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Original Article

# Effect of nesting on selected physiological parameters among preterm babies

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## Abstract

This study was conducted to evaluate the effect of nesting on selected physiological parameters among preterm babies admitted in NICU of Pariyaram Medical College Hospital, Kannur. **Methods:** This is a quasi-experimental study with pre-test post-test design carried out among the 60 preterm babies consecutively selected as per inclusion criteria and the data was collected by using proforma for assessing socio-demographic data and physiological parameters monitoring chart. **Results:** The findings revealed that there is a significant difference in axillary temperature, heart rate, respiratory rate, $SPO_2$, capillary refill time and activity including behavioral status, global posture, global tone, sucking reflex and stress sign of preterm babies in the experimental and control group after five days of nesting ($p<.05$). **Conclusion:** This study concluded that the use of nesting as a safe and cost-effective intervention for stabilizing the physiological parameters and overall activity of preterm babies admitted in NICU.

**Keywords:** Effect**;** Nesting; Physiological parameters; Preterm babies, India

## Introduction

Worldwide, preterm birth is seen in almost 11.1% of all pregnancies. Preterm birth represents approximately 70% of neonatal and 36% of infant deaths. As per the estimate, 27 million babies are born each year in India, out of which 3.5 million babies are born prematurely. As the preterm neonates are a vulnerable population, they require highly specialized nursing care and medical interventions with advanced technology (Blencowe et al., 2013).

There is mounting evidence that repeated stress during the critical period of infant development, has long-lasting effects on several physiological systems, including the central nervous system which is manifested by unstable physiological parameters (Singh & Deorari, 2003).

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The goal of developmental supportive care is to create a 'womb out of womb' which reduces the stress of the preterm infant in the Neonatal Intensive Care Unit. The initiation of Newborn Individualized Developmental Care and Assessment Program (NIDCAP) has led to a greater emphasis on developmental care (Chaudhari, 2011).

Developmental care introduced in 1986 by Als et al., is a broad category of interventions that are designed to minimize the stress of the neonatal intensive care unit environment (Lucas, 2015).

Preterm babies are the most vulnerable group. After birth, the first few months, act as a transitory period during which baby has to adjust to the new environment. Hence the position of babies throughout this time is very important (Joseph, Ambika, & Williams, 2013).

The preterm babies in the intrauterine environment enable gradual maturation of the fetal organs and play a very important role in position and movement (Behrman & Butler, 2007).

Following the periods of activity, the consistent, dynamic uterine boundaries help the fetus in assuming flexed

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midline position. After birth in the neonatal intensive care unit the neonate has the tendency to assume flattened postures either by a preterm or sick neonate. This makes the infant at increased risk for developing short or long term atypical posture, movement patterns and motor incoordination both in the short and long term (Joseph, Ambika, & Williams, 2013).

A flexed, midline position without overextending the baby's head and neck is the recommended position for the newborn. Good posture, muscle control and stable physiological parameters of newborn babies can be achieved through correct positioning. Use of nesting will make the newborn feel secure and the physiological parameters of the newborn also will be stable. They are able to grasp their hands together and suck their fingers during nesting, and this makes them more comfortable. Newborn always need help to find a position in which they are able to be comfortable (Mony, Selvam, Diwakar, & Raghavan, 2018). Nesting is a method to help the newborn to maintain a position that promotes comfort, sleep and stable physiological parameters by minimizing the effect of environmental stimuli of Neonatal Intensive Care Unit. (Sandeep, Yogesh, & Sharin, 2015) Hence nesting is one of the strategies of developmental supportive care which can be utilized while providing care to the preterm infants in the NICU (Lucas, 2015).

This study was aimed to evaluate the effect of nesting on selected physiological parameters among preterm babies admitted in NICU.

**The objectives of the study were to:**

- Assess the physiological parameters among preterm babies.
- Evaluate the effect of nesting on selected physiological parameters among preterm babies.

## Materials and Methods

The research approach is quantitative and used quasi-experimental nonequivalent control group pre-test post-test design. The present study was conducted in the NICU of Pariyaram Medical College Hospital, Kannur. Sixty preterm infants (30 each in the experimental and control group) were selected by consecutive sampling selected based on the inclusion criteria. The first 30 preterm babies were considered in the experimental group and next 30 preterm babies were included in the control group to avoid sample contamination. Proforma for assessing demographic data of preterm babies and proforma for assessment of physiological parameters of preterm babies were used. Proforma for assessment of physiological parameters of preterm babies consists of two sections. Section A is physiological parameters monitoring chart and section B is an observation checklist to assess the activity of preterm babies. Observation technique was used for assessing the respiratory rate, capillary refill time and activity. Biophysiological measures such as axillary temperature, heart rate, oxygen saturation and weight were measured by using a digital thermometer, stethoscope, standardized pulse oximeter and weighing machine, respectively.

**Data Collection Procedure**

After getting approval from the Institutional Ethics Committee, administrative sanction from Medical Superintendent, Nursing Superintendent and Head of the Department of Pediatrics of Pariyaram Medical College Hospital, Kannur, the main study was conducted from 17 December 2018 to 13 April 2019 among 60 preterm babies (30 each in the experimental and control group) in the NICU of Pariyaram Medical College Hospital, Kannur as per sampling criteria. Consecutive sampling was used for selection of preterm babies. Initial screening of record was done to collect the demographic data. The tool used for the assessment of physiological parameters included physiological parameters monitoring chart and activity observation checklist.

Lottery method was used to select the sample. On the first day, the investigator selected sample for the experimental group soon after their admission to the Neonatal Intensive Care Unit. Investigator introduced herself and established a good rapport with the parents. After explaining the purpose of the study, confidentiality was assured with informed consent. On the same day, baseline physiological parameters were assessed before nesting. Each baby needed 10-15 mins for assessment. Then nesting was provided with sterilized turkey towel of 140 cm long and 75 cm wide throughout the day and night for five days except during feeding, clinical examination and routine care. For the five consecutive days, physiological parameters were

checked every evening at 5 pm. Nesting intervention was demonstrated to a primary caregiver in the night shift and after return demonstration, it had been continued by the caregiver. Each day the investigator provided a new nest with a sterilized towel for the preterm babies in the experimental group.

After completing the observation of preterm babies in the experimental group, the next samples were assigned to the control group. On the first day, baseline physiological parameters were assessed. For the next five consecutive days, physiological parameters were checked every evening at 5 pm. The preterm babies in the control group were given routine care.

## Results

Table 1:

*Distribution of Preterm Babies Based on Sample Characteristics*

(N= 30+30=60)

| Sample characteristics | Experimental group(n=30) | | Control group (n=30) | |
|---|---|---|---|---|
| | f | % | f | % |
| **GA in weeks** | | | | |
| 28-31 weeks | 9 | 29.7 | 12 | 40 |
| 31-34 weeks | 18 | 59.4 | 16 | 52.8 |
| 34-37 weeks | 3 | 9.9 | 2 | 6.6 |
| **Gender** | | | | |
| Male | 18 | 60 | 19 | 63.3 |
| Female | 12 | 40 | 11 | 36.7 |
| **Type of delivery** | | | | |
| Vaginal | 10 | 33.3 | 11 | 36.7 |
| Forceps | - | - | - | - |
| Vacuum | - | - | - | - |
| Cesarean | 20 | 66.7 | 19 | 63.3 |
| **Birth weight** | | | | |
| 500-1000gm | 5 | 16.5 | 6 | 19.8 |
| 1001-1500gm | 22 | 72.6 | 15 | 49.5 |
| 1501-2000gm | 3 | 9.9 | 9 | 29.7 |
| 2001-2500gm | - | - | - | - |
| **Apgar score 1'** | | | | |
| <4 | - | - | 1 | 3.3 |
| 4-6 | 15 | 50 | 18 | 60 |
| 7-10 | 15 | 50 | 11 | 36.7 |
| **Apgar score 5'** | | | | |
| <4 | - | - | 2 | 6.7 |
| 4-6 | - | - | 28 | 93.3 |
| 7-10 | 30 | 100 | - | - |
| **History of any resuscitation at birth** | | 33.3 | 15 | 50 |
| Yes | 10 | 66.7 | 15 | 50 |
| No | 20 | | | |
| **Feeding status** | | | | |
| NPO with IV | 1 | 3.3 | 3 | 9.9 |
| fluids | 25 | 83.3 | 25 | 83.3 |
| NG tube feed | - | - | - | - |
| Gastrostomy | - | - | - | - |
| Exclusive breastfeed | 4 | 13.3 | 2 | 6.7 |
| Pallada feed | | | | |

Table 1 shows that most of the preterm babies in the experimental group (59.4%) and the control group (52.8%) belong to the gestational age between 31-34 weeks. Most of the preterm babies in the experimental group (60%) and the control group (63.3%) are male babies. Most of the preterm babies in the experimental group (66.7%) and 63.3% preterm babies in the control group are born by caesarean section and the majority of preterm babies in the experimental group (72.6%) and 49.5% of preterm babies in the control group have a birth weight between 1001gm -1500gm. Most of the preterm babies (50%) in the experimental group have the Apgar score between 4-6 and 7-10 respectively and most of the preterm babies in the control group (60%)

Table 2:

*Difference in the Physiological Parameters among Preterm Babies in Experimental and Control Group Before and After Five Days of Nesting*

(N=30+30)

| Variable | Exp (n=30) | | | | Con(n=30) | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | T | p | Mean | SD | t | p |
| Temperature | -.60 | 1.25 | 2.65 | .013* | .46 | 1.15 | 2.1 | .03* |
| Heart rate | -.60 | 14.55 | .025 | .980 | 6.3 | 13.8 | 2.5 | .01* |
| Respiratory rate | 1.03 | 10.47 | .54 | .593 | 4.6 | 9.50 | 2.6 | .01* |
| SPO2 | | | | | | | | |
| Capillary refill | -1.13 | 2.15 | -2.0 | .050 | 1.3 | 2.22 | 3.5 | .01* |
| time | .90 | .403 | 12.24 | .001* | .63 | .96 | 3.5 | .001* |
| Weight | | | | | | | | .18 |
| | -13.5 | 112.7 | -.66 | .517 | 50.5 | 202 | 1.37 | |

Table value t (29) =2.05;*significant p<.05

have the Apgar score between 4-6 in one minute. All the babies in the experimental group (100%) have the Apgar score between 7-10 and majority of the babies in the control group (93.3%) have the Apgar score between 4-6 in 5 mins.

Paired t-test used to assess the significance of the difference in the physiological parameters among preterm babies in the experimental group before and after five days of nesting. From Table 2, it is evident that in the experimental group, calculated t value obtained for temperature and capillary refill time are larger than the table value. Hence it can be inferred that there is a significant difference in physiological parameters among the experimental group after five days of nesting. But in the control group, the calculated t value obtained for variables temperature, heart rate, respiratory rate, SPO2 and capillary refill time is larger than the table value at p<.05. Hence it is evident that there is a significant difference in these variables before and after five days of routine care.

Table 3:
*Difference in the Physiological Parameters (Activity) among Preterm Babies in Experimental and Control group Before and After Five Days of Nesting*

(N=30)

| Variable | Experimental | | | Control | | |
|---|---|---|---|---|---|---|
| | Pre-test score | 5th day score | p | Pre-test score | 5th day score | p |
| **Behaviour status** | 13 | 28 | .001*** | 8 | 8 | 1.000 |
| Alert | 17 | 2 | .001*** | 22 | 22 | 1.000 |
| Drowsiness sleepy | - | - | - | - | - | - |
| **Global posture** | 28 | 2 | .001*** | - | - | - |
| Partially flexed | 2 | 28 | .001*** | - | - | - |
| Fully flexed | - | - | - | 30 | 29 | 1.000 |
| Extended | 25 | 0 | .001*** | 0 | 1 | 1.000 |
| **Global tone** | 5 | 30 | .001*** | - | - | - |
| Hypotonia | - | - | - | | | |
| Normotonia | | | | | | |
| Hypertonia | | | | | | |

McNemar test was used to assess the difference in the physiological parameters (activity) among preterm babies in the experimental and control group before and after five days of nesting. Table 3 depicts that among preterm babies in the experimental group, the p-value obtained for behavioral status, global posture and global tone are found to be statistically significant as p<.05. This shows that there is a significant difference in these variables among preterm babies in the experimental group; before and after five days of nesting. Among preterm babies in the control group, p-value obtained for behavioral status and global tone are not found to be statistically significant as p>.05 level of significance. This shows that there is no significant difference in behavioral status and global tone among preterm babies in the control group before and after five days of routine care. In relation to global posture, pre-test and post-test values are constant. Hence it was inferred that there is no significant difference in global posture among preterm babies in the control group before and after five days of observation.

Wilcoxon signed-rank test was used to assess the significance of the difference in the physiological parameters(activity) among preterm babies in the experimental and control group before and after five days of nesting. From Table 4, it is evident that in experimental group p-value obtained for activity, sucking reflex and stress sign are significant as p<.05. This indicates that there is a significant difference in these variables before and after five days of nesting. Among the control group, p-values are not statistically significant as p>.05 level of significance. Hence it is evident that there is no significant difference in these variables before and after five days of routine care.

Independent sample t-test used to assess the significance of the difference in the physiological parameters among preterm babies in the experimental and control group after five days of nesting. From Table 5, it is evident that calculated t value obtained for the variable weight among preterm babies in the experimental and control group after five days of nesting is smaller than the table value at p>.05 level of significance. Hence it is evident that there is no significant difference in the weight among preterm babies in the experimental and control group after five days of nesting.

Chi-square test was used to assess the significance of the difference in the physiological parameters (activity) of preterm babies in the experimental and control group after five days of nesting. From Table 6, it is evident that there is a significant difference in activity

Table 4:
*Significance of Difference in the Physiological Parameters (Activity) among Preterm Babies in Experimental and Control Group Before and After Five Days of Nesting*

(N=60)

| Variable | Experimental | | | | | Control | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Pre-test Median | IQR | 5th day median | IQR | p | Pre-test median | IQR | 5th day median | IQR | p |
| Activity | 1 | 0 | 2 | 1 | .001*** .001*** | 1 | 1 | 1 | 1 | .3 |
| Sucking | 1 | 1 | 2 | 1 | .001*** | 1 | 1 | 1 | 1 | 1 |
| Stress sign | 1 | 0 | 2 | 0 | | 1 | - | 1 | 0 | .1 |

including behavioral status, global posture, global tone, sucking reflex and stress sign among preterm babies in the experimental and control group after five days of nesting.

Table 5:
*Significance of Difference in the Physiological Parameters among Preterm Babies in Experimental and Control Group after five days of Nesting*

(N=60)

| Variable | Exp | | Control | | | |
|---|---|---|---|---|---|---|
| | mean | SD | Mean | SD | t | p |
| Temperature | 98.4 | .79 | 97.38 | .63 | 5.53 | .001** |
| Heart rate | 142.33 | 10.7 | 149.1 | 14 | -2.0 | .044* |
| Respiratory rate | 49.73 | 6.9 | 59.13 | 11 | -3.8 | .001** |
| SPO2 | 97.5 | 1.9 | 95.2 | 1.6 | 4.97 | .001** |
| Capillary refill time | 2.8 | .41 | 4.43 | .57 | -12 | .001** |
| Weight | 1136.8 | 219 | 1194.3 | 319.6 | -.81 | .421 |

Table value t (29) =2.05; *significant at p<.05; ***Highly significant at p<.001

Table 6:
*Significance of Difference in Physiological Parameters (Activity) among Preterm Babies in the Experimental and Control Group After Five Days of Nesting*

(N=60)

| Variable | Calculated value $\chi 2$ | df | p |
|---|---|---|---|
| Activity | 48.75 | 2 | .001*** |
| Behavioral status | 6.40 | 1 | .011* |
| Global posture | 52.50 | 1 | .001*** |
| Global tone | 56.12 | 1 | .001*** |
| Sucking reflex | 27.26 | 2 | .001*** |
| Stress sign | 35.62 | 1 | .001*** |

Table value $\chi 2(1) = 3.84$;Table value $\chi 2(2) = 5.99$

Hence it is interpreted that nesting has an effect in improving the physiological parameters of preterm babies in NICU. A significant difference is observed mostly in the overall activity level of preterm babies when compared to physiological parameters. So, nesting as a cost-effective intervention can be incorporated in the care of preterm babies in NICU in order to promote comfort, posture and stable physiological parameters.

## Discussion

The study findings indicate that nesting is effective in improving the physiological parameters of preterm babies in NICU.

The study is consistent with the study to assess the effect of nesting on physiological parameters and comfort behavior among 30 preterm infants. The findings of the study indicated that physiological parameters and comfort level of preterm infants significantly improved when they lie under the nest (Sandeep, Yogesh, & Sharin, 2015).

The present study is backed by a study conducted to assess the effectiveness of nesting on posture and movements among 60 preterm babies (30 in each experimental and control group) in selected hospitals in Mysore. The study result shows that posture and movement score among preterm babies in the experimental and control group (p<.05) (Joseph, Ambika, & Williams, 2013).

The present study is congruent with the study to evaluate the effect of applying nesting technique as developmental care on physiological functioning and neuro behavioral organization (40 in each experimental and control group) in NICU of Ain Shams University Hospital, Egypt. The study results showed a statistically significant difference concerning premature infants physiological, behavioral and neurological outcomes (El-Nagger & Bayoumi, 2016).

**The limitations:**

This study included the use of non-probability sampling (consecutive sampling), which limits the generalizability of the study findings to the study sample. Some preterm babies are lost during the period of data collection due to phototherapy treatment, so the period of data collection was extended.

## Conclusion

Based on the findings, the study concluded that nesting is effective in maintaining stable physiological parameters including axillary temperature, heart rate, respiratory rate, SPO2, capillary refill time and overall activity (behavioral status, global posture, global tone, sucking reflex and stress sign) of preterm babies ($p<.05$) Effectiveness of nesting is observed mostly in the overall activity level including behavioral status, global posture, global tone, sucking reflex and stress sign of preterm babies when compared to physiological parameters. The study shows that nesting has no effect in weight gain of preterm babies. The study also pointed out that the period of stay in the nest has a significant effect on improving the physiological parameters of preterm babies. Longer the duration of stay in the nest, better the outcome. There is a significant difference in the physiological parameters of preterm babies after the fifth day than the third day. There is a need to implement strategies of developmentally supportive care like nesting that mimic the intrauterine environment in the NICU that provides more appropriate infant's state of alertness, posture, comfort and stable physiological parameters.

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