kematian neonatal terjadi di negara berkembang. Amerika Serikat memiliki data prevalensi BBLR sekitar 7,3% dari 2 juta persalinan, di Inggris 6% dari 2,3 juta persalinan dan di Afrika 12% dari 2,8 juta persalinan (Azari, 2013).

Menurut survei demografi kesehatan indonesia (SDKI) terdapat 7,5 % angka kejadian BBLR dari 2,7 persalinan pada tahun 2012. Indonesia merupakan negara yang memiliki prevalensi BBLR di semua provinsi. Provinsi Sulawesi Tengah angka BBLR tertinggi di Indonesia dengan presentase 16,8% sementara Sumatera Utara terendah dengan persentase 7,2% (RISKESDAS, 2013).

Sumber panas yang paling efektif bagi bayi baru lahir baik yang lahir cukup bulan maupun BBLR adalah kehangatan yang diberikan ibu dengan metode *scin to scin*

atau yang lebih dikenal dengan metode kanguru. Metode kanguru merupakan metode revolusi perawatan pada bayi kurang bulan (BKB)/BBLR yang bermanfaat untuk meningkatkan ikatan antara ibu dan bayi karena terjadinya kontak langsung ke kulit. Selain itu juga memulihkan bayi prematur dan meningkatkan rasa percaya diri bagi orangtua dalam merawat bayi premature (Suradi, 2012). Hasil penelitian menunjukkan bahwa terdapat hubungan metode kanguru dengan suhu tubuh BBLR di RSKD Ibu dan Anak Pertiwi Makasar (Anggreini, 2014). Hasil penelitian meyatakan bahwa ada pengaruh perawatan metode kanguru terhadap perubahan berat badan BBLR di ruang inap perinatologi RSUD dr. Achmad Mochtar Bukit Tinggi (Silvia dkk, 2015).

Data dari petugas Neonatus Intensive Care Unit (NICU) di Rumah Sakit GrandMed Lubuk Pakam, bahwa banyak kendala yang dialami diantaranya adalah tidak cukup tersedianya tenaga perawat yang telaten dan terampil untuk melaksanakan metode kanguru, waktu kunjungan yang terbatas, dan terpisahnya ruangan ibu dan bayi. Selain itu khususnya ayah belum dilibatkan sejak bayi lahir sampai pulang ke rumah untuk melakukan metode kanguru bergantian dengan ibu untuk menjalin interaksi sedini mungkin, belum ada ruangan tersendiri untuk PMK tetapi hanya tersedia kursi yang nyaman untuk ibu yang melakukan baju khusus kanguru yang tersedia belum mencukupi dan belum dilakukan penelitian tentang PMK di ruang NICU terhadap kontribusinya dengan peningkatan suhu tubuh BBLR.

2. METODE

Desain penelitian ini dengan rancangan *pre eksperiment* dengan *one group pretest-postest design*. Jumlah populasi sebanyak 40 orang yaitu seluruh BBLR yang dirawat di ruang NICU. Sampel dalam penelitian ini sejumlah 22 orang. Variabel independen yaitu perawatan metode kanguru. Variabel dependen yaitu suhu tubuh BBLR. Pengumpulan data yang dilakukan menggunakan data primer yang berasal dari lembar observasi yang berisikan hasil pengukuran suhu tubuh dan data sekunder diperoleh dari data rekam medik. Analisa data yang digunakan adalah uji *Paired Sample T-test*.

3. HASIL dan PEMBAHASAN

Hasil analisis suhu tubuh pada bayi berat lahir rendah (BBLR) sebelum dilakukan metode kanguru yaitu dengan nilai rata-rata 34,7 dengan standar deviasi 1,211 terlihat pada tabel berikut:

Tabel 1: Pengukuran suhu tubuh pada bayi berat lahir rendah sebelum dilakukan perawatan

Suhu Tubuh (*Pre Test*)	Mean	Standar Deviasi (SD)
Suhu tubuh	34,7	1,211

Suhu lingkungan bayi sewaktu didalam kandungan sebesar 36°C-37°C dan segera setelah lahir bayi dihadapkan pada suhu lingkungan yang umumnya lebih rendah. Hal ini menyebabkan bayi akan kehilangan panas pada tubuh bayi atau yang disebut hipotermia. Hipotermia pada bayi terjadi karena ketidakmampuan untuk mempertahankan produksi panas pada tubuh bayi dan menggigil, sedikitnya lemak subkutan (lemak coklat) yang tidak memadai, dan sistem saraf pengatur suhu tubuh yang belum matang (Surasmi, 2012). Selain itu, daerah permukaan bayi akan menurun sehingga mempercepat hilangnya panas. Bayi BBLR terdapat jaringan adiposa sedikit dan kelenturan menurun sehingga memerlukan suhu lingkungan yang lebih panas untuk mencapai suhu yang normal (Proverawati, 2012).

Hasil analisis suhu tubuh BBLR sesudah dilakukan metode kanguru yaitu dengan nilai rata-rata 36,9 dengan standar deviasi 0,349 terlihat pada tabel berikut:

Tabel 2: Pengukuran suhu tubuh pada bayi berat lahir rendah sesudah dilakukan perawatan

Suhu Tubuh (*Post Test*)	Mean	Standar Deviasi (SD)
Suhu tubuh	36,9	0.349

Perawatan metode kanguru sebagai suatu cara perawatan untuk bayi BBLR melalui kontak kulit dengan kulit antara ibu dengan bayinya dimulai di rumah sakit dan dilanjutkan dirumah dengan tetap diberikan ASi supaya bayi tetap hangat (Surasmi, 2012). Perawatan metode kanguru merupakan suatu cara khusus dalam Perawatan bayi BBLR dengan metode kanguru yakni melakukan kontak langsung antara kulit bayi dengan kulit ibu untuk membantu perkembangan kesehatan bayi melalui peningkatan kontrol suhu, menyusui dan pencegahan infeksi (Proverawati, 2012).

Analisa statistik menunjukkan bahwa bahwa rerata pengukuran suhu tubuh pretest 34,7 dan suhu tubuh posttest 36,7 maka perbedaan atau selisih antara pengukuran suhu tubuh pretest dan postes adalah 2.2273 dengan standar deviasi (SD) 1.1977. Hasil Uji statistik didapatkan nilai p = 0,004 < (α = 0,05) maka dapat disimpulkan bahwa Hipotesa (Ha) diterima yaitu ada pengaruh perawatan metode kanguru terhadap peningkatan suhu tubuh bayi berat lahir rendah.

Tabel 3: Rata-rata, standar deviasi, lower, upper, p-Value

Mean Suhu Tubuh			Paired Test			*pValue*
Pre test	Posttest	Perbedaan	Standar Deviasi	95% Confidence Interval		
				Upper	Lower	
34,7	36,9	2.2273	1.1977	1.6962	2.7583	0.004

BBLR mempunyai keterbatasan dalam pengaturan fungsi tubuhnya, salah satunya adalah ketidakstabilan suhu tubuh, sehingga dapat menyebabkan hipotermi pada bayi BBLR. Hipotermi dapat menyebabkan kesakitan bahkan kematian pada bayi BBLR. Salah satu solusi pencegahan hipotermi pada BBLR dengan melakukan perawatan metode kanguru dengan prinsip melakukan *skin to skin contact* sehingga bayi tetap hangat. Hal ini bertujuan untuk memberikan lingkungan hangat pada bayi dan meningkatkan hubungan ibu dengan bayinya (Anggriani, 2014). Hasil penelitian menunjukkan bahwa ada perbedaan yang bermakna lama hari rawat bayi BBLR yang diberikan metode kanguru dengan yang tidak diberikan (Astuti, 2018).

4. KESIMPULAN

Rata-rata suhu tubuh bayi sebelum dilakukan perawatan metode kanguru 34,7 dengan standar deviasi 1,211. Suhu tubuh bayi sesudah dilakukan perawatan metode kanguru rata-rata memiliki suhu 36,9 dengan standar deviasi 0,349. Ada perbedaan suhu tubuh sebelum dan sesudah perawatan metode kanguru pada bayi berat lahir rendah (BBLR) dengan p-Value yaitu 0.004 yang berarti nilai p (0,004) < (α=0,05).

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SWADDLING DAN KANGAROO MOTHER CARE DAPAT MEMPERTAHANKAN SUHU TUBUH BAYI BERAT LAHIR RENDAH (BBLR)

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ABSTRAK

Tujuan dari penelitian ini adalah untuk mengetahui pengaruh *swaddling* dan *kangaroo mother care* terhadap peningkatan suhu tubuh bayi berat lahir rendah di Puskesmas Biak Muli Aceh Tenggara. Penelitian ini merupakan penelitian *quasy experimental* dengan desain penelitian *pre-test and post-test without control.* Hasil penelitian ini didapatkan nilai rata-rata suhu tubuh bayi sebelum dan sesudah dilakukan intervensi *swaddling* (*p valu*e =0,168, Δ=0,02) dan untuk hasil intervensi sebelum dan setelah KMC didapatkan nilai (p *value* = 0,000, Δ=0,47) dan untuk hasil intervensi sebelum dan setelah *swaddling* + KMC didapatkan nilai (p *value*=0,000 , Δ=0,58). Simpulan, intervensi kombinasi antara *swaddling* dan KMC lebih signifikan dibanding dengan intervensi *swaddling* saja dan intervensi KMC saja.

Kata Kunci ; BBLR, *Kangaroo Mother Care,* Suhu Tubuh, *Swaddling*

ABSTRACT

The purpose of this study was to determine the effect of swaddling and kangaroo mother care on the increase in body temperature of low birth weight infants in Puskesmas Biak Muli, Southeast Aceh. This research is a quasy experimental research design with pre-test and post-test without control. The results of this study obtained the average value of the baby's body temperature before and after swaddling intervention (p value = 0.168, Δ = 0.02) and for the results of interventions before and after KMC obtained values (p value = 0.000, Δ = 0.47) and for the results of interventions before and after swaddling + KMC obtained values (p value = 0,000, Δ = 0.58). In conclusion, the combination intervention between swaddling and KMC is more significant compared to swaddling intervention alone and KMC intervention alone.

Keywords ; LBW, Kangaroo Mother Care, Body Temperature, Swaddling

PENDAHULUAN

Bayi dengan BBLR merupakan salah satu faktor utama peningkatan mortalitas dan morbiditas bayi khususnya pada masa perinatal. WHO mengatakan bahwa bayi berat lahir rendah sebagai bayi yang lahir dengan berat badan kurang dari 2500 gram tanpa memandang usia gestasi.

BBLR merupakan masalah yang perlu mendapat perhatian khusus, karena pada bayi dengan BBLR dapat menyebabkan gangguan pertumbuhan, perkembangan dan gangguan mental pada masa mendatang (Simbolon, 2012; Padila & Agustien, 2019). Tingkat kematangan sistem organ yang belum sempurna juga mengakibatkan BBLR memiliki resiko tinggi mengalami masalah kesehatan hingga kematian (Maryunani, 2013).

BBLR merupakan kondisi bayi yang dilahirkan dengan berat kurang dari 2500 gram tanpa memandang usia gestasi. BBLR dapat disebabkan oleh bayi lahir kurang bulan (usia kehamilan kurang dari 37 minggu), pertumbuhan janin yang terhambat (PJT) atau kombinasi dari keduanya (Octa, 2014). Masalah pada bayi BBLR terutama terjadi karena keridakmatangan sistem organ pada bayi tersebut. Masalah pada bayi BBLR yang sering terjadi adalah gangguan termoregulasi, gangguan pada sistem pernafasan, kardiovaskular, hematologi, gastro intestinal, susunan saraf pusat dan ginjal (Octa, 2014; Sindu, 2015). Salah satu dari kebanyakan faktor kritis yang terjadi pada bayi BBLR adalah masalah pengaturan suhu tubuh dan pencegahan hipotermia sebagai komplikasi utama pada periode awal kelahiran (Padila et al., 2018).

Berdasarkan hasil Riset Kesehatan Dasar (Riskesdas) oleh Kementerian Kesehatan tahun 2014, penyebab tersering terjadinya kematian bayi di Indonesia adalah asfiksia (37%) Berat Badan Lahir Rendah (BBLR) (34%) dan infeksi / sepsis (12%). Angka kelahiran BBLR di Indonesia mencapai 350.000 setiap tahunnya (Sutarjo, 2015; Kaban, 2014). Di Jawa Tengah sendiri sekitar 10% dari kelahiran bayi adalah BBLR. Sedangkan di kota Semarang pada tahun 2014 tercatat sebanyak 563 bayi lahir dengan BBLR (Widoyono, 2015). Meskipun menduduki urutan ke 2 dari penyebab kematian bayi, namun kasus bayi dengan BBLR merupakan pemicu dari terjadinya kasus asfiksia dan infeksi / sepsis. Hal tersebut dikarenakan bayi BBLR mengalami imaturitas pada organ paru-paru sehingga BBLR mudah mengalami kesulitan bernafas. Bayi BBLR juga memiliki daya tahan tubuh yang masih lemah dan pembentukan antibodi yang belum sempurna sehingga beresiko terjadi infeksi (Bobak et al., 2007; Lawn et al., 2013).

BBLR menjadi salah satu penyebab terbanyak kematian neonatus, yaitu sebesar 32% WHO (2015). Penyebab utama kesakitan dan kematian BBLR tersebut diantaranya asfiksia, infeksi dan hipotermi (Proverawati & Cahyo, 2010). Hipotermi terjadi akibat ketidakseimbangan antara produksi panas dan kehilangan panas Wafi (2010).

BBLR sangat rentan mengalami hipotermi karena tipisnya cadangan lemak di bawah kulit dan belum matangnya pusat pengatur panas di otak. Hal ini juga di dukung oleh Andriati & Romlah (2015) mengatakan bahwa hipotermi yang dialami BBLR menyebabka nterjadinya penyempitan pembuluh darah yang mengakibatkan terjadinya metabolis anaerobik, meningkatkan kebutuhan oksigen, meningkatkan hipoksemia dan berlanjut dengan kematian Perawatan BBLR dengan kualitas baik dapat menurunkan angka kejadian kematian neonatal, seperti inkubator dan perlengkapannya pada *Neonatal Intensive Care Unit* (Rustina & Nurhaeni, 2011). Namun, perawatan tersebut relatif lebih mahal dan bila terjadi pada keluarga yang tidak mampu merupakan suatu keadaan yang sangat memberatkan (Silvia & Gusnila, 2015).

Bayi BBLR belum dapat mengatur suhu dengan sempurna dalam menghadapi perubahan lingkungan kehidupan intrauterine ke kehidupan ekstrauterine (Octa, 2014; Fatsman et al., 2014). Suhu yang dingin menyebabkan bayi BBLR menggunakan cadangan *brown fat* untuk menghasilkan panas. BBLR memiliki jaringan lemak subkutan, *brown fat* dan penyimpanan glikogen yang rendah sehingga berisiko mengalami ketidakstabilan suhu tubuh (Lawn et al., 2013). Bobak (2007) juga mengungkapkan bahwa bayi dengan BBLR memiliki sedikit massa otot, lebih sedikit cadangan *brown fat*, lebih sedikit lemak subkutan untuk menyimpan panas dan sedikit kemampuan untuk mengontrol kapiler kulit. Hal tersebut menyebabkan BBLR mudah mengalami kehilangan panas tubuh dan berisiko terjadinya hipotermia (Bobak, 2007; Nurlaila et al., 2015).

Beberapa metode perawatan alternatif yang lebih mudah, murah dan efektif dalam menstabilkan suhu tubuh BBLR, yaitu dengan cara *swaddling* dan metode *kangaroo mother care* (KMC) (Bobak, 2012).

Swaddling atau yang sering dikenal dengan istilah bedong adalah pembungkus kain yang diberikan pada bayi baru lahir. Membedong dapat membuat bayi lebih tenang, hangat dan membatasi ruang gerak bayi. Membedong bayi ini bertujuan untuk menghindari bayi kehilangan panas dan dapat menstabilkan suhu tubuhnya (Sunarsih, 2012). Upaya lain dalam penanganan hipotermi pada bayi dengan BBLR, yaitu perawatan metode KMC (Dewi & Nanny 2010; Padila et al., 2018).

Perawatan metode KMC adalah perawatan untuk BBLR dengan melakukan kontak langsung antara kulit bayi dengan kulit ibu (*skin-to-skin contact*) dengan meletakkan bayi di dada ibu (Endang, 2010). Metode KMC mampu memenuhi kebutuhan BBLR dengan menyediakan situasi dan kondisi yang mirip dengan rahim sehingga memberi peluang BBLR untuk beradaptasi dengan baik di dunia luar. Metode ini dapat dilakukan di rumah sakit dan di rumah karena metode KMC merupakan cara yang sederhana untuk merawat bayi BBLR yang menggunakan suhu tubuh ibu untuk menghangatkan bayinya (Puspitaningtyas et al., 2011).

Beberapa kelebihan penggunaan KMC ialah memenuhi kebutuhan bayi yang paling mendasar yaitu adanya kontak kulit bayi ke kulit ibu dimana tubuh ibu akan menjadi thermoregular bagi bayinya sehingga bayi mendapatkan kehangatan, memudahkan dalam pemberian ASI, perlindungan infeksi, stimulasi, keselamatan dan kasih sayang (Sulistiyowati, 2016).

METODE PENELITIAN

Desain yang digunakan peneliti adalah penelitian eksperimen dengan rancangan *pre-test and post test without control* untuk mengetahui pengaruh metode *swaddling* dan KMC terhadap suhu tubuh pada bayi BBLR.

Pemilihan sampel yang digunakan pada penelitian ini adalah dengan cara *purposive sampling*, yaitu suatu teknik penetapan sampel dengan cara memilih sampel diantara populasi sesuai dengan yang dikehendaki peneliti, sehingga 30 sampel tersebut dapat mewakili karakteristik populasi yang telah dikenal sebelumnya. Instrumen yang dipakai berupa lembar observasi pengukuran temperatur sedangkan peralatan yang digunakan berupa thermometer digital.

Proses pengambilan data dilakukan pada dua rumah sakit yang ada di Kabupaten Aceh Tenggara selama tiga bulan terakhir. Kriteria inklusi dari penelitian ini adalah BBLR dengan berat badan kurang dari 2500 gram pasca rawat inap di RS. Sebelum dilakukan proses pengambilan data, orangtua calon responden diberikan informasi

tentang penelitian yang akan dilakukan, keuntungan dan dampak yang mungkin dapat ditimbulkan selama proses penelitian, bila orang tua calon responden menyetujuinya maka dilanjutkan dengan pengisian lembar persetujuan menjadi responden.

Pengambilan data untuk menentukan kelompok pada tiap intervensi yang akan dilakukan dengan cara: bayi yang akan pulang pasca rawat inap d RS akan menjadi kelompok intervensi pertama yaitu *swaddling*, dan untuk bayi yang akan pulang pasca rawat inap di RS berikutnya akan menjadi kelompok intervensi ke dua yaitu KMC, dan untuk bayi berikutnya akan menjadi kelompok tiga dengan intervensi kombinasi antara *swaddling* dan KMC.

Dan untuk bayi yang akan pulang pasca rawat inap selanjutnya akan kembali ke kelompok pertama dan begitu seterusnya. Kemudian suhu tubuh bayi diukur sebelum dilakukan intervensi *swaddling* dan KMC, lalu dilakukan pengukuran ulang setelah intervensi dilakukan. Pengolahan data dilakukan dengan menggunakan uji *pairet t-tes* karena data homogen dan berdistribusi normal.

HASIL PENELITIAN

Karakteristik responden

Tabel. 1
Distribusi Frekuensi Responden Berdasarkan Usia Bayi,
Usia Gestasi dan BB Bayi (n=30)

	Mean	Min - max	Standar deviasi
Usia bayi	13,60	6-25	4,606
Usia gestasi	29,83	27-32	1,577
BB bayi	2259,30	1455-2490	256,262

Berdasarkan tabel 1 menunjukkan bahwa rata-rata usia bayi ialah 13,6 hari (SD = 4.606) dengan usia termuda 6 hari dan usia tertua 25 hari. Nilai rata-rata usia gestasi bayi ialah 29,83 minggu (SD = 1,577) dengan usia termuda 27 minggu dan usia tertua 32 minggu. Untuk nilai rata-rata BB bayi ialah 2259,30 gram (SD = 256,262) dengan berat terendah 1455 gram dan berat tertinggi 2490 gram.

Rata-Rata Suhu Tubuh Bayi Sebelum dan Setelah Dilakukan Intervensi *Swaddling*, KMC dan *Swaddling* + KMC

Tabel. 2
Rata-Rata Suhu Tubuh Sebelum dan Sesudah Intervensi *Swaddling*,
KMC dan *Swaddling* + KMC (n=30)

Variabel	Mean	SD	95% CI	*p value*	n
Swaddling					
Suhu tubuh sebelum	36,70 °C	0,20548	-05016 –		
Suhu tubuh setelah	36,72 °C	0,21499	01016	0,168	10
Selisih	0,02^{0}C				
KMC					
Suhu tubuh sebelum	36,73 °C	0,11595	-57691		10
Suhu tubuh setelah	37,20 °C			0,00 0	
Selisih	0,47 °C	0,15635	-36309		

Swaddling dan KMC					
Suhu tubuh sebelum	36,66 °C	0,08433	-62524		10
Suhu tubuh setelah	37,24 °C	0,10750	-53476	0,000	
Selisih	0,58 °C				

Berdasarkan tabel 2 didapatkan hasil bahwa rata-rata suhu tubuh sebelum diberikan intervensi *swaddling* ialah 36,7ºC dan rata-rata suhu tubuh setelah diberikan intervensi *swaddling* ialah 36,72ºC, dengan selisih 0,02ºC. Hasil uji statistik didapatkan nilai *p value* < 0,168, sehingga dapat disimpulkan bahwa tidak ada pengaruh suhu tubuh sebelum dan setelah diberikan *swaddling*.

Rata-rata suhu tubuh sebelum diberikan intervensi KMC ialah 36,73ºC dan rata-rata suhu tubuh setelah diberikan intervensi KMC ialah 37,2ºC, dengan selisih 0,47ºC. Hasil uji statistik didapatkan nilai *p value* > 0,000, sehingga dapat disimpulkan bahwa ada perbedaan rata-rata suhu tubuh sebelum dan setelah diberikan KMC.

Rata-rata suhu tubuh sebelum diberikan intervensi *swaddling* dan KMC ialah 36,66ºC dan rata-rata suhu tubuh setelah diberikan intervensi *swaddling* dan KMC 37,2ºC, dengan selisih 0,58ºC. Hasil uji statistik didapatkan nilai *p value* >0,000, sehingga dapat disimpulkan bahwa ada perbedaan rata-rata suhu tubuh sebelum dan setelah diberikan *swaddling* dan KMC.

PEMBAHASAN

Usia bayi

Hasil analisis didapatkan bahwa nilai rata-rata usia bayi ialah 13,6 hari (SD = 4.606) dengan usia termuda 6 hari dan usia tertua 25 hari. Semakin bertambah usia bayi maka semakin tinggi tingkat adaptasi terhadap lingkungan luar. Deswita (2011) menyebutkan bahwa respon fisiologis yang normal pada BBLR merupakan tugas perkembangan awal setelah bayi dilahirkan. Hal ini juga didukung oleh Proverawati (2010) yang mengatakan bahwa BBLR memiliki jaringan lemak subkutan rendah dan permukaan luas tubuh yang relatif besar.

Usia Gestasi

Hasil analisis didapatkan nilai rata-rata usia gestasi bayi ialah 29,83 (SD = 1,577) dengan usia termuda 27 minggu dan usia tertua 32 minggu. Kehamilan cukup bulan/*aterm* merupakan kehamilan yang telah memasuki minggu ke 37-42, sedangkan kehamilan <37 minggu disebut *preterm*/kurang bulan dan bila >42 minggu disebut *posterm* (Manuaba, 2010).

Usia kehamilan minggu ke-28 merupakan pembentukan sistem syaraf pusat kontrol pernafasan, minggu ke-32 merupakan saat penimbunan lemak pada subkutan dan memasuki minggu ke-36 organ paru mulai berfungsi (Rahmi, 2014).

Hal ini didukung oleh pernyataan Manuaba (2010) mengatakan bahwa bayi yang lahir dengan usia kehamilan kurang bulan (<37 minggu) mengakibatkan pertumbuhan dan perkembangan janin belum optimal. Bayi yang terlahir saat <37 minggu dapat mengganggu pembentukan sistem penimbunan lemak pada subkutan sehingga bayi berisiko memiliki berat lahir kurang dari 2500 gram.

BB bayi

Hasil analisis didapatkan nilai rata-rata berat badan bayi ialah 2259,30 gram (SD= 256,262) dengan berat terendah 1455 gram dan berat tertinggi 2490 gram. Maryunani (2013) menyebutkan bahwa BBLR memiliki lapisan pembungkus lemak subkutan yang

lebih tipis dan luas badan bayi relatif lebih besar sehingga penguapan tubuh pun semakin besar karena kurangnya jaringan di bawah kulit (Respon fisiologis bayi terhadap paparan dingin adalah dengan proses oksidasi dari lemak coklat (IDAI, 2015). Hal ini menunjukkan bahwa bayi BBLR beresiko mengalami hipotermi sehingga dibutuhkan upaya cepat dalam penanganan pada BBLR seperti metode KMC untuk menjaga agar suhu tetap stabil.

Penelitian ini juga sejalan dengan penelitian yang dilakukan oleh Bobak (2012) menjelaskan BBLR dalam hal ini bayi kurang bulan, kehilangan kesempatan untuk mempersiapkan diri hidup di luar uterus yang biasanya terjadi pada trimester ketiga. Makin muda usia gestasi, kemampuan beradaptasi makin berkurang. Agar mendapat peluang beradaptasi yang sama dengan bayi cukup bulan maka harus diberikan lingkungan dan kebutuhan yang sama dengan keadaan di dalam uterus. Penanganan umum perawatan BBLR adalah mempertahankan suhu bayi agar tetap normal, pemberian minum dan pencegahan infeksi.

Pengaruh S*waddling* terhadap Suhu Tubuh BBLR

Hasil penelitian menyebutkan bahwa nilai rata-rata peningkatan suhu tubuh bayi sebelum dan setelah diberikan intervensi *swaddling* tidak berpengaruh. Dari hasil uji *dependent t test* menunjukkan bahwa tidak ada perbedaan suhu tubuh bayi sebelum dan setelah diberikan intervensi *swaddling* dengan nilai *p value* < 0,168 dan $\Delta = 0,02$.

Sunarsih (2012) mengatakan bahwa hingga saat ini manfaat bedong belum terbukti secara ilmiah, justru dengan pemberian bedong akan membatasi gerakan bayi, tangan dan kakinya tidak mendapatkan banyak kesempatan untuk bergerak bebas sehingga akan dapat menghambat perkembangan motoriknya. Namun Yosi (2012) menyebutkan manfaat *swaddling* diantaranya bayi merasa aman dan nyaman, memudahkan ibu untuk menyusui, dan meningkatkan lama tidur bayi. Jadi fungsi bedong memang bukan untuk meningkatkan suhu tubuh tetapi mencegah kehilangan panas, yang artinya bedong hanya untuk menjaga kestabilan suhu tubuh pada bayi baru lahir dan bayi BBLR.

Pengaruh KMC terhadap Suhu Tubuh BBLR

Hasil penelitian ini menyebutkan bahwa nilai rata-rata peningkatan suhu tubuh bayi sebelum dan sesudah diberikan intervensi KMC mengalami peningkatan. Dari hasil uji *dependent t test* menunjukkan bahwa ada perbedaan tingkat suhu tubuh bayi sebelum dan setelah diberikan intervensi KMC dengan nilai *p value* > 0,000) dengan $\Delta = 0,47$. Nilai selisih peningkatan suhu tubuh bayi menggunakan intervensi KMC lebih tinggi dari pada *swaddling*.

Metode KMC merupakan perawatan suportif yang dilakukan dengan meletakkan bayi diantara kedua payudara ibu sehingga terjadi kontak langsung kulit ibu dan kulit bayi. Penelitian ini juga sejalan dengan penelitian yang dilakukan oleh Rahmi & Rismayanti (2014) mengatakan bahwa ada pengaruh kontak kulit ke kulit antara ibu dan bayi terhadap suhu tubuh ibu dan bayinya sebelum dan setelah intervensi KMC dilakukan.

Menurut hasil penelitiannya dikatakan bahwa ketika suhu tubuh bayi dingin maka dada ibu akan menghangatkan, sehingga suhu tubuh stabil; sebaliknya jika suhu tubuh bayi terlalu tinggi maka dada ibu akan menurunkannya. Ketika suhu tubuh bayi rendah maka dada ibu akan berupaya untuk manaikkannya sampai dalam rentang normal. Sehingga ketika suhu tubuh sudah mencapai batas normal, dada ibu akan

mempertahankan agar tetap stabil. Suhu tubuh ibu dan suhu tubuh bayi sebelum dilakukan intervensi 36^0C. Setelah itu bayi ditempelkan di dada ibu selama 1 jam dan dilakukan pengukuran suhu tubuh.

Hasil penelitian dari beberapa artikel menunjukkan bahwa perawatan metode *kangaroo mother care* memberikan pengaruh terhadap respon fisiologis pada Bayi Berat Lahir Rendah, yaitu dalam mempertahankan suhu tubuh, peningkatan berat badan, peningkatan saturasi O2 dan stabilisasi nadi. Menurut Astuti et al., (2015) pada 28 bayi, melalui metode kuasi eksperimental dengan pre dan post test control group desain, tentang pengaruh penerapan KMC dengan peningkatan berat badan BBLR. Terjadi peningkatan berat badan pada bayi yang mendapatkan perawatan KMC yaitu sebesar 1071,43 gram. hal ini berarti ada pengaruh perawatan KMC terhadap peningkatan berat badan bayi BBLR.

Penelitian ini didukung pula oleh penelitian sebelumnya yang dilakukan oleh Lestari et al., (2014) mengatakan bahwa terdapat perbedaan rata-rata berat badan bayi sebelum dan sesudah perawatan dengan metode kanguru di ruang perinatologi RSUD Dr. Achmad Mochtar Bukittinggi. Penelitian yang dilakukan dengan pendekatan one group pretest posttest ini berdasarkan ratarata berat bayi sebelum perawatan metode kanguru dan sesudah perawatan metode kanguru yaitu 28,30 gram dengan standar deviasi 3,093. Penelitian yang dilakukan ini dilaksanakan selama 2 minggu. Penelitian lain oleh Lestari et al., (2014) tentang pengaruh KMC terhadap stabilitas suhu tubuh BBLR di ruang Peristi RSUD Kebumen menunjukkan bayi berat badan lahir rendah yang diberikan perlakuan perawatan metode kanguru/*kangaroo mother care* memiliki peluang mengalami suhu tubuh normal 0,350 kali lebih tinggi dibandingkan responden yang tidak diberikan perlakuan perawatan metode kanguru/*kangaroo mother care*.

Pada pengukuran kedua suhu tubuh bayi mengalami peningkatan. Hal ini karena sistem termoregulasi ibu sudah bagus dibandingkan BBLR. Selain memberikan manfaat untuk bayi dan ibu nya, metode KMC ini juga memberikan manfaat untuk ayah, petugas kesehatan dan fasilitas kesehatan. Menurut Maryunani (2013) manfaat KMC untuk ayah yaitu ayah memiliki peranan yang lebih besar dalam perawatan bayinya, serta meningkatkan hubungan antara ayah-bayinya. Untuk petugas kesehatan KMC ini memberikan manfaat berupa efisiensi tenaga petugas kesehatan, beban kerja petugas berkurang, petugas kesehatan dapat melakukan tugas lainnya. Sedangkan untuk fasilitas pelayanan kesehatan yaitu lama rawat perawatan lebih pendek sehingga bayi bisa lebih cepat pulang, efisiensi anggaran.

Pengaruh *Swaddling* + KMC terhadap Suhu Tubuh BBLR

Hasil penelitian pada intervensi *swaddling* dan KMC juga menunjukkan peningkatan suhu tubuh bayi sebelum dan setelah pemberian intervensi. Intervensi ini diberikan selama dua jam, yaitu satu jam untuk *swaddling* dan satu jam untuk KMC. Nilai selisih peningkatan suhu tubuh lebih tinggi dari kedua intervensi yang lain. Hal ini menunjukkan bahwa intervensi ini lebih efektif dalam meningkatkan suhu tubuh bayi dengan nilai *p value* > 0,000) dengan Δ= 0,58.

Swaddling dan KMC lebih tinggi dari pada *swaddling* saja dan KMC saja. Hal ini menunjukkan bahwa intervensi ini paling efektif dalam meningkatkan suhu tubuh pada BBLR dari pada kedua intervensi yang lain. *Swaddling* dilakukan untuk mencegah terjadinya kehilangan panas melalui radiasi, konpeksi dan epavorasi, bayi yang dibedong mampu mempertahankan suhu tubuhnya sehingga ketika bayi dilanjutkan dengan penggunaan KMC suhu tubuh bayi akan mengalami peningkatan karena terjadi

proses konduksi yaitu proses transfer panas dari dan melalui kontak langsung antara ibu dan bayi.

Penelitian ini menunjukkan adanya pengaruh perawatan metode KMC terhadap suhu tubuh, hal ini dapat terjadi karena berbagai macam faktor. Menurut Markum (2009) beberapa cara yang mempengaruhi peningkatan suhu tubuh pada BBLR antara lain bayi ditempatkan pada inkubator yang dilengkapi dengan alat pengatur suhu, *couves* yang diberi lampu penghangat, membedong bayi, dan perawatan KMC. Pada penelitian ini terlihat adanya peningkatan rata-rata suhu tubuh BBLR disetiap perlakukan perawatan *swaddling* dan KMC.

Hasil penelitian ini sejalan dengan penelitian sebelumnya menunjukkan dari segi efektifitas yang diukur melalui kenaikan suhu tubuh bayi BBLR, penerapan perawatan metode KMC dapat memberikan efek peningkatan suhu tubuh pada bayi BBLR dengan optimal yang dapat diawali dengan melakukan IMD, yakni segera setelah bayi lahir bayi diletakkan diperut ibu untuk mencari puting ibu dan telah dilakukan pada semua bayi BBLR. Efektifitas KMC ini didukung adanya kemauan ibu untuk melaksanakan KMC serta adanya dukungan dari keluarga sebagai *Kangaroo Support* (Deswita, 2011).

Intervensi ini merupakan suatu tindakan *wholness* yang dicapai dengan menjaga keseimbangan antara 4 konservasi yang meliputi konservasi energi, integritas struktur, integritas personal dan integritas sosial (Alligood, 2014). Integritas bayi dan orang tuanya dapat dilihat dari tercapainya fungsi mandiri dalam perawatan bayinya dengan stabilitas fisiologis dan pertumbuhan, meminimalkan cedera struktural, kemampuan perkembangan otak dan sistem keluarga yang stabil (Alligood, 2014).

Peran perawat berada pada proses 4 konservasi yang dipaparkan dalam teori Levine, dmana perawat tidak hanya memberikan pengobatan medis, tetapi juga merupakan mitra dalam membantu bayi mempertahankan keseimbnagannya dan bayi mampu beradaptasi dengan lingkungan baru.

SIMPULAN

Dalam penelitian ini menunjukkan bahwa terdapat perbedaan rata-rata suhu tubuh BBLR sebelum dan sesudah diberikan intervensi swaddling, intervensi KMC dan intervensi kombinasi antara *swaddling* dan KMC.

SARAN

Diharapkan perawat dapat menerapkan intervensi KMC dalam mempertahankan suhu tubuh bayi BBLR. Intervensi KMC ini dapat dilakukan oleh perawat dan dengan melibatkan orang tua dan konsep adaptasi sebagai salah satu tindakan *wholeness* dengan mempertahankan kesehatan individu. Bagi peneliti selanjutnya diharapkan membandingkan intervensi ini dengan intervensi lainnya.

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Original Article

The Effect of Kangaroo Mother Care Intervention on the Newborns Health Outcome Delivers at Sulaymaniyah Maternity Teaching Hospital

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ABSTRACT

Background and Objectives: Kangaroo mother care is an intervention for all newborns but especially for premature and low birth weight infants. The method involves babies being carried, usually by the mother, with skin-to-skin contact. It is the most achievable way for decreasing neonatal morbidity and mortality and is practical, inexpensive especially for developing countries. This study intended to assess the effect of kangaroo mother care on the newborns' health outcome at Sulaymaniyah Maternity Teaching Hospital in Sulaymaniyah, Kurdistan Region, Iraq.

Methods: A quasi-experimental, pre-post intervention study was conducted in the Neonatal Intensive Care Unit and Baby Friend Unit of the hospital. One hundred newborn-mother pairs participated in the Kangaroo mother care procedure. The newborns were physiologically monitored before, in the middle and after the procedure.

Result: The highest mean of newborn temperature was 37˚C after Kangaroo mother care in the visit three and the lowest mean temperature was 36.1˚C before Kangaroo mother care. There were statistically significant differences between the before, middle and after-procedure measurements in temperature, heart rate and respiratory rate (p-value <0.05) on all three visits, while there was no significant difference between the means of the oxygen saturation at all three visits (p-value was more than the standard alpha 0.05 F-test=0.961). There was a highly significant association between oxygen saturation and newborn birth weight and gestational age. Individual vital signs abnormalities were often corrected during the Kangaroo mother care sessions. Newborns involved in the procedure showed steady and statistically significant improvement in vital physiological parameters during three sessions on all three days.

Conclusion: Majority of babies who received Kangaroo mother care showed significant improvement in vital physiological parameters on all three days without using special equipment showing that this strategy can offer improved care to newborn infants. These findings support wider implementation of this strategy.

Keywords: Kangaroo, mother, care, newborn, health, outcome, effects

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INTRODUCTION

Kangaroo mother care (KMC) was first initiated in Colombia in 1978 [1]. The method involves babies being carried on the chest, usually by the mother, with skin-to-skin contact (SSC). SCS is a specially designed form of KMC which influences the physical and psychological development and the health of an infant over the first years of life and provides neurological, autonomic, somatic, behavioural,

and motor development benefits. KMC can be applied after birth for maximal effect and can continue to be implemented through the first years of life. Many factors are connected with an infant's growth and development, as well as the initiation and practising of KMC. [2]. The procedure of KMC between the mother and the baby is a secure and economical procedure that has proven advantages for mothers and children in comparison to an incubator caring method. It plays a symbolic role in infant survival, neurodevelopment, and the quality of mother-infant bonding. KMC balances good essence care and helps providers to ration the use of expensive basics such as warmers and incubators for all newborn babies especially pre-term and those with a low-birth-weight (LBW). Skin-to-skin bonding between the mother and her infant reduces maternal postpartum, depressive symptoms and improves autonomy [3].The KMC is done in three stages, the first and second one are performed in the hospital and the third in the family setting. The first stage is practised at the Intensive Care Unit (ICU) facilitating the bonding of the parents with the baby and positioning of the newborn. The second stage occurs in the Kangaroo nursery/unit, where the mother actively co-operates in the care of her child under the supervision of the health team. The third stage occurs after discharge at home where the baby should remain in the kangaroo position most of the day [4].The birth of a premature baby is an extremely stressful situation for parents, producing feelings of fear and insecurity. Therefore, the newborn-mother relationship is essential. KMC for pre-term babies is always related to better cognitive and motor development at six months of age. In addition to neonatal and maternal health outcomes, KMC is an essential tool in reducing the postpartum hospital stay and overall healthcare expense. It provides economic profit to the parents, as pre-term and LBW babies who were given KMC require less time for hospitalization [5]. The World Health Organization (WHO) supported study in Nepal, which showed that hypothermia was common in newborn infants early after birth; increased mortality was noted across all ranges of hypothermia, and the risk was 12 times greater among pre-term babies. [6]. KMC is a practical, inexpensive intervention, for developing countries. It implies putting the newborn baby in intimate skin-to-skin contact with the mother's chest and abdomen with repeated and preferably unique breastfeeding. This is similar to caring for a surrogate, where the premature baby is kept warm in the mother's bag and near to the breasts for unlimited feeding. KMC has emerged as a non-conventional low-cost method that provides warmth, touch, and security to the newborn and is believed to have a significant survival benefit. A recent Cochrane study reported that KMC improves breastfeeding outcomes and cardio -respiratory stability in infants without adverse effects [7]. A quasi-experimental study at Hawler Maternity Teaching Hospital in Erbil, Iraq from February to May 2017 showed that 48% of mothers who received SSC and 46% with routine care had successful breastfeeding. Newborns who received SSC initiated breastfeeding within 2.41 ± 1.38 (M ± SD) minutes after birth, however, newborns who received routine care started breastfeeding in 5.48 ± 5.7 (M ± SD) minutes. [8]Moreover, the prevalence of hypothermia in the newborns who received SSC and routine care was 2 and 42% respectively. This study was conducted to assess the effect of KMC on the newborns' physiological parameters as there has been no research on this subject in the Sulaymaniyah province

METHODS

A quasi-experimental, pre-post intervention design was used in this study at Sulaymaniyah Maternity Teaching Hospital in Sulaymaniyah in the Kurdistan Region of Iraq. All mothers of newborn babies in the Neonatal Intensive Care Unit (NICU) and Baby Friend Unit (BFU) were asked to participate in this study. A purposive non-probability sample of one hundred newborn-mother pairs was recruited to participate in the study. The study data were collected from all NICU newborn babies. The mothers were interviewed before KMC and monitored with newborns during KMC procedures in the period between the 8th of January 2019 and the 28th of May 2019. The researchers were trained for a month about KMC as preparation for data collection.The research tool included a field-tested questionnaire about the mother and their newborn demographic information. Direct monitoring and documentation were done in the NICU and BFU. The data collection tool was prepared in English and translated to the Kurdish language to be used for the mothers' interview. The council of the College of Medicine number 4 accepted protocol of the study on the 7th of February 2019, which was also approved by the ethical committee of the College of Nursing at University of Sulaymaniyah. An official letter from the College of Nursing at the University of Sulaymaniyah was sent to the Maternity Teaching Hospitals in Sulaymaniya to obtain facilitation and cooperation during data collection of this study from the 13th of November 2018.Data were collected through direct structured interview of postnatal mothers using a questionnaire. The study questionnaire consisted of three parts, as follows: Part one included four questions about neonatal demography and medical history: gestational age (weeks), birth weight (grams), gender and feeding type. The standard classification of both gestational age and birth weight was used: **Gestational age (9)**

< 28 weeks
Extremely pre-term
28 to less than32 Weeks
Very pre-term
32 to less than 37 Weeks
Moderate to late pre-term
37 to less than 40 Weeks
Full-term
weeks
Post-term

Newborn Birth weight/gram (10)

<1500
Extremely low birth weight(ELBW)
1500 to less than 2000
Very low birth weight(VLBW)
2000 to less than 2500
Low birth weight(LBW)
2500 to less than 3500
Normal weight (NW)
3500
Overweight(OW)

Regarding age and birth weight as follow re, Heart rate, respiratory rate and Oxygen saturation) **Part two** contained maternal demographic information such as age, education level, occupation, residency, employment and parity.

Part three included the monitoring of physiological parameters, such as body temperature, heart rate, respiratory rate, and oxygen saturation of newborns before and after the demonstration of KMC. The purpose of the study was clearly explained to all the postnatal mothers and relatives, and their verbal consent was obtained before filling the questionnaire. The KMC custom-made was applied on the mother's bare chest, with newborns wearing only a diaper for at least 30 minutes with covering the baby head, back and feet to avoid hypothermia. For implementing KMC, mothers were asked to use any front-opening light dress. Babies were dressed in a cap, socks, and nappy and no other

garments. After placing into KMC bag, the baby was placed upright inside mother's clothing against the bare skin of the chest and abdomen. Head was turned to one side and placed in a slightly extended position, and eye-to-eye contact between mother and baby was encouraged. The hips were kept flexed and abducted in a ' frog' position; the arms were also flexed. The baby was allowed to suck on the breast as often as it wanted. The newborns were physiologically monitored before the KMC, in the middle, and after the procedure for consecutive three days in three sessions. Four vital physiological parameters of the newborns, such as axillary temperature, respiration rate (RR/ min), heart rate (HR/ min), and oxygen saturation (SpO2) were assessed, monitored and recorded. An axillary temperature was taken in °C by a digital thermometer. Respiration rate was assessed by observing chest movements for a full one minute. The heart rate and oxygen saturation were monitored by the pulse-oximeter. All mothers of newborns including full-term, pre-term babies, low birth weight babies, and postmature babies were trained about KMC. Newborns on Continuous Positive Airway Pressure (CPAP) and unwilling mothers were excluded from participation in the study. All statistical computation was enhanced using the statistical method software SPSS 21. The data were coded, tabulated, and presented in a descriptive form. The statistical procedures that were applied to determine the results of the present study included:

1. Alpha-Cronbach has been used for testing the reliability of the questionnaire.
2. Descriptive statistical data analysis (newborn demographic characteristics and mother demographic characteristics)
3. Inferential data analysis:

A. One sample t-test
B. Independent samples t-test
C-Parried samples t-test
D-One way ANOVA (F-test)
Reliability of Questionnaire

RESULTS

It can be seen in Table 1 that the Alpha Cronbach measure was used to get the result of the reliability of the questionnaire. As a result, the value of Alpha Cronbach equalled to 0.896, and the validity was 0.803 showing the high reliability of the questionnaire.

Table 1: Reliability and Validity

Methods	Result
Alpha Cronbach	0.896
Validity	0.803

Table 2 demonstrates that 36% of the newborns were full-term and post-term in gestation age (the highest rate among all levels of gestational age) followed by 19% of moderate and late pre-term (9%). Regarding the birth weight, more than half of newborns (51%) had normal weight (2500 - 3500gms) followed by 18% of low birth weight infants (2000 - 2500gms). The majority of the newborns were male reaching 60% of the total. Regarding the feeding type, 46% of newborns were bottle-fed, which was the highest percentage among all the feeding types, 24% were breastfed, and only 3% were on the nasogastric tube (NGT) feeding. Table 3 indicates that out of 100 mothers, 51% were between 20 – 30 years of age. The second-largest group of mothers were 30 to 40 years old (40%). Most of the participants (63%) lived in urban areas. Regarding educational level, the data showed that 26% of mothers had a secondary level of education and 24% were educated at higher education institutions. The most frequent occupation was being a housewife (83%). Among the study

participants, 57% of the mothers' parity was low multipara , which represented the highest frequency among all levels of

Table 2: Distribution of the newborns' demographic characteristics

Characteristics		Frequency	Percent
Gestational age/week			
< 28 weeks	Extremely pre-term	0	(0)
28 to less than32 W	Very pre-term	9	(9)
32 to less than 37 W	Moderate to late pre-term	19	(19)
37 to less than 40 W	Full-term	36	(36)
> 40 weeks	Post-term	36	(36)
Total		100	(100)
Birth weight (grams)			
< 1500	Extremely low birth weight (ELBW)	7	(7)
1500 to less than 2000	Very low birth weight (VLBW)	8	(8)
2000 to less than 2500	Low birth weight(LBW)	18	(18)
2500 to less than 3500	Normal weight (NW)	51	(51)
≥ 3500	Overweight (OW)	16	(16)
Total		100	(100)
Gender			
Male		60	(60)
Female		40	(40)
Total		100	(100)
Feeding type			
Breastfeeding		24	(24)
Bottle feeding		46	(46)
Mixed feeding		9	(9)
NGT (nasogastric tube)		3	(3)
NPO (nothing per oral)		18	(18)
	Total	100	(100)

Table 3: Distribution of the mothers' demographic characteristics

Characteristic	Frequency	Percent
Mother age/ years		
Less than 20	6	(6)
20 – 30	51	(51)
30 – 40	40	(40)
More than 40	3	(3)
Total	100	(100)
Residency		
Rural	11	(11)
Urban	63	(63)
Suburban	26	(26)
Total	100	(100)
Level of education		
Illiterate	17	(17)
Read & write	16	(16)
Secondary educated	26	(26)
Preparatory educated	17	(17)
Higher education	24	(24)
Total	100	(100)
Employment		
Employed	17	(17)
Housewife	83	(83)
Total	100	(100)
Parity		
Primipara	29	(29)
Low multipara (1-3)	57	(57)
Grand multipara (4-8)	14	(14)
Total	100	(100)

Table 4 shows the means of the physiological parameters of the whole sample. There were highly statistically significant differences in means between the before, middle and after KMC measurements in temperature, heart rate and respiratory rate at all three visits (P< 0.05). The highest mean of temperature (37°C after KMC) was at Visit 3 and the lowest mean (36.1° C before KMC) was recorded at Visit 1. There were no statistically significant differences between the means of the oxygen saturation at Visit 1 (p=0.088), Visit 2 (p=0.721) and Visit 3 (p=0.384) because the result of the p-value was more than the standard alpha 0.05.Table 5 shows the association between gestational age and temperature at all three visits(before KMC, in the middle of KMC, after KMC). There were statistically significant differences between gestational age and temperature because the p-values were less than the standard alpha 0.05 by using ANOVA table (F-test). The Mean ± SD of temperature (Visit 3 after KMC) in full-term and post-term newborns was 36.9 ± 0.18, which was the highest value of the mean. Furthermore, the mean ± S.D in at Visit 1 in very pre-term infants was 35.6 °C ± 0.72, which was the lowest value of the mean.Table 6 shows the association between gestational age and heart rate. Data show that there was a statistically significant difference between gestational age and heart rate (during and after KMC (p=0.01). In contrast, the data from Visit 1 (p= 0.22), Visit 2 (p=0.165), and Visit 3 (p=0.645),(all visits, p=0.18) before KMC (p=0.222), in the middle of KMC (p=0.43) show that there was no statistically significant difference between gestational age and heart rate because the p-value was greater than the common alpha 0.05. The mean ± SD of heart rate before KMC in moderate to late pre-term was 144 ± 14.99, which was the highest value of the mean. Furthermore, the mean and standard deviation of heart rate after KMC in post-term newborns was 116 ± 7.37, which was the lowest value of the mean. Table 7 demonstrates the association between gestational age and respiratory rate during all three visits, before KMC, in the middle of KMC and after KMC). There was a statistically significant difference between gestational age and respiratory rate at Visit 3 (p-value = 0.001) and after KMC (p-value = .048) because the p-value was less than the standard alpha 0.05. The means ± SDs of the respiratory rate before KMC in very pre-term and moderate to late pre-term infants were 43 ± 6.5 and 43 ± 6.16 respectively, which were the highest values of the mean. Otherwise, the mean ± SD of respiratory rate after KMC in post-term newborns was 35 ± 3.42, which was the lowest value of the mean. Table 8 indicates the association between gestational age and oxygen saturation., There was statistically significant difference between gestational age and oxygen saturation at Visit 1 (p=0.046), Visit 2 (p=0.005), Visit 3 (p=0.047), (all visits, p=0.003), before KMC (p=0.008), in the middle of KMC (p=0.045), and after KMC (p=< 0.001) because the p-values were less than the common alpha 0.05. Table 9 shows the association between birth weight and temperature. There was a statistically significant difference between birth weight and temperature at Visit1 (p=0.028), Visit 2 (p=0.001), Visit 3 (p=< 0.001), (al visits, p=0.001), before KMC (p=0.007), in the middle of KMC (p=0.001) and after KMC (p=< 0.001) because of the p-value < 0.05 . The mean ± S.D of the temperature after KMC in babies weighing less than1500 grams was 36 ± 0.69 which was the lowest value of the mean.

Table 4: The mean values of physiological parameters of newborns at three visits

	Physiological Parameter	Visits 1			Visits 2			Visits 3		
		Before	Middle	After	Before	Mid-dle	After	Before	Middle	After
Tempera-ture ℃	Mean	36.1	36.4	36.6	36.5	36.6	36.8	36.6	36.8	37
	S.D	0.73	0.54	0.49	0.5	0.41	0.35	0.42	0.33	0.27
	Minimum	33.8	34.6	34.6	34.6	35.2	35	38.1	37.9	37.8
	Maximum	38.3	38.1	38.1	35.1	35.6	35.9	37.8	37.9	37.8
	F- test		17.23			15.808			23.458	
	Sig.		< 0.001			< 0.001			< 0.001	
Heart Rare Beats/ minute	Mean	145	130	123	138	130	119	132	123	115
	S.D	19.39	14.69	12.2	17.04	14.86	12.8 6	12.89	13.7	10.92
	Minimum	79	91	96	99	100	93	100	98	95
	Maximum	184	178	158	190	168	154	160	168	152
	F- test		52.745			40.142			44.141	
	Sig.		< 0.001			< 0.001			< 0.001	
Respirato-ry Rate Breath/ minute	Mean	43	40	37	42	39	37	41	39	36
	SD.	6.73	4.93	5.3	6.19	5.65	5.55	7.08	7.1	6.96
	Minimum	20	22	24	28	26	24	28	24	24
	Maximum	72	58	58	56	54	52	62	60	60
	F- test		27.984			23.640			10.775	
	Sig.		< 0.001			< 0.001			< 0.001	
Oxygen Satura-tion%	Mean	98	98	99	98	98	98	98	99	99
	SD.	2.33	2.1	1.77	1.79	1.97	1.67	1.55	1.57	1.41
	Minimum	88	91	92	92	92	91	94	94	95
	Maximum	100	100	100	100	100	100	100	100	100
	F- test		2.452			0.24			0.961	
	Sig.		0.088			0.787			0.384	

Table 5: The association between gestational age and temperature

Temperature		Gestational Age / Weeks			
		28 to < 32 W	32 to < 37 W	37 to < 40 W	≥ 40 W
		Very Pre-term	Moderate to late Pre-term	Full-term	Post-term
Visit 1	Mean± S.D	35.6 ± 0.72	36.5 ± 0.72	36.4 ± 0.41	36.5 ± 0.57
	F-Test		8.039		
	Sig.		< 0.001		
Visit 2	Mean± S.D	36.1 ± 0.55	36.6 ± 0.57	36.7 ± 0.24	36.7 ± 0.27
	F-Test		7.307		
	Sig.		< 0.001		
Visit 3	Mean± S.D	36.3 ± 0.44	36.8 ± 0.37	36.9 ± 0.18	36.9 ± 0.23
	F-Test		13.813		
	Sig.		< 0.001		
General	Mean± S.D	36 ± 0.53	36.6 ± 0.52	36.7 ± 0.24	36.7 ± 0.27
	F-Test		10.687		
	Sig.		< 0.001		
Before	Mean± S.D	35.7 ± 0.63	36.5 ± 0.68	36.5 ± 0.34	36.5 ± 0.37
	F-Test		+68.159		
	Sig.		< 0.001		
Middle	Mean± S.D	36 ± 0.49	36.6 ± 0.51	36.7 ± 0.24	36.7 ± 0.27
	F-Test		10.251		
	Sig.		< 0.001		
After	Mean± S.D	36.3 ± 0.52	36.8 ± 0.4	36.9 ± 0.17	36.9 ± 0.18
	F-Test		13.595		
	Sig.		< 0.001		

Table 6: The association between gestational age and heart rate

Heart Rate		Gestational Age / Weeks			
		28 to < 32 W	32 to < 37 W	37 to < 40 W	≥ 40 W
		Very Pre-term	Moderate to late Pre-term	Full-term	Post-term
Visit 1	Mean± S.D	130 ± 10.64	138 ± 14.17	133 ± 12.74	131 ± 13.43
	F-Test		1.497		
	Sig.		0.22		
Visit 2	Mean± S.D	131 ± 15.17	134 ± 15.64	128 ± 10.29	127 ± 13.11
	F-Test		1.737		
	Sig.		0.165		
Visit 3	Mean± S.D	125 ± 8.61	125 ± 10.19	123 ± 11.42	122 ± 11.02
	F-Test		0.557		
	Sig.		0.645		
General	Mean± SD.	129 ± 9.04	133 ± 11.09	128 ± 9.41	126 ± 10.15
	F-Test		1.662		
	Sig.		0.18		
Before	Mean± SD.	134 ± 11.22	144 ± 14.99	137 ± 12.16	137 ± 14.29
	F-Test		1.492		
	Sig.		0.222		
Middle	Mean± SD.	127 ± 8.49	131 ± 11.73	127 ± 10.49	126 ± 11.86
	F-Test		0.929		
	Sig.		0.43		
After	Mean± SD.	125 ± 9.00	123 ± 10.09	118 ± 9.63	116 ± 7.37
	F-Test		3.57		
	Sig.		0.017		

Table 7: The association between gestational age and respiratory rate

Respiratory Rate		Gestational Age / Weeks			
		28 to < 32 W	32 to < 37 W	37 to < 40 W	≥ 40 W
		Very Pre-term	Moderate to late Pre-term	Full-term	Post-term
Visit 1	Mean± S.D	37 ± 5.1	39 ± 4.59	41 ± 5.25	41 ± 3.83
	F-Test		1.842		
	Sig.		0.145		
Visit 2	Mean± S.D	41 ± 6.67	41 ± 6.54	39 ± 4.87	38 ± 4.39
	F-Test		1.581		
	Sig.		0.199		
Visit 3	Mean± S.D	45 ± 9.23	40 ± 6.12	38 ± 5.98	36 ± 5.49
	F-Test		5.732		
	Sig.		0.001		
General	Mean± SD.	41 ± 5.2	40 ± 4.89	39 ± 3.93	38 ± 3.66
	F-Test		1.534		
	Sig.		0.211		
Before	Mean± SD.	43 ± 6.5	43 ± 6.16	42 ± 4.72	41 ± 4.57
	F-Test		0.658		
	Sig.		0.58		
Middle	Mean± SD.	42 ± 5.22	40 ± 5.12	39 ± 3.81	38 ± 3.81
	F-Test		1.528		
	Sig.		0.212		
After	Mean± SD.	39 ± 5.18	38 ± 4.65	36.7 ± 4.18	35 ± 3.42
	F-Test		2.586		
	Sig.		0.048		

Table 8: The association between gestational age and oxygen saturation

Oxygen Saturation		Gestational Age / Weeks 28 to < 32 W Very Pre-term	32 to < 37 W Moderate to late Pre-term	37 to < 40 W Full-term	≥ 40 W Post-term
Visit 1	Mean± S.D	97 ± 2.39	98 ± 1.85	98 ± 1.84	99 ± 1.37
	F-Test		2.769		
	Sig.		0.046		
Visit 2	Mean± S.D	97 ± 2.25	98 ± 1.79	98 ± 1.3	99 ± 1.12
	F-Test		4.482		
	Sig.		0.005		
Visit 3	Mean± S.D	98 ± 1.57	98 ± 1.27	99 ± 0.95	99 ± 1.32
	F-Test		2.752		
	Sig.		0.047		
General	Mean± SD.	97 ± 1.88	98 ± 1.48	99 ± 0.94	99 ± 0.91
	F-Test		5.012		
	Sig.		0.003		
Before	Mean± SD.	97 ± 2.24	98 ± 1.6	98 ± 1.25	99 ± 1.02
	F-Test		4.199		
	Sig.		0.008		
Middle	Mean± SD.	97 ± 1.89	98 ± 1.69	98 ± 1.05	99 ± 1.08
	F-Test		2.77		
	Sig.		0.045		
After	Mean± SD.	97 ± 2.05	98 ± 1.4	99 ± 0.83	99 ± 0.89
	F-Test		6.931		
	Sig.		< 0.001		

Table 9: The association between birth weight and temperature

Temperature		Birth weight (grams) <1500 ELBW	1500 – 2000 VLBW	2000 – 2500 LBW	2500 – 3500 NW	> 3500 OW
Visit 1	Mean± S.D	36 ± 1.1	36 ± 0.99	37 ± 0.5	36 ± 0.4	37 ± 0.34
	F-Test			2.85		
	Sig.			0.028		
Visit 2	Mean± S.D	36 ± 0.76	36 ± 0.79	37 ± 0.29	37 ± 0.24	37 ± 0.19
	F-Test			5.411		
	Sig.			0.001		
Visit 3	Mean± S.D	36 ± 0.6	37 ± 0.51	37 ± 0.2	37 ± 0.2	37 ± 0.22
	F-Test			8.186		
	Sig.			< 0.001		
General	Mean± S.D	36 ± 0.79	36 ± 0.71	37 ± 0.32	37 ± 0.25	37 ± 0.19
	F-Test			5.434		
	Sig.			0.001		
Before	Mean± S.D	36 ± 0.99	36 ± 0.91	37 ± 0.45	36 ± 0.33	37 ± 0.3
	F-Test			3.756		
	Sig.			0.007		
Middle	Mean± S.D	36 ± 0.73	36 ± 0.71	37 ± 0.31	37 ± 0.26	37 ± 0.18
	F-Test			5.473		
	Sig.			0.001		
After	Mean± S.D	36 ± 0.69	37 ± 0.58	37 ± 0.2	37 ± 0.18	37 ± 0.13
	F-Test			8.12		
	Sig.			< 0.001		

Table 10 demonstrates the association between birth weight and heart rate. There was a statistically significant difference between birth weight and heart rate after KMC (p=0.042) because the result of the p -value was less than the standard alpha 0.05 using ANOVA table (F-test). The temperature at all visits before KMC and in the middle KMC showed no statistically significant differences between the birth weight and heart rate because of the p-value >0.05. The mean ± SD of the heart rate in the middle of KMC in newborns with a weight of 2000 – 2500 grams was 125 ± 6.45, which was the lowest value of the mean, and the majority of the means of the heart rate in the middle of KMC in infants weighing less than 1500 grams were 133.Table 11 shows the association between birth weight and respiratory rate. There was a statistically significant difference between birth weight and respiratory rate at Visit 3 (p=< 0.001), (all visits, p=0.049) in the middle of KMC, (p=0.015) and after KMC (p=0.024) as indicated by the p-value < 0.05. In contrast, at Visit 1 (p=0.438) , Visit 2 (p=0.093) and before significant difference between birth weight and respiratory rate as the p-value was more than the common alpha 0.05 by using ANOVA table (F-test). The mean± SD of the respiratory rate before KMC in newborns with a weight of less than 1500grams was 41 ± 4.18), which was the highest value of the mean. Table 12 shows the association between birth weight and oxygen saturation. There was a statistically significant difference between birth weight and oxygen saturation at Visit 1 (p=0.007) ,Visit 2 (p=< 0.001), Visit 3 (p=0.048), (all visits ,p=0.001), before KMC (p=< 0.001), in the middle of KMC (p=0.018) and after KMC (p=0.001) because of the p-value < 0.05 by using ANOVA table (F-test). The mean ± SD of oxygen saturation in the middle of KMC in newborns weighing 2500 – 3500 grams was 99 ± 1.07 had the highest value of the mean. At the same time, the mean ± SD of oxygen saturation in the middle of KMC in infants with weight less than 1500 grams was 97 ± 1.66, which was the lowest value of the mean.

Table 10: The association between birth weight and heart rate

Heart Rate		Birth weight (grams) <1500 ELBW	1500 – 2000 VLBW	2000 – 2500 LBW	2500 – 3500 NW	> 3500 OW
Visit 1	Mean± S.D	133 ± 11.75	135 ± 15.98	132 ± 11.0	132 ± 13.58	134 ± 12.42
	F-Test			0.212		
	Sig.			0.931		
Visit 2	Mean± S.D	140 ± 12.05	123 ± 12.35	130 ± 12.61	127 ± 12.61	132 ± 13.76
	F-Test			2.153		
	Sig.			0.08		
Visit 3	Mean± S.D	129 ± 10.94	125 ± 8.31	119 ± 5.62	123 ± 11.81	125 ± 11.99
	F-Test			1.329		
	Sig.			0.265		
General	Mean± SD.	134 ± 8.94	128 ± 11.29	127 ± 7.68	127 ± 10.42	130 ± 11.16
	F-Test			0.972		
	Sig.			0.427		
Before	Mean± SD.	141 ± 9.08	137 ± 15.37	138 ± 14.11	138 ± 13.0	140 ± 16.49
	F-Test			0.158		
	Sig.			0.959		
Middle	Mean± SD.	133 ± 10.36	127 ± 9.61	125 ± 6.45	126 ± 11.84	132 ± 12.55
	F-Test			1.674		
	Sig.			0.162		
After	Mean± SD.	129 ± 9.57	121 ± 11.05	119 ± 7.12	117 ± 9.35	119 ± 8.35
	F-Test			2.582		
	Sig.			0.042		

Table 11: The association between birth weight and respiratory rate

Respiratory Rate		Birth weight (grams) <1500 ELBW	1500 – 2000 VLBW	2000 – 2500 LBW	2500 – 3500 NW	> 3500 OW
Visit 1	Mean± S.D	37 ± 5.97	39 ± 3.05	40 ± 4.83	40 ± 4.78	41 ± 4.32
	F-Test			0.952		
	Sig.			0.438		
Visit 2	Mean± S.D	44 ± 5.19	41 ± 7.55	39 ± 5.73	38 ± 4.88	39 ± 3.93
	F-Test			2.055		
	Sig.			0.093		
Visit 3	Mean± S.D	48 ± 7.91	43 ± 7.39	39 ± 5.43	37 ± 5.94	37 ± 5.27
	F-Test			6.015		
	Sig.			< 0.001		
General	Mean± SD.	43 ± 4.31	41 ± 5.04	39 ± 4.21	38 ± 3.97	39 ± 3.54
	F-Test			2.476		
	Sig.			0.049		
Before	Mean± SD.	44 ± 5.47	44 ± 7.23	42 ± 5.88	41 ± 4.63	43 ± 4.29
	F-Test			1.025		
	Sig.			0.398		
Middle	Mean± SD.	44 ± 4.29	41 ± 4.88	39 ± 3.87	38 ± 4.15	39 ± 3.48
	F-Test			3.25		
	Sig.			0.015		
After	Mean± SD.	41 ± 4.18	38 ± 4.09	37 ± 4.14	36 ± 4.03	36 ± 3.66
	F-Test			2.958		
	Sig.			0.024		

Table 12: The association between birth weight and oxygen saturation

Oxygen Saturation		Birth weight (grams) > 1500 ELBW	2000 – 1500 VLBW	2500 – 2000 LBW	3500 – 2500 NW	< 3500 OW
Visit 1	Mean± S.D	1.95 ± 96	1.34 ± 98	1.6 ± 98	1.54 ± 98	2.26 ± 98
	F-Test			3.775		
	Sig.			0.007		
Visit 2	Mean± S.D	2.08 ± 96	1.59 ± 98	1.57 ± 98	1.33 ± 99	0.87 ± 99
	F-Test			5.573		
	Sig.			0.001 >		
Visit 3	Mean± S.D	1.58 ± 97	1.19 ± 98	1.32 ± 99	1.17 ± 99	1.13 ± 99
	F-Test			2.497		
	Sig.			0.048		
General	Mean± SD.	1.61 ± 97	1.17 ± 98	1.4 ± 98	0.92 ± 99	1.13 ± 98
	F-Test			5.433		
	Sig.			0.001		
Before	Mean± SD.	1.8 ± 96	0.79 ± 99	1.61 ± 98	1.11 ± 98	1.39 ± 98
	F-Test			6.394		
	Sig.			0.001 >		
Middle	Mean± SD.	1.66 ± 97	1.56 ± 98	1.5 ± 98	1.07 ± 99	1.26 ± 98
	F-Test			3.128		
	Sig.			0.018		
After	Mean± SD.	1.86 ± 97	1.54 ± 98	1.32 ± 99	0.87 ± 99	1.06 ± 99
	F-Test			4.842		
	Sig.			0.001		

DISCUSSION

A study was performed at NICU/BFU at the maternity teaching hospital in Sulaimaniyah over six months between the 8th of January 2019 and the 28th of May 2019. The period of one month before the study was used for training about KMC.

The procedure of KMC is an easy and inexpensive procedure for the care of newborns. KMC enhances both newborn and maternal well-being and can be practised in any situation without the requirement of special equipment such as special cots, heaters and incubators. Even though initially perceived for use only in developing countries with limited resources, its use has gradually expanded globally as medical caregivers, parents, and administrators have become highly familiar with its physiological, psychological, and cost benefits. (11,12,13) This study is generally in agreement with earlier studies, as the regular upward trend in temperature during KMC sessions and throughout our study had a p -value of 0 (p=< 0.001), which was a very highly significant finding. Another study about the KMC on pre-term babies found that the mean axillary temperature and the mean heart rate was higher during KMC than during routine care. (14) KMC raises the newborn's temperature, and as the goal is to 'retain the warm of the newborn', the intervention is one of the most inexpensive ways to protect babies during the critical neonatal period (15). Similarly, in this study, very highly significant differences were found in heart rate and respiratory rate before and after KMC at p=< 0.001. Similarly, Hoe et al. who studied the KMC effect on the mother and newborn physiology, stated that kangaroo care promotes stability of physiological function. (16) In his study, the heart rate remained stable, but the respiratory rate ranged between 20 to 72 (mean 41.2), and breathing difficulties did not x occur during KMC (17). In agreement to the finding of this study, studies about the effects of KMC on the vital signs of low-birth-weight and pre-term newborn found no significant changes in the physiological parameter of oxygen saturation among newborns (18,19). In contrast to that, another study showed increased SpO2 (93.8% vs 97.3%) after performing KMC (20). Earlier studies about KMC and oxygen saturation and paternal bonding found a decrease in apnea and improvement in oxygen saturation in mechanically ventilated newborns who were able to tolerate KMC transfer and position changes. (21) In the cohort study by Nurian et al. who compared the effect of KMC and conventional care methods on physiological criteria in low birth weight infants in Shahid Beheshti University of Medical Sciences at Tehran in 2009, significant changes were seen between two groups in terms of heart rate, oxygen saturation and respiratory rate 5 minutes after the intervention (p < 0.05). The result shows that KMC affects the sustainability of physiological parameters during care. Thus, caregivers should use KMC for mothers and infants [22].In this study, the infants born before 32-week gestation gained more benefits from KMC application than moderate to late pre-term. In these babies the temperature and gestational age had the p-value = < 0.001 at all three visits and (before, middle, after KMC). Heart rates difference between the general means of three visits and the three checking periods had p-value between 0.18 and 0.017 that indicates there was a significant difference in the mean and standard deviation of heart rate before KMC in moderate to late pre-term (144 ±14.99). Otherwise, the mean and SD of heart rate after KMC in post-term newborns was 116± 7.37, which was

the lowest value of the mean, Respiration rate had minimal changes, and oxygen saturation had the p-value = < 0.001 at three visits. Contrary to this study findings, a meta-analysis study to determine the physiological effects of skin-to-skin contact on newborns and mothers concluded that, although there was an increase in body temperature of 0.22°C, there was no change in heart rate. Likewise, change in oxygen saturation in another study was statistically not clinically significant; showing the decline in oxygen saturation of 0.60% during periods of KMC. Prematurity did not affect the regularity of these parameters. [23]Regarding the association between KMC and birth weight, it can be stated that all newborns especially low birth weight newborns receiving KMC showed a modest but statistically significant rise in temperature, respiration rate, heart rate, and oxygen saturation without the requirement for any special equipment. This can aid to avoid complications and the need for more detailed measurements. There is a room for making KMC the standard of care for the LBW newborns in most settings. Nonetheless, adequate planning and labour would be required to motivate and train mothers to carried out KMC and to monitor that they do so satisfactorily [24].Furthermore, KMC does have comparative benefits over conventional care, especially with aspects of improving neonatal survival, supporting exclusive breastfeeding, and promoting early discharge from the hospital. Even though it was initially proposed for resource-constrained settings to decrease the high neonatal mortality rates related with pre-term and LBW infants, KMC is now been recommended by the WHO for neonatal care in both developed (highin come) and developing (low-income) countries. In developed countries, there appears to be a huge gap in its implementation due to the high accessibility of incubators and other technology components of conventional care. Inputs have been made regarding KMC implementation in many developing countries where facility-based KMC has been individualized. Continuous training for health professionals and provision of facilities is needed, which could be financed by international aid organizations to scale up the program in these settings (25,26).

CONCLUSION

Kangaroo Mother Care is protective against a variety of adverse effects on newborn outcomes and has not shown evidence of harm. From the available evidence, KMC significantly improves physiological variables and thus it may positively influence the newborns' physical health. The KMC is one of the essential, inexpensive methods that significantly improves the newborns' physiological outcomes. In Sulaymaniyah, it has the potential to improve neonatal survival, support exclusive breastfeeding, and promote early discharge from the hospital.

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CONFLICT OF INTEREST

The authors report no conflict of interests.

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Short Communication

Effect of Kangaroo Mother Care on Vital Physiological Parameters of The Low Birth Weight Newborn

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ABSTRACT

Objectives: Low birth weight (LBW; <2500 g), which is often associated with preterm birth, is a common problem in India. Both are recognized risk factors for neonatal mortality. Kangaroo mother care (KMC) is a non-conventional, low-cost method for newborn care based upon intimate skin-to-skin contact between mother and baby. Our objective was to assess physiological state of LBW babies before and after KMC in a teaching hospital setting. **Materials and Methods:** Study cohort comprised in-born LBW babies and their mothers - 300 mother-baby pairs were selected through purposive sampling. Initially, KMC was started for 1 hour duration (at a stretch) on first day and then increased by 1 hour each day for next 2 days. Axillary temperature, respiration rate (RR/ min), heart rate (HR/ min), and oxygen saturation (SpO_2) were assessed for 3 consecutive days, immediately before and after KMC. **Results:** Data from 265 mother-baby pairs were analyzed. Improvements occurred in all 4 recorded physiological parameters during the KMC sessions. Mean temperature rose by about 0.4°C, RR by 3 per minute, HR by 5 bpm, and SpO_2 by 5% following KMC sessions. Although modest, these changes were statistically significant on all 3 days. Individual abnormalities (e.g. hypothermia, bradycardia, tachycardia, low SpO_2) were often corrected during the KMC sessions. **Conclusions:** Babies receiving KMC showed modest but statistically significant improvement in vital physiological parameters on all 3 days. Thus, without using special equipment, the KMC strategy can offer improved care to LBW babies. These findings support wider implementation of this strategy.

Keywords: India, kangaroo mother care, low birth weight, newborn, physiological parameter, preterm

Introduction

Low birth weight (LBW; <2500 g regardless of gestational age), which is often associated with preterm birth, is an important predictor of infant death within 28 days of birth.[1] It is estimated that globally, out of 139 million live births, more than 20 million LBW babies are born each year-over 95% of them in developing countries, mainly of South Asia and sub-Saharan Africa.[2] It is also estimated that, in developing countries, LBW infants are approximately 13 times more likely to die than normal birth weight counterparts.[3] Medical cost is also significantly higher in caring for preterm and other LBW babies. LBW occurs in about 20-30% of all live births in India.[4]

A major problem with such babies is their inability to control body temperature — a preventable cause of their morbidity and mortality. A World Health Organization (WHO) supported study in Nepal showed that hypothermia was common in newborn infants soon after birth; increased mortality was noted across all grades of hypothermia, and the risk was 12

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times higher among preterm babies.[5] A study from India[6] revealed that 2.9% intramural babies and 45% babies born at home developed mild to moderate hypothermia.

Kangaroo mother care (KMC) implies placing the newborn baby in intimate skin-to-skin contact with the mother's chest and abdomen coupled with frequent and preferably exclusive breast-feeding. This is similar to marsupial care-giving, where the premature baby is kept warm in the maternal pouch and close to the breasts for unlimited feeding. KMC has emerged as a non-conventional low cost method for newborn care that provides warmth, touch, and security to the newborn and is believed to confer significant survival benefit. An updated Cochrane review has reported that KMC benefits breastfeeding outcomes and cardio-respiratory stability in infants without negative effects.[7]

Indian data on outcome of KMC are limited, though it has been found to be an effective and feasible method of care of LBW babies in hospital setting.[8] With this background, the objective of our study was to assess the physiological state of LBW babies during KMC in a teaching hospital setting. The broader intention is to generate data to recommend wider implementation of the strategy.

Materials and Methods

The study design was quasi-experimental with subjects serving as their own control. The study cohort comprised LBW babies born at Institute of Postgraduate Medical Education & Research (IPGME&R), Kolkata and its associated SSKM Hospital, and mothers of these babies. This is a tertiary care teaching hospital with level III neonatal intensive care unit (NICU) facility. The study protocol was approved by the institutional ethics committee, and formal written informed consent of willing mothers was obtained. Babies with sick mothers or gross congenital malformations were not included.

At first, the mothers were counseled regarding breastfeeding and KMC and their benefits. Then, breastfeeding and KMC were demonstrated with the help of volunteer mothers. After motivation, formal written informed consent of willing mothers was obtained for participation in the study. Three hundred mother-baby pairs were selected through purposive sampling over a period of 3 years. Babies requiring NICU admission were also included provided they became hemodynamically stable.

For implementing KMC, mothers were asked to use any front open light dress. Babies were dressed with cap, socks, and nappy and no other garments. After placing into a custom-made KMC bag, the baby was placed upright inside mother's clothing against bare skin of the chest and abdomen. Head was turned to one side and placed in a slightly extended position and eye to eye contact between mother and baby was encouraged. The hips were kept flexed and abducted in a 'frog' position; the arms were also flexed. The baby was allowed to suck on the breast as often as it wanted. On the first day, KMC was provided for 1 hour at a time, second day 2 hours, third day 3 hours, and subsequently, the at-a-stretch duration was increased to as long as the mother felt comfortable. Counseling and demonstration were repeated for initially hesitant mothers till they were able to offer KMC confidently and correctly. Mothers who failed to execute KMC correctly despite repeated demonstrations were withdrawn from the study, although they were made conversant with the KMC technique ultimately.

Four vital physiological parameters of the baby, namely temperature, respiration rate, heart rate, and oxygen saturation, were assessed immediately before and after KMC for 3 consecutive days. Axillary temperature was measured (in °C) by digital thermometer. Respiration rate was assessed by observing chest movements for full one minute. Heart rate and oxygen saturation were recorded with the help of pulse-oximeter.

Statistical analysis

Data have been summarized by mean and standard deviation; 95% confidence interval (CI) values have been stated where deemed relevant. All 4 physiological variables were normally distributed. Boxplots have been used to depict the range of values encountered for individual parameters. Mean values before and after KMC were compared (two-tailed analysis) by Students' paired *t* test; $P < 0.05$ has been considered statistically significant. Statistica version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001] software was used for analysis.

Results

Complete data was available for 265 cases out of the 300 mother-baby pairs recruited. Data from those 35 cases where the mother could not implement KMC correctly or for the scheduled duration on all 3 days were not included. The age of the mothers was 25.7 ± 5.19 years (mean ± standard deviation). The gestational age of the babies at birth was 33.2 ± 3.30 weeks and birth weight was 1450.9 ± 311.19 g. Table 1 depicts the physiological variables on the 3 successive days and [Table 2] summarizes the changes with their 95% CI and statistical significance. There were no deaths in these babies.

Table 1: Range of values for the four physiological parameters recorded in the study

Physiological parameter		Day 1		Day 2		Day 3	
		Before KMC	After KMC	Before KMC	After KMC	Before KMC	After KMC
Temperature (°C)	Minimum	35.8	36.5	36.1	36.5	35.6	36.6
	Maximum	37.1	37.4	37.0	37.3	38.0	37.3
	Mean±SD	36.5±0.12	36.9±0.15	36.5±0.13	36.9±0.15	36.5±0.12	37.0±0.13
Respiration rate (per minute)	Minimum	26	30	26	32	26	32
	Maximum	60	60	56	60	66	60
	Mean±SD	39.7±5.75	42.3±4.80	39.4±5.16	42.8±4.90	40.1±4.91	43.7±4.63
Heart rate (bpm)	Minimum	91	120	92	110	85	110
	Maximum	180	168	170	160	188	164
	Mean±SD	140.5±10.62	145.3±7.64	141.3±9.92	145.9±7.77	141.5±9.39	146.5±6.72
O_2 saturation (%)	Minimum	78	90	77	90	78	94
	Maximum	100	100	100	100	100	100
	Mean±SD	91.9±3.47	97.6±1.88	92.9±3.37	98.5±1.46	93.5±3.19	99.5±0.78

bpm: Beats per minute, KMC: Kangaroo mother care, SD: Standard deviation

Table 2: Changes in physiological parameters before and after KMC in the study cohort

Difference between post-KMC and pre-KMC value with respect to	Statistics of paired differences (change)		
	Mean ± SD	95% CI	*P* value
Temperature (°C)-Day 1	0.34±0.17	0.320-0.36	<0.001
Temperature (°C)-Day 2	0.39±0.15	0.370-0.41	<0.001
Temperature (°C)-Day 3	0.43±0.20	0.40-0.45	<0.001
Respiration rate (per minute)-Day 1	2.6±3.49	2.2-3.0	<0.001
Respiration rate (per minute)-Day 2	3.3±3.75	2.9-3.8	<0.001
Respiration rate (per minute)-Day 3	3.7±3.73	3.2-4.1	<0.001
Heart rate (per minute)-Day 1	4.8±8.22	3.8-5.8	<0.001
Heart rate (per minute)-Day 2	4.6±7.99	3.6-5.5	<0.001
Heart rate (per minute)-Day 3	5.0±7.35	4.1-5.9	<0.001
O_2 saturation (%)-Day 1	5.7±3.06	5.4-6.1	<0.001
O_2 saturation (%)-Day 2	5.6±3.23	5.2-6.0	<0.001
O_2 saturation (%)-Day 3	6.0±3.06	5.6-6.4	<0.001

CI: Confidence interval, KMC: Kangaroo mother care,SD: Standard deviation

Temperature showed a small rise during KMC, and the changes were statistically significant on all 3 days. During initiation of the KMC session, some babies had mild hypothermia. During KMC, most babies showed steady rise in temperature and none developed hypothermia.

No baby had respiratory distress at baseline. The mean change in respiration rate during KMC was 2.6 ± 3.49 ($P < 0.001$) on day 1, 3.3 ± 3.75 ($P < 0.001$) on day 2, and 3.7 ± 3.73 ($P < 0.001$) on day 3. During KMC sessions, the babies showed regular respiration and often fell asleep. No baby developed apnea during KMC. From the standard deviation figures in Table 2, it is evident that the variability in respiration rate was also brought down by KMC.

Heart rate showed a rise during KMC, and the mean changes were modest but statistically significant on all 3 days - 4.8 ± 8.22 on day 1 ($P < 0.001$), 4.6 ± 7.99 on day 2 ($P < 0.001$), and 5 ± 7.35 on day 3 ($P < 0.001$). Few babies had bradycardia (< 100 bpm) at baseline - 2 babies on day 1, and 1 each on day 2 and 3 - but during KMC session, all babies achieved normal (between 100-170 bpm) and stable heart rates.

Mean oxygen saturation also improved by about 5% on all 3 days, the change being statistically significant along with distinct reduction in the dispersion of this parameter. Below 90% saturation at start of the KMC session was present in 64, 47, and 32 babies respectively on the 3 days, but all recovered following the session. Even babies on oxygen had their oxygen requirement reduced within 15 minutes of starting KMC.

Figures 1 and 2 depict the range of values encountered for body temperature and oxygen saturation in the study cohort over the 3 successive study days.

Overall, it can be said that babies receiving KMC showed statistically significant improvement in all the 4 vital physiological parameters, of which the extent of rise in respiration rate and oxygen saturation were also clinically significant. This was seen on all 3 days.

Discussion

KMC is a simple and low-cost intervention for the care of LBW infants. It enhances both infant and maternal well-being and can be practiced in any situation without needing special equipment (e.g. special cots, heaters, incubators). Although initially conceived for use in developing countries with limited resources, its use has expanded worldwide as caregivers, parents, and administrators become increasingly familiar with the physiological, psychological, and cost benefits associated with the practice.[9-11]

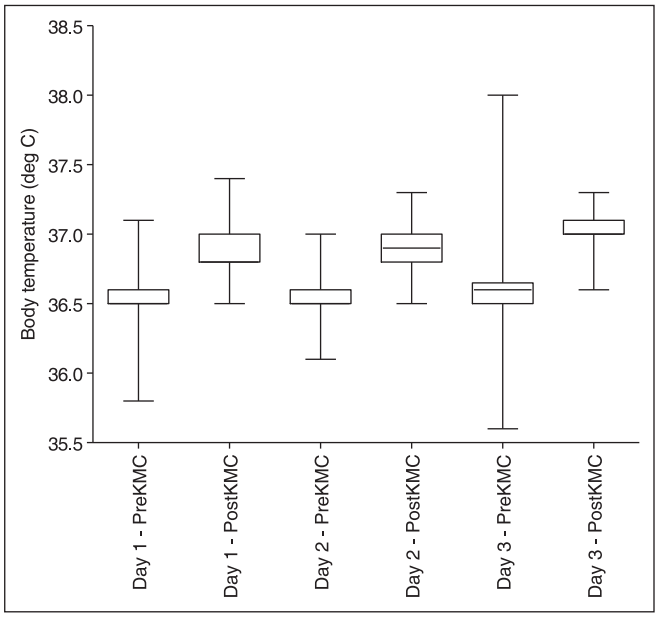

Figure 1: Temperature changes induced by kangaroo mother care sessions on the three successive study days

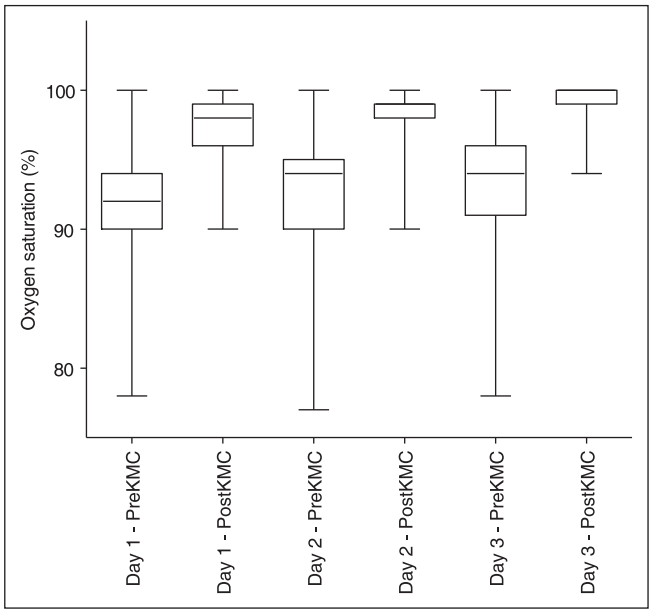

Figure 2: Changes in O_2 saturation brought about by kangaroo mother care sessions on the three successive study days

Our study results are broadly in agreement with earlier studies. Although not a marked rise, the smooth upward trend in temperature during KMC sessions should protect the newborn against temperature fluctuations and cold stress. Jothipriya J has reported that mean axillary temperature and mean heart rate were higher during KMC than during routine care.[12] If nothing else, KMC achieves the goal of 'keeping baby warm,' which is one of the most cost-effective interventions to protect babies during the critical neonatal period.[13] Ludington-Hoe *et al*. have reported that kangaroo care promotes stability of physiological function.[14] In their study,[15] heart rate remained stable (mean 143.9), respiratory rate ranged from 20 to 72 (mean 41.2), and apnea episodes did not occur during KMC. After placing babies in KMC position, their temperature never fell below 36.8°C and remained at a mean of 37.1°C.

There was distinct improvement in oxygen saturation during the KMC sessions. This is relevant for sick newborns, particularly those requiring oxygen supports. Earlier studies also report decrease in apnea and improvement in oxygen saturation in mechanically ventilated babies able to tolerate transfer and position changes.[16,17]

A meta-analysis of 23 studies of 190 term and 326 preterm infants (gestational age 26 to 36 weeks) concluded that there was an increase in body temperature of 0.22°C, no change in heart rate, and a statistically but not clinically significant decrease in oxygen saturation of 0.60% during periods of skin-to-skin contact.[18] Prematurity did not affect the stability of these parameters. Our study found a similar rise of temperature, a small but statistically significant rise in heart rate, and a definite improvement in oxygen saturation. These improvements are unlikely to have been due to chance alone since similar improvements were noted on all 3 days, even with as little as 1 hour of kangaroo care on the first day.

The reasons for the beneficial effects of KMC are yet to be fully explored. Heat transfer from mother to baby is obvious. The intimate and early skin-to-skin contact between mother and baby, with repeated nutritive and non-nutritive suckling, possibly also evokes neuropsychological responses that program physiology and behavior. Further, during KMC, the infant experiences maternal heart sounds, rhythmic maternal breathing, warmth and prone positioning, all of which offer gentle stimulation across auditory, tactile, vestibular, and thermal sensory systems, which may in sum total have a tranquilizing effect on the baby, allowing physiological parameters to stabilize.[19]

This study had its share of limitations. It was observational in nature rather than a randomized controlled trial. Despite being motivated, several mothers failed to provide KMC correctly, even after repeated demonstrations, and their data had to be excluded. This emphasizes the need for perseverance for both mothers and nursing staff towards proper KMC technique.[20] The study was conducted in the postnatal ward and NICU setting where healthcare providers are strongly motivated and maintain close supervision. Similar close supervision may not be possible in general ward and domiciliary settings. Therefore, we cannot claim that improvement of physiological parameters, with its attendant clinical implications, would be obtainable in any setting. Indeed,

implementation of KMC requires organized planning and effort, and lack of these are barriers towards extending the benefits to all babies in need of such care.[21,22]

Notwithstanding these limitations, it can be stated that low birth weight babies receiving KMC show modest but statistically significant rise in temperature, respiration rate, heart rate, and oxygen saturation through kangaroo care, without the need for any special equipment. This can help to avoid complications and the need for more elaborate interventions. There is a case for making KMC the standard of care for the LBW newborn in our setting. However, adequate planning and manpower would be needed to motivate and train mothers to undertake KMC and to monitor that they do so satisfactorily.

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Effects of Kangaroo Care on body temperature of premature infants and maternal satisfaction at Maharaj Nakhon Si Thammarat hospital, Thailand☆

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ABSTRACT

Objective: This quasi-experimental study aimed to examine the effects of Kangaroo Care (KC) on infant temperature and maternal satisfaction.
Methods: Purposive sampling was used to select mothers and premature infants into either the KC group (n = 32) or the control group (n = 32). The researchers applied KC to mothers and infants 1 h a day for three consecutive days. The control group received no intervention except for usual care. The infants' temperature was measured before, immediately after KC, and 30 and 60 min. Mothers' satisfaction in both groups was collected after the experiment on day 3.
Results: The overall average infant temperature in the KC group on days 1 through 3 was significantly different ($p < 0.001$), with a change in the average temperature between the four-time points. The average temperature measured at three-time points after KC was significantly higher than those of the control group on days 1–3 ($p < 0.01$). The mean maternal satisfaction score in the KC group was significantly higher than that of the control group ($p < 0.001$).

1. Introduction

The birth rate of newborns, including premature infants weighing less than 2500 g in Thailand, remains at a continuously high level, representing 10.4%, 10.6%, 11.1%, 11.0%, and 11.3 percent of live birth babies from 2014 to 2018, respectively, which is higher than the target set of no more than 7% (Strategy and Planning Division, Ministry of Public Health, 2018). The percentage of preterm infants weighing less than 2500 g admitted in Maharaj Nakhon Si Thammarat Hospital from 2014 to 2019 was 11.1, 11.4, 11.6, 12.2, 12.4, and 12.8, respectively and this number is rising (NICU statistics, 2020).

Preterm infants are prone to hypothermia and hyperthermia because they have a larger body surface area compared to body weight, less brown fat, and a heat control center in the hypothalamus that is not fully developed (Kliegman et al., 2011). Hypothermia can cause hypoglycemia, hypoxia, and acidosis, which can lead to an increased risk of morbidity and mortality (Kliegman et al., 2011). Therefore, premature infants should be closely monitored and kept warm for their temperature. One alternative way to maintain a normal body temperature is to apply Kangaroo care (Boundy et al., 2006).

Kangaroo care (KC) is a method of holding an infant that involves skin-to-skin contact. The infant, who is typically naked except for the diaper, is placed in an upright position against the mother's bare chest. To decrease the embarrassment of a mother from a bare chest, a mother can use a shirt or blanket to wrap around her infant's back. The environment should be private, quiet, and have good ventilation. The duration of KC is at least 1 h, depending on the stability of the infant's temperature and the mother's endurance (Punthmatharith, 2012). This method allows heat from the mother's body to be transmitted to the infant by conduction, causing the infant's body temperature to rise and keep the infant warm, which is very important (Cinar and Filiz, 2006). Kangaroo care can increase infants' body temperature because it is similar to heat flow through conduction (Sharma et al., 2016) from the skin surfaces of mothers to infants. The area of the chest that is closer to the heart has a higher skin temperature because of high blood flow to the heart (Yang et al., 2011). Radiation heat is warm air inside an incubator, such as warm air in/between blankets/baby kangaroo clothes (Thukral et al., 2008).

☆ Research interests are newborn, preterm babies, kangaroo mothers' care, and satisfaction and attachment.

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From past research reviews, Boundy et al. (2006) conducted a meta-analysis of 124 studies and found that KC increased newborns' temperature, which is consistent with the findings of Knobel-Dail (2014). Ludington-Hoe et al. (2000) found that KC enables infants to have a temperature that is more suitable for their age and weight than that in an incubator. However, previous studies have not examined the changes in infant temperature for the duration of each period after KC.

For mothers' satisfaction with KC, it is necessary to conduct studies in Thailand because, at the beginning of KC, the mother must expose her bare chest to allow the infant to lie on it. Subsequently, a blanket, shirt, or hospital gown can be wrapped around the mother and over the infant's back for warmth. This process may cause mothers to be embarrassed, in contrast to the Thai culture. Thailand has a hot climate, and requiring an infant to lie on the mother's chest at room temperature may be sticky and uncomfortable. This approach may not be suitable for KC. However, in past research reviews, Nahidi et al. (2011) revealed that 95% of mothers in the experimental group were very satisfied with skin-to-skin contact or and Jabraeili et al. (2018) showed that the mean satisfaction of mothers in the skin-to-skin or KC group was significantly higher than that of the routine care group ($p < 0.001$). It was found that fathers who practiced KC with premature infants were impressed and had a high level of positive experience in caring for Kangaroo infants (Punthmatharith and Sangsawang, 2011).

Therefore, researchers are interested in studying the effects of KC on the temperature of premature infants and the satisfaction of mothers. Researchers want to use research results as a more effective alternative way of caring for premature infants at low temperatures. The research hypotheses were as follows:

1. The average body temperatures of premature infants in the KC group are higher (within the norms) than those of the usual care group.
2. The mean of maternal satisfaction in the KC group is higher than that of the usual care group.

2. Methods

2.1. Study design, setting, and population

This quasi-experimental study was conducted between September 2017 and September 2018 in the sick newborn ward of the Maharat Nakhon Si Thammarat Hospital in Thailand. Purposive sampling was used to recruit the sample based on the following inclusion criteria: 1) mothers had premature infants with gestational age less than 37 weeks and weighing in the range of 1500–1800 g, were 18 years of age or older, able to read, listen, and understand the Thai language well, and had no history of mental disorders, common cold, fever, or skin infections; and 2) infants still had a problem with temperature control and were in the incubator, had a normal heart rate (130–160 beats per minute) and respiration rate (30–60 beats per minute), could breathe in normal air without oxygen, did not have congenital anomalies, and had no complications. The exclusion criteria included infants who had complications or crises that required resuscitation during the experiment and mothers and infants who were unable to fully implement the KC regimen.

The sample size was determined using a power analysis with an effect size of 0.63, power of .80, and alpha of .05. The effect size was calculated based on a previous study (Ludington-Hoe et al., 2000). The sample consisted of 64 pairs of mothers and infants, which were divided into two groups: 32 pairs in the KC group and 32 pairs in the usual care group.

2.2. Research instruments

1) An incubator is used to maintain appropriate infant temperature. It was inspected for a standardized incubator by the manufacturer every three months.
2) A Microlife digital thermometer, a standardized thermometer with an accuracy of ±0.1 °C, was used to measure the infant's temperature via axilla. A room-temperature thermometer was used to monitor the room temperature of 25 °C. The accuracy of all thermometers was maintained by the medical device technician at the hospital once a month.
3) Three rocking chairs with armrests are used for mothers to perform KC.
4) A Kangaroo Care Manual was developed by the researchers based on the literature review. It consists of the steps and preparations of performing KC.

2.3. Data collection instruments

1) A mothers' and infants' demographic data questionnaire was developed by researchers.
2) A Kangaroo Care record form was developed by the researchers. It consisted of date, time, and duration of performing KC.
3) A body temperature record form was developed by researchers to record infants' temperature in both groups.
4) The maternal satisfaction questionnaire was developed by the researchers to measure mothers' satisfaction with Kangaroo care (12 items) or receiving usual care (12 items) regarding convenience, service quality, information/advice provision, and overall satisfaction. The rating scale ranges from 0 (not satisfied) to 5 (most satisfied)

All the instruments passed the content (face) validity of the three experts. The temperature record form had an inter-rater reliability of 0.77. Maternal satisfaction with KC and usual care indicated a Cronbach's alpha reliability of 0.94 and 0.88, respectively.

2.4. Procedure

The study was first performed in the usual care group and then in the KC group.

The usual care group.

1. After the mothers signed the informed consent form to participate in the study, the researchers collected the demographic data of mothers and infants, measured and recorded the infants' temperature (T1).
2. The mothers and infants received the usual care from nurses. Mothers could visit, take care of, hold, or touch their infants 24 h a day. Infants had clothes on or swaddled with a diaper.
3. The researchers measured the infants' temperature immediately (T2), at 30 min (T3), and 60 min (T4) after the mothers visited their infants every day for three days between 2:00 and 3:00 p.m.
4. The mothers completed the maternal satisfaction with usual care questionnaire on day 3.

The Kangaroo Care Group.

1. After the mothers signed an informed consent form to participate in the study, researchers collected the demographic data of mothers and infants, measured and recorded the infants' temperature (T1).
2. The researchers provided the Kangaroo Care Manual to mothers and explained the

Steps in performing KC.

3. The researchers placed the infants wearing only a diaper on the mother's bare chest in an upright position, with their chest against their mothers' chest. The researchers covered the infant's back with a diaper made of linen (20 × 20 inches, with a thickness of 0.3 mm) during the mother's KC. Mothers were prepared for readiness before performing KC, such as emptying the bowel and full stomach, as well

as for infants, such as feeding and cleaning urine and feces. They performed KC in a private area once a day for three consecutive days between 2.00–3.00 p.m. The researchers evaluated any complications of the infants before and during KC. If the infants were sick or had any complications such as infection or breathing disorders, or if the mothers had a fever, respiratory infection, or contagious disease of the skin, the researchers ended the study, but the data were still recorded. In this study, no illnesses or complications were found in either the mothers or infants.

4. The researchers measured the infants' temperatures immediately after KC (T2), at 30 min (T3), and 60 min after KC (T4) once a day for three consecutive days.
5. The mothers completed the maternal satisfaction with KC questionnaire after performing KC on day 3.

2.5. Statistical analysis

Demographic data were analyzed using descriptive statistics. Infant temperature was analyzed using repeated-measures analysis of variance (RM-ANOVA) and posthoc tests. Comparisons of average infant temperature and means of maternal satisfaction between groups were analyzed using the independent *t*-test. The significance level was set at $p < 0.05$.

The assumptions of the *t*-test and ANOVA were tested. Some data were not normally distributed (outliers). After deleting two outliers in the usual care group, the data were re-analyzed, and the findings showed no significant difference before and after deleting outliers. Thus, the sample size used for the analysis and interpretation of the findings in the usual care group was 29, and that in the KC group was 31.

3. Results

1) A comparison of the demographic data of mothers and infants between groups

The demographic data of the mothers and infants showed no statistically significant differences between the two groups ($p > 0.05$). The mothers in both groups had an average age of 27 years. The majority of mothers in both groups had a bachelor's degree in education, worked in businesses, were mostly Buddhist, had one child, and had a similar average family income. In both groups, more than half of the infants were male, and most were the first child. The average gestational age and current age of the infants in both groups were approximately 30 and 32 weeks, respectively. The infants in the usual care and KC groups had an average birth weight of 1501.72 and 1481.94 g, respectively, and an average current weight of 1654.48 and 1653.23 g, respectively. The duration of hospital admission of infants in the usual care and KC groups were 10.52 and 12.65 days, respectively.

2) Comparisons of the overall average body temperature of infants within and between groups

Before interpreting the results, the researchers tested the assumptions of the RM-ANOVA and found that all assumptions were met, except that Mauchly's test of sphericity was significant ($p < 0.01$). Thus, the results from Greenhouse-Geisser were used for interpretation and presentation. The overall results were as follows: 1) There were statistically significant differences in temperature between the usual care and KC groups on day 1 ($F(1,58) = 15.23$, $p = 0.000$), day 2 ($F(1,58) = 9.40$, $p = 0.003$), and day 3 ($F(1,58) = 10.54$, $p = 0.002$), 2) There were statistically significant differences in changes of the average temperature between four time points (before, immediately after, at 30 min, and at 60 min after), which were on day 1 ($F(2.49,144.11) = 31.75$, $p = 0.000$), day 2 ($F(2.46,142.61) = 28.54$, $p = 0.000$) and day 3 ($F(2.22,128.57) = 18.03$, $p = 0.000$), and 3) The interaction between treatment and time showed statistically significant differences on day 1 ($F(2.49,144.11) = 38.16$, $p = 0.000$), day 2 ($F(2.46,142.61) = 14.74$, $p = 0.000$), and day 3 ($F(2.22,128.57) = 12.93$, $p = 0.000$).

3) **Comparisons of the average body temperature of infants at captured time-points for each day in the KC group**

Before interpreting the results, the researchers tested the assumptions of the RM-ANOVA and found that on day 1, all assumptions were met. Thus, the result from the assumed sphericity showed that the overall mean temperature differed significantly between time points ($F(3,90) = 81.84$, $p = 0.000$). On days 2 and 3, Mauchly's test of sphericity was significant ($p < 0.01$). Thus, the result from Greenhouse-Geisser showed that the overall average temperature differed significantly between time points on day 2 ($F(2.53,75.75) = 40.96$, $p = 0.000$) and day 3 ($F(1.94,58.13) = 34.61$, $p = 0.000$).

The post hoc results using Bonferroni correction showed that on the first and second days, the average temperatures measured immediately after KC, at 30 min, and at 60 min after KC was significantly higher than that before KC ($p < 0.001$). On the third day, the average temperature measured immediately and 30 min after KC was significantly higher than that before KC ($p < 0.001$). The temperature measured 60 min after KC was lower than that immediately after KC on days 1 ($p < 0.05$) and day 3 ($p < 0.001$). The average temperature measured at 60 min after KC was significantly lower than that at 30 min on days 2 ($p < 0.05$) and day 3 ($p < 0.001$) (Table 1).

4) Comparisons of the average body temperature of infants at captured time-points for each day in the usual care group

The results showed that the overall average temperature did not differ significantly between time points on the first ($F[2.08, 58.17] = 0.37$, $p = 0.698$), second ($F(2.10, 58.79) = 1.23$, $p = .301$), and third days ($F(2.32, 64.86) = 0.78$, $p = 0.480$). Thus, further post hoc analyses were not required.

5) Comparisons of the average body temperature of infants for each day and time points between groups

The results showed that there were no significant differences in average temperature measured before the experiment between the groups on days 1, 2, and 3 ($p > 0.05$). The average temperature measured immediately after the experiment in the KC group was higher than those of the usual care group on days 1, 2, and 3 ($p < 0.001$). The average temperature measured 30 min after the experiment in the KC group was higher than those of the usual care group on days 1, 2, and 3 ($p < 0.001$). The average temperature measured 60 min after the experiment in the KC group was higher than those of the usual care group on days 1, 2, and 3 ($p < 0.01$) (Table 2). In both groups, the temperatures, regardless of time, were all within the normal range (36.75–36.98 °C).

6) Comparisons of the mean score of maternal satisfaction between groups

The results showed that mothers in the KC group were more satisfied

Table 1
Comparisons of the average body temperature of infants at captured time-points for each day in the KC group.

Comparison	D1 Mean diff.	p	D2 Mean diff.	p	D3 Mean diff.	p
T1 vs T2	−0.23	.000	−0.17	.000	−0.15	.000
T1 vs T3	−0.21	.000	−0.19	.000	−0.11	.000
T1 vs T4	−0.18	.000	−0.15	.000	−0.05	.067
T2 vs T3	0.02	.964	−0.01	1.000	0.04	.233
T2 vs T4	0.05	.041	0.03	.980	0.10	.000
T3 vs T4	0.03	.220	0.04	.017	0.07	.000

Table 2
Comparisons of the average body temperature of infants for each day and time points between groups.

Time	KC group (n = 32)		Usual care group (n = 32)			
	M	SD	M	SD	t	p
Day 1						
T1	36.76	0.14	36.83	0.15	−1.89	.064
T2	36.98	0.11	36.81	0.10	6.12	.000
T3	36.97	0.08	36.82	0.08	6.76	.000
T4	36.94	0.09	36.83	0.05	5.61	.000
Day 2						
T1	36.75	0.12	36.79	0.12	−1.57	.123
T2	36.92	0.10	36.82	0.10	3.75	.000
T3	36.93	0.10	36.82	0.07	5.03	.000
T4	36.89	0.09	36.82	0.04	3.75	.001
Day 3						
T1	36.83	0.13	36.85	0.11	−0.51	.610
T2	36.98	0.11	36.86	0.11	4.36	.000
T3	36.94	0.08	36.84	0.07	5.22	.001
T4	36.88	0.08	36.83	0.05	2.85	.006

than mothers in the control group (KC: M ± SD = 4.31 ± 0.39; usual care: M ± SD = 3.84 ± 0.27; t = 5.47, p < 0.001).

4. Discussion

The findings of the present study were similar to those of Sari et al. (2018). In the present study, the average infant temperature (°C) rose from 36.78 ± 0.04 to 36.94 ± 0.04. This result is consistent with the findings of Parmar et al. (2009). It was found that during Kangaroo Mother Care (KC), babies' temperature (°C) rose from 36.75 ± 0.19 to 37.23 ± 0.25, and the study by Gere et al. (2021) showed that skin temperature in °C at the end of the skin-to-skin contact or KC was 36.88 (SD = 0.51), the study of Papana and Tawitha (2016) which the result revealed that the temperature was within the normal range before (36.8 ± 0.20), during KC (36.9 ± 0.30), and after KC (37.0 ± 0.40 °C) and the study of Punyavachira and Yoorat (2016) revealed that the temperature was within the normal range before (36.87 ± 0.25), at 30 min during KC (36.79 ± 0.20), at 60 min during KC (36.90 ± 0.20), at 30 min after KC (36.98 ± 0.17 °C), and 60 min after KC (37.07 ± 0.13). In the present study, it was found that after KC, infants' temperature increased by 0.16 °C. This corresponds to a meta-analysis of 23 studies by Mori et al. (2010), which concluded that KC can increase infants' temperature by 0.22 °C. The present study adds to the evidence that infants can maintain normal temperature after the end of KC for 60 min (T = 36.88–36.99 °C). The temperature at the start and end of KC was fine.

Regarding maternal satisfaction with KC and usual care, mothers in the KC group were more satisfied with care than mothers in the usual care group. KC made mothers close to their infants and felt warm with their infants after being separated from them after birth. Caring via KC is good for mothers, as it helps to support the relationship between mothers and premature infants (Athanasopoulou and Fox, 2014). It also affects oxytocin secretion, which is a hormone of love (Roller, 2003), and causes the mother to accept the child, resulting in satisfaction with childcare. In terms of the hotness and stickiness problems from the hot climate, the weather was not hot during the data collection period. Thus, we provided KC with a good ventilation room with open windows. Almost all of the mothers felt comfortable. Only two mothers described feeling a little hot but still happy and proud to perform KC. None of the mothers felt embarrassed from performing KC because we arranged a private area and covered the infant's back with a thin diaper made of linen during the mother's KC. While mothers in the usual care group received usual care, the mothers visited, touched as required, and changed diapers, but were not as close as KC. For this reason, KC made the mother more satisfied than the mother receiving usual care. The findings of this study were consistent with those of Nahidi et al. (2011), which revealed that the majority of mothers in the experimental group were very satisfied with skin-to-skin contact or KC, and the study of Jabraeili1 et al. (2017) showed that the satisfaction of mothers in the skin-to-skin or KC group was significantly higher than that of the routine or usual care group (p < 0.001).

5. Conclusion

This KC method is practical, harmless, inexpensive, and suitable for mothers and premature infants to increase temperature both in hospitals and at home. These findings were proposed as a policy to perform KC as routine care in the study setting. Home health care nurses cooperating with village health volunteers can promote and support mothers to perform KC continually at home. Thus, it is important to practice KC in all related settings to protect the infants from the risk of hypothermia.

Ethical approval

The study design and procedure were approved by the Research Ethics Review Committee of Walailak University (approval number: WUEC-16-109-01, dated issue 10/16/2017) and the ethics committee of the study hospital (approval number: 27/2017). All participants were informed of the study's objectives, procedures, duration, potential risks and benefits, voluntary participation, and protection of confidentiality and rights to withdraw at any point in the study without any consequences to current treatment or hospital service. Before signing the informed consent form, participants were assured of their confidentiality and anonymity, and they were given sufficient time to ask questions about the study. During the study, if they had any discomfort, all activities were stopped until they were ready to continue. No such events were observed in the present study.

Declaration of competing interest

The authors declare that there is no conflict of interest.

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THE EFFECTIVENESS OF THE KANGAROO METHOD CARE (KMC) ON BODY TEMPERATURE STABILITY IN LOW BIRTH WEIGHT (LBW) BABIES IN THE PERINATOLOGY ROOM OF THE REGIONAL PUBLIC HOSPITAL DR ACHMAD DIPONEGORO PUTUSSIBAU

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Abstract

Low birth weight is a baby born with birth weight of less than 2500 grams. Babies with low birth weight have a great potential to experience various health problems as a result of incomplete and mature organs and body functions. One of the problems than often occurs is the imperfect regulation of body temperature. To maintain the stability of body temperature, a methoded is used, namely the Kangaroo Method Care (KMC). The purpose of this study was to determine the effectiveness of the Kangaroo Method Care (KMC) on the stability of body temperature in Low Birth Weight (LBW) infants in the Perinatology Room of The Regional Public Hospital dr Achmad Diponegoro Putussibau. This research is a quantitative research. This study uses a quasy-experimental without a control group with the design used is a pretest post test one group design. This research test using Paired T-Test. This research was conducted in the Perinatology Room of the Regional Public Hospital dr Achmad Diponegoro Putussibau which was carried out on April 12th – June 24th 2021 with a total of 25 LBW respondents. The results of statistical tests based on the t-test, the count value was -11,126 with a p-value 0f 0,000. It is known that the p-value is 0,000 < α (0,05), this indicates that there is an effect of the Kangaroo Method Care (KMC) on the stability of body temperature in Low Birth Weight (LBW) infants in the Perinatology Room of The Regional Public Hospital dr Achmad Diponegoro Putussibau.

Keywords: Kangaroo Method Care, Body temperature, LBW

Introduction

One indicator to determine the degree of public health is the infant mortality rate (IMR). The infant mortality rate in Indonesia is still very high, the most common cause of infant mortality is the birth of low birth weight babies (LBW). IMR is the number of infant deaths in the first 28 days of life per 1000 live births. The infant mortality rate in Indonesia is still higher than other ASEAN countries, which is 27 per 1000 live births (Anindya et al., 2020). Reports of the incidence of LBW in 2015 in the world contained 15.5% low birth weight, which means that around 20.6 million babies are born each

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year, 96.5% of them in developing countries. The rate of LBW in developing countries (16.5%) is more than double the rate in developing regions (7%). Low birth weight (LBW) is one of the main problems in developing countries. India is one of the countries with the highest incidence of LBW. About 27% of babies born in India are LBW. South Asia has the highest incidence, with 28% of infants with LBW, while East Asia/Pacific has the lowest rate, at 6% (World Health Organization (WHO), 2015). In West Kalimantan, the trend of the percentage of LBW cases since 2014 in West Kalimantan Province has increased. The trend of the percentage of LBW cases in West Kalimantan Province in the last 5 years in 2014 was 2.60%, in 2015 it was 2.62%, in 2016 it was 3.20%, in 2017 it was 3.62% and in 2018 it increased by 3 ,66 % (Dinas Kesehatan Provinsi Kalimantan Barat, 2019). The work report of the Kapuas Hulu district health office is an accumulation of data reported from health care facilities with LBW Infant Coverage in 2018 as many as 343 LBW babies from a total of 4,222 live births, all of which were handled. Meanwhile, from the 2018 death rate report, of the 65 babies who died there were 5 babies with LBW cases, this LBW case is the number five contributor to infant mortality in Kapuas Hulu Regency (Kapuas, 2018). Based on data from the Perinatology Room of RSUD dr. Achmad Diponegoro Putussibau in 2019, the incidence of low birth weight (LBW) babies in the January to June 2019 range fell with a total of 106 LBW babies. From July to December 2019, it increased with a total of 138 LBW babies, there was an increase in the LBW birth rate with a difference of 30 babies per 6 months in 2019 (Kapuas, 2018). Low birth weight babies have a great potential to experience various health problems as a result of incomplete and mature organs and body functions. Health problems that need attention from the health care team when caring for LBW babies are problems that occur as a result of imperfect regulation of body temperature, respiratory function, nervous function, cardiovascular function, bleeding system, digestive system, and immune system (Hughes & Simpson, 1995). In Indonesia, there are still many people who do not know the benefits of Kangaroo Method Care (KMC). In general, hospitals or clinics that have complete incubator facilities are still limited in number. In addition, the use of incubators to care for LBW babies requires high costs. Due to the limitations of incubator facilities, it is not uncommon for one incubator to be occupied by more than one baby and can increase the occurrence of nosocomial infections in hospitals (Acharya, Singh, Bhatta, & Poudel, 2014). The Effect of Kangaroo Treatment Method on Increasing Body Temperature of Low Birth Weight Infants in Nicu Grandmed Lubuk Pakam Hospital showed that the results of the study showed that there was an effect of Kangaroo Treatment Method on increasing body temperature of low birth weight infants (Acharya et al., 2014). The results of this study were supported by the results of another study . Shows that health education is effective in improving the practice of kangaroo care methods. The gap that occurred in the RSUD dr. Achmad Diponegoro Putussibau, precisely in the Perinatology room, was limited in the special sling used for the kangaroo method care (KMC) care for babies with low birth weight. This special sling only amounts to 1 piece, while babies with low birth weight sometimes can have more

than 1 on the same day of care, as a result the health workers on duty have to replace them with long cloths. Another gap found is that there are no nurses/midwives on duty in the perinatology room who have attended special training on kangaroo care methods. Based on the above phenomenon, researchers are interested in conducting research on the effectiveness of the kangaroo method of care for the stability of body temperature in infants with low birth weight (LBW) in the perinatology room of RSUD Dr. Achmad Diponegoro Putussibau. The purpose of this study was to determine the effectiveness of Kangaroo Treatment Method on Body Temperature Stability in Low Birth Weight Babies (LBW) in the Perinatology Room of Dr. Achmad Diponegoro Putussibau Hospital.

Method

This research is a quantitative research. This study uses a quasi-experimental without a control group with the design used is a pretest post test one group design. The research test used Paired T-Test. In this study, the sampling technique used by the author is to use a non-probability technique, namely a saturated sample or often called total sampling.

The population of this study were infants with low birth weight (LBW) at the Regional General Hospital Dr. Achmad Diponegoro Putussibau who was treated in the Perinatology room from April 12th - June 24th 2021 were conducted in the perinatology room of RSUD Dr. Achmad Diponegoro Putussibau. With a total of 25 LBW respondents. This instrument was developed by the researcher after conducting a literature review on journals and books on kangaroo care methods. The data collection tools used were observation sheets, thermometers, pulse oximetry, informed consent and baby scales.

Intervention in the study began in April to June 2021. If at that time there were LBW babies who met the inclusion criteria, the researchers immediately took the baby as a sample of one baby, the kangaroo method was treated for at least 2 hours, then temperature measurements were taken before and after kangaroo care.

This research data collection used observation sheets, thermometers, pulse oximetry, informed consent and baby scales. After the patient agreed, the researcher asked the mother of the LBW baby to sign the informed consent form, after which the researcher conducted the study. This research has passed the ethical test from STIK Muhammadiyah Pontianak with registration number 99/II.I.AU/KET.ETIK/IV/2021. Univariate analysis was conducted to describe the characteristics of age, gender and birth weight. Bivariate analysis was carried out on two variables to determine the relationship or correlation, differences. The qualitative independent variables in this study have two categories. Therefore, the test was carried out using the method of using the average difference test for two paired samples (paired sample t-test).

Results and Discussion

Results

1. Univariate analysis test

Before treatment with the Kangaroo Method on the stability of body temperature in Low Birth Weight Babies (LBW) the mean value (average) was 36.5740 and after the mean value (average value) increased to 37.1988. Before the Kangaroo Method Treatment was carried out on the stability of body temperature in Low Birth Weight Babies (LBW) the median value (middle value) was 36.550 and after the median value (middle value) increased to 37.1. Before the Kangaroo Method Treatment on the stability of body temperature in Low Birth Weight (LBW) infants the minimum value (lowest value) was 36.5 and after the minimum value (lowest value) was increased to 36.95. Before the Kangaroo Method Treatment for the stability of body temperature in Low Birth Weight Babies (LBW) the maximum value (highest value) was 36.90 and after the maximum value (highest value) was increased to 37.95.

Mean, Median, Minimum and Maximum Effectiveness of Kangaroo Method Treatment on Body Temperature Stability in Low Birth Weight (LBW) Babies in the Perinatology Room of Dr Achmad Diponegoro Putussibau Hospital.

Table 1

Body body temperature	Score			
	Mean	Median	Minimum	Maximum
Pre Test	36,5740	36,550	36,35	36,95
Post Test	37,1988	37,10	36,90	37,95

2. Bivariate analysis test (Paired Sample T-Test)

Based on table 2, it can be seen that before the Kangaroo Method treatment was given to the stability of body temperature in Low Birth Weight Babies (LBW) the mean value (average) was 36.5740 and after the mean value (average value) increased to 37, 1988. Based on the t-test, the t-count value was -11.126 with a p-value of 0.000. It is known that the p-value is 0.000 < (0.05), this indicates that there is an effect of Kangaroo Method treatment on the stability of body temperature in Low Birth Weight Babies (LBW) in the Perinatology Room of Dr. Achmad Diponegoro Putussibau Hospital.

The Effectiveness of Kangaroo Method Treatment on Body Temperature Stability in Low Birth Weight (LBW) Babies in the Perinatology Room of Dr Achmad Diponegoro Putussibau Hospital.

Table 2

Variable	Treatment	N	Mean	SD	T	p-value
body	Pre test	25	36,5740	0,13317	-	0,000

temperature	Post test	25	37,1988	0,21104	11,126

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Discussion

The Effectiveness of the Kangaroo Care Method on the Stability of Body Temperature in Babies with Low Birth Weight (LBW) in the Perinatology Room of RSUD Dr. Achmad Diponegoro Putussibau

The results of research conducted on 25 respondents with low birth weight babies in the Perinatology room of RSUD dr. Achmad Diponegoro Putussibau showed that the average body temperature of babies with low birth weight (LBW) before the Kangaroo Treatment Method was 36. 50C and after Kangaroo Care Method was carried out at 37.10C. After the Paired T-Test test was carried out, the t-count value was -11.126 with a p-value of 0.000. It is known that the p-value is 0.000 < (0.05), this indicates that there is an effect of the Kangaroo Care Method on the stability of body temperature in Low Birth Weight Babies (LBW) in the Perinatology Room of Dr. Achmad Diponegoro Putussibau Hospital.

The ambient temperature of the baby while in the womb is 36°C-37°C and immediately after birth the baby is exposed to a generally lower environmental temperature. This causes the baby to lose heat in the baby's body or what is called hypothermia. Hypothermia in infants occurs due to the inability to maintain heat production in the baby's body and shivering, insufficient subcutaneous fat (brown fat), and an immature nervous system regulating body temperature (IBU, 2017). In addition, the baby's surface area will decrease thereby accelerating heat loss. LBW babies have little adipose tissue and decreased flexibility, so they need a warmer environmental temperature to reach a normal temperature (Nur'aisyah, 2020).

The findings in this study showed that all LBW infants who were respondents experienced an increase in body temperature, and an increase in the frequency of oxygen saturation after the Kangaroo Method Treatment. In other words, Kangaroo Treatment Method can normalize the baby's body physiology. The KMC method can also provide a stimulus to the hypothalamus which can release corticotropin-releasing factor (CRF) and also endorphins so as to produce a sense of comfort and calm in the baby (Yusuf et al., 2017).

In this study, according to the data obtained regarding the baby's weight before being given the kangaroo method, it was closely related to the incidence of mothers who gave birth before term. This is in accordance with the data obtained in this study, there were 5 infants with low birth weight who were not yet full term. Mothers who have a pregnancy of less than 37 weeks will be at risk of giving birth to babies with LBW. This can happen because the intrauterine growth of the fetus is not optimal. Where the

development and growth of the fetus in intrauterine takes ± 38 weeks for the baby to be ready to be born and adjust to the environment outside the womb .

In this study also found mothers who gave birth to twins where there were 7 LBW babies who were twins. This can be influenced by the occurrence of LBW because the baby has to share nutrition with the two fetuses and also the space for the baby to grow and develop is getting smaller because there are two fetuses in one uterus. Given the unique physiological demands placed on the body during multiple pregnancies, it is imperative that healthcare providers advise women on the importance of adequate caloric intake and provide guidance on macronutrient and micronutrient intake for optimal pregnancy outcomes.

The benefits of the kangaroo method of care include a stable baby's heart rate, more regular breathing, so that the distribution of oxygen throughout the body is better. Babies can sleep soundly and for a long time, are calmer, cry less and gain weight faster, make breastfeeding easier, strengthen the bond between mother and child, and shorten the care period between mother and child.

In this study, the cloth used for the treatment of the kangaroo method was an ordinary long cloth, namely using a jarik cloth. Jarik cloth will be tied or tied behind the mother's shoulder to support so that the baby does not fall. The implementation of this kangaroo method uses a simple method. In hospitals with complete facilities, they usually use special cloths for kangaroo treatment, but in this study, researchers only used regular long cloths made of cotton. At the time of the implementation of the kangaroo method of care, there was no standard temperature application in the room, this was related to inadequate hospital facilities. The implementation of the kangaroo method was carried out in grade 2, there were 3 babies with LBW, and 22 babies with other LBW carried out in a class 3 room, all without any standard application of temperature.

Kangaroo mother care improves growth and reduces problems with low birth weight babies such as hypothermia, hypoglycemia, and length of hospital stay. Therefore, it should be recommended in the care of all these high-risk neonates.

Conclusion

Based on the results of research and discussion, it can be concluded that the average body temperature before Kangaroo Method Care (KMC) is 36.50C. The average body temperature after Kangaroo Method Care (KMC) is 37.10C. The effect of Kangaroo Method Care (KMC) on increasing body temperature in LBW in the perinatology room of Dr. RSUP. Achmad Diponegoro Putussibau in 2021 with a p-value of 0.000.

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