Effectiveness of Nesting Technique on Posture and Physiological Parameters

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Abstract

Introduction: According to World Health Organization (WHO), every year about 15 million babies are born prematurely around the world and that is more than 1 in 10 of all babies born worldwide. The NICU environment may interfere with the maturation and organization of preterm infant's central nervous system. Nesting enables the new born to maintain a flexed posture and facilitates physiological parameters. The aim of the study was to determine the effectiveness of Nesting Technique on Posture and Physiological Parameters among preterm and low birth weight babies.

Materials and methods: The study was quasi experimental one group pre- and posttest design. A total of 40 preterm and low birth weight babies were selected by purposive sampling technique. The tool comprised demographic data, observation checklist for posture, and a structured observation checklist for physiological parameters. The babies were placed in the nest for 6 hours daily for 5 days. Data analysis was done using mean, percentage, standard deviation, and ANOVA.

Results: Most of the mothers [22 (55%)] were in the age group between 25 years and 30 years. With regard to the age of the baby, 11 (27.5%) were 4 days old. With regard to the weight, 37 (92.5%) of the babies had their weight between 1.5 kg and 2.0 kg. The mean score of posture and physiological parameters that is temperature, heart rate, respiratory rate, and oxygen saturation revealed that the low birth weight and preterm babies experienced stable posture and physiological parameters during the period of nesting, which was highly statistically significant at the $p < 0.001$ level.

Conclusion: The study concluded that nesting technique among preterm and low birth weight babies helps stabilize the vital parameters and posture maintenance.

Keywords: Low birth weight babies, Nesting, Physiological parameters, Posture, Preterm.

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Introduction

According to the World Health Organization (WHO), every year about 15 million babies are born prematurely globally, which is more than one in ten of all babies.[1] Due to complications of preterm birth, approximately 1 million children die annually. Preterm birth is the leading cause of newborn deaths all over the world.[2]

In 2013, as many as 22 million newborns an estimated 16% of babies born globally were low birth weight (LBW), according to UNICEF. South Asia had the highest incidence, with 28% newborns weighing less than 2.5 kilograms. India had the third-highest percentage of LBW newborns.[3]

Newborns must undergo many adaptations after delivery to adjust to extrauterine life. One of the important adjustments is the need to rapidly increase body temperature and strive to accommodate to an environment colder than that of the prenatal environment.[4] Keeping newborns warm, especially preterm infants, can be challenging.

Preterm infants, may spend a longer duration in the neonatal intensive care unit (NICU) and are exposed to an environment very different from that *in utero*. This eventually may interfere with their maturation and development of their central nervous system. This can lead to short-term sequelae, like changes in heart rate (HR), respiratory rate (RR), blood pressure, and saturation levels.[5] Incorrect body positioning results in postural deformities, such as hip abduction and external rotation, ankle eversion, retracted and abducted shoulders, and neck hyperextension.[6]

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It is necessary for maintaining a proper anatomical alignment to avoid any types of contractures or potential complications related to incorrect positioning. Placing them in physiological flexion which includes flexion of all joints, scapular protraction, and posterior pelvic tilt is the ideal position of the newborn, as it facilitates proper joint alignment and symmetry, supports neuromuscular development, and promotes self-soothing in premature infants.[7] When the baby is in flexed position, it promotes warmth and increases blood supply to the periphery and brain. This helps in the proper growth and development of preterm babies and LBW infants.[8]

Caregivers now focus on providing a protective environment that will promote physiological stability.[9] Nesting positioning directly impacts the amount of energy the infant expends in several ways. Nesting to a great extent helps the newborn maintain a flexed

posture, similar to the position which was present *in utero* and also facilitates physiological stability.[10]

So the investigators were interested to determine the effectiveness of nesting technique on posture and physiological parameters among preterm babies and LBW infants.

Objectives of the Study

- To assess the posture and physiological parameters on preterm and LBW babies
- To determine the effectiveness of nesting technique on posture and physiological parameters among preterm and LBW babies

Hypothesis

H1: There is a difference in the posture and physiological parameters among preterm and LBW babies, before and after nesting.

Materials and Methods

Quantitative approach and preexperimental one group pretest–posttest design were adopted for the study. The study was conducted in the neonatal intensive care unit (NICU) of a tertiary care hospital. Forty preterm and LBW babies who fulfilled the inclusion criteria were selected by purposive sampling technique. The inclusion criteria included babies who were preterm and LBW babies weighing between 1 and 2 kg, age less than 7 days, neonates with no medical or surgical illness, congenital defects, those who were not treated with sedatives 24 hours prior to intervention, and whose parents or guardians gave their consent. Babies who weighed less than 1 kg and who were critically ill were excluded from the study.

The tool consisted of three parts:

Part-I: A structured interview schedule for demographic data that consisted of the age of the mother, age of the baby, gender of the baby, type of delivery, and anthropometric measurement that included birth weight, length, head circumference, chest circumference, etc.

Part-II: It consists of an observational checklist to assess the posture of preterm and LBW babies. It ranged from 1—total extension, to 4—complete flexion.

Part-III: It was a structured observational checklist to assess the physiological parameters, namely temperature, HR, oxygen saturation (SaO_2), and RR by using a digital thermometer, pulse oximeter, and by counting the number of times newborn's chest rose, for one full minute, respectively.

A written permission was obtained from the NICU in-charge, and an informed consent was obtained from the parents who were willing to place their babies in the nesting technique. The observations of HR, SaO_2, RR, and temperature were made and recorded before the nesting and documented. The baby was then placed in a nest, where a sterile towel was taken, and was rolled to make a nest around the babies. The babies were placed in a supine position and the rolled towel encircled the baby. Once again, the observations were recorded after 6 hours. The observations were recorded every day for five consecutive days. The data analysis was done using the parameters mean, percentage, standard deviation, and ANOVA.

Results

Sociodemographic Variables

Most of the mothers 22 (55%) were in the age group between 25 years and 30 years. With regard to the age of the baby, 11 (27.5%)

were 4 days old and 22 (55%) were males. APGAR score was 7 for 20 (50%) babies. With regard to the weight, 37 (92.5%) babies had their weight between 1.5 and 2.0 kg and 22 (55%) babies had their length between 40 and 50 cm.

Assessment of Posture: Temperature, HR, RR and SaO_2

None of the babies remained in a complete flexed position during the pretest on day 1, whereas in posttest on day 5, 36 (80%) babies maintained the flexed posture. Only 9 (22.5%) babies had their temperature between 36.5°and 37.3°C during the pretest on day 1, whereas in posttest on day 5, 38 (95%) babies maintained the normal temperature. Thirty-one (77.5%) babies had the HR between 120 and 160 beats/minute during the pretest on day 1, whereas in posttest on day 5, 39 (97.5%) maintained the normal HR. Thirty-one (77.5%) babies had the RR between 40 and 60 breaths/minute during the pretest on day 1, whereas in posttest on day 5, 37 (97.5%) maintained the normal RR. Only a few (four babies) (10%) had their SaO_2 between 90 and 100% on day 1, whereas on day 5 after nesting, 39 (97.5%) maintained the same SaO_2.

Table 1 depicts that there was a substantial difference in the maintenance of temperature between the pretest and posttest which was statistically highly significant at $p < 0.001$ level.

Table 2 indicates that there was a substantial difference in the maintenance of HR between the pretest and posttest which was statistically highly significant at $p < 0.001$ level.

Table 3 indicates that there was a substantial difference in the maintenance of RR between the pretest and posttest which was statistically highly significant at $p < 0.001$ level.

Likewise, there was a substantial difference in the SaO_2 between pretest and posttest which was statistically highly significant at $p < 0.001$ level.

Discussion

Nesting positioning plays a major role in maintaining a beneficial position where the babies feel more secure and are more physiologically stable.[11] The aim of the study was to assess the effectiveness of nesting technique on posture and physiological parameters among the preterm newborns. Before placing the babies in the nest, the posture of the preterm babies were in extended posture, whereas after placing the preemies in the nest, the legs attained complete flexion and the arms were partially flexed. The findings are consistent with a similar study done to evaluate the movement and posture among the preterm babies in supine position before and after nesting. The findings showed that the nest facilitates a flexed posture of the limbs with adduction of shoulders and reduces extended postures of the legs and arms.[12]

The mean temperature during the pretest was 36.01°C, and during the posttest, the temperature increased to 36.73°C which was highly statistically significant at $p < 0.001$ level. Likewise, the mean HR during the pretest was 123 beats/minute, and during the posttest, it was 142 beats/minute which was highly statistically significant at $p < 0.001$ level. The mean RR which was 41.55 breaths/minute during the pretest increased to 49.47 breaths/minute during the posttest which was statistically highly significant at $p < 0.001$ level. Similarly, the mean SaO_2 during the pretest was 84.7% which was increased to 92.3% during the posttest which was highly statistically significant at $p < 0.001$ level.

The study findings were supported by a similar study that was carried out to assess and evaluate the effectiveness of nesting on

Table 1: Repeated-measures ANOVA on changes in temperature over a period of time

Tempera-ture	Day 1				Day 2				Day 3				Day 4				Day 5				F	p value
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
	36.01	0.768	36.29	0.548	36.01	0.768	36.49	0.796	36.29	0.768	36.74	0.629	36.29	0.762	36.85	0.743	36.29	0.768	37.31	0.458	34.62	<0.001

Table 2: Repeated-measures ANOVA on changes in HR over a period of time

Heart rate	Day 1				Day 2				Day 3				Day 4				Day 5				F	p value
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
	123.3	9.615	126.5	8.035	123.3	9.615	130.6	7.851	123.3	9.615	134.7	9.186	123.3	9.615	138.6	8.808	123.3	9.615	142.2	9.897	93.01	<0.001

Table 3: Repeated-measures ANOVA on changes in RR over a period of time

Respiratory rate	Day 1				Day 2				Day 3				Day 4				Day 5				F	p value
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
	41.55	3.83	43.55	3.83	41.53	3.83	46.35	4.83	41.55	3.83	49.5	5.16	41.55	3.83	52.1	5.64	41.53	3.83	49.47	6.3	4929	<0.001

the physiological parameters of preterm infants admitted to NICU. Thirty preterm infants were selected by prospective sampling. The data collected were recorded in the physiological parameters record sheet. The findings of the study revealed that there was a significant effect at 60th and 120th minutes on temperature (t = 7.86, 11.2), RR (t = 6.43, 5.03), and HR (t = 6.61, 2.41).[13]

CONCLUSION

The study concluded that the nesting technique had a positive effect on the physiological functioning and maintenance of posture. Hence, nesting can be administered for all the preterm and LBW babies admitted to NICU. Further studies are recommended in this aspect with a larger sample size.

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