



"EFFECT OF NESTING ON THE PHYSIOLOGICAL PARAMETERS OF THE NEONATES ADMITTED IN NICU"

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ABSTRACT

The neonatal period is the most vulnerable time for a child's survival. A survey in 2019 showed that children faced the highest risk of dying in their first month of life at an average global rate of 17 deaths per 1,000 live births. A quantitative, evaluative, Quasi experimental one group pre test – post test design to evaluate the effect of Nesting on the physiological parameters of the neonates admitted in NICU, was conducted w.e.f. August to December 2021 on 32 neonates through Non Probability, Total enumerative (Consecutive sampling) Sampling Technique. Data was collected through a self structured observation checklist and Modified Levine's Conservation Model of Nursing was adopted as conceptual framework. Reliability was determined by Cronbach's alpha test using inter rater method which was 0.756 found to be acceptable with high and significant reliability. **Results:** The major findings of the study showed that the Mean physiological parameters level scores before the administration of the Nesting in supine position (HR: 133.50 ± 19.56, RR: 49.88 ± 16.76, SpO₂: 94.75 ± 3.19) on Day 1, was higher than the mean physiological parameter level scores (HR: 130.06 ± 17.45, RR: 49.38 ± 17.78, SpO₂: 94.09 ± 3.22) after the administration of Nesting. While, the Mean physiological parameters level scores before the administration of the Nesting in lateral position (HR: 136.06 ± 15.20, SpO₂: 95.19 ± 2.75) on Day 2, was higher than the mean level scores (HR: 131 ± 17.42, SpO₂: 94.09 ± 2.85) after the administration of Nesting with a negligible difference in RR before and after the administration of Nesting (49.38 ± 16.09, 49.88 ± 16.08). Lateral position was considered a better and safe position of nesting than supine position. Decrease in the physiological parameter level scores within the normal limits, of the neonates due to the effect of Nesting, was significant & not by chance, thus rejecting the null hypothesis at p < 0.05, though much difference was not found in the RR of the neonates in both the positions. Significant association existed at p < 0.05 between the HR with the demographic variables *Body weight, Gestational age (wks) and Length of stay in NICU (days)* in lateral position of nesting. Significant association also existed between the RR and the demographic variables *Sex and Education* separately in supine and lateral position of nesting. Significant association existed between SpO₂ with the demographic variable *mother's occupation* in supine position of Nesting and *Postnatal age (in days) of the neonate and Residential area* in lateral position of nesting, rejecting the null hypothesis. The study concluded that nesting was effective in reducing the physiological parameters of the neonates within the normal limits, especially in lateral position.

KEYWORDS : Effect, Nesting, Neonates, NICU, Physiological parameters

INTRODUCTION:

India is a vast country, over 74% of the population lives in rural areas. Inevitably, there is wide disparity among various population groups, with the rural NMR (Neonatal Mortality Rate) almost double that of the urban areas.¹ The neonatal period is the most vulnerable time for a child's survival.² An important reason for the high neonatal mortality is lack of care at birth. The challenge in the newborn care is to identify the cost-effective interventions to address newborn problems currently lacking a ready solution.¹

About 0.75 million neonates die every year in India, the highest for any country in the world.³ The current infant mortality rate for India in 2021 was 28.771 deaths per 1000 live births.⁴ Each year, 3.5 million preterm (< 38 weeks of gestation) neonates are born in India. Above 80% of total neonatal deaths occur among LBW/preterm neonates which accounts for 42% of the global burden, the largest for any country.³ India ranks number 1 in infant mortality in the world, three infants die every two minutes: UNIGME (United Nations Inter-agency Group for Child Mortality Estimation).⁵

The Indian state of Bihar is the third most populous Indian state with an estimated population of 110 million in 2016, which contributes substantially to neonatal mortality burden in India.⁶ A news published in The Times of India quoted a report, released by Union Health Minister Shri Harsh Vardhan on Dec 14th 2020; stating that the NMR per 1,000 live births in Bihar was 35.2% during 2019-20.⁷

Background of the study:

Nature is supreme, the way it looks after all the needs of the baby in the womb. The baby is comfortably "nested" in a flexed posture with hands in the midline close to his mouth. The physiological needs of oxygenation, nutrition and excretion are admirably met by the utero-placental unit.⁸

Uterus provides ideal ambient conditions to the baby. All attempts should be made to create uterus-like baby friendly ecology in the nursery. A soft, comfortable, "Nestled" and cushion bed should be created. "Nesting or positioning or therapeutic/ developmental positioning" is a comfortable measure that stimulates in-utero feeling of lack of space and makes the baby less prone to startle. The infant can be positioned prone or on the side with flexed extremities by providing a 'nest' with a rolled blanket.¹

One of the interventions suggested in NIDCAP (Newborn Individualized Developmental Care and Assessment Program) is "nesting". Nesting was designed by Danielle Salducci a paediatric physiotherapist. In nesting, the neonate must be positioned in such a way that the head and body are on the same axis close to the midline, which is similar to the foetal position in mother's uterus, promoting comfort, sleep and to maintain stable physiological parameters. It is made up with rolled towels, blankets or cot sheets in a 'U' shape to provide intrauterine boundaries and form a 'nest'.⁹

Need of the study:

Newborns have so many adjustment problems soon after the delivery. The striking difference between the intrauterine environment & the NICU is obvious.¹⁰ The preemies and LBW babies have poor muscle tone and they lie with their arms and legs straight or extended. The extended posture for a long period of time may lead to abnormal tone with consequent delay in motor development. A baby friendly womb-like ambience and ecology in the NICU to simulate in-utero environment should be created. All the health care professionals in the NICU should be gentle, considerate and compassionate in providing care to the neonates.⁸

One of the earliest neurodevelopmental interventions in the NICU is therapeutic positioning.¹⁰ Nesting, as a component of

developmental care, improves neonates sleep quality through preservation of neonate's" curved limb position and reduction of sudden movements as well as immobility of the arms and legs along with preventing abrupt and distressing movements. Babies usually feel more secure and are more physiologically stable if they have boundaries (nesting) placed around them, as they are used to an enclosed womb. In addition, they gain comfort from being able to grasp their hands together, suck their fingers or hold onto bedding. Often babies need assistance to find a position in which they can do these things. Nesting is a convenient, cost-effective, requires less time and skills, hence it is easy for the nurse to practice and beneficial for preterm babies, starts with simple intervention by making nest for preterm babies.¹¹

Although Nesting is recognized as an essential element of care in the Neonatal Intensive Care Unit (NICU), the definition and standardization of Nesting or developmental positioning has not been fully researched or implemented into practice. This project aims to improve the quality and consistency of the Nesting practices in the NICU of this facility by implementing a standardized nesting resource and providing educational resources and bedside training. A secondary aim is to add to the body of knowledge about "Nesting or therapeutic or developmental positioning" by adding evidence to support the use of a standardized positioning assessment tool as an education and evaluation resource.¹²

There's not many studies done related to "nesting" and its beneficial effects especially in Bihar; neither the population at large is aware about the said term or technique. So, this study seeks to redress this issue and the findings of this study will add to the body of knowledge to use developmentally supportive positioning techniques in the neonates esp Premature and LBW's to facilitate their growth and development. Researcher thus felt the need to contribute through the said study, the newer, nonpharmacological practices, in order to improve the physiological parameters, posture and the movements of the neonates thus preventing further hidden negative deleterious consequences.

Objectives:

1. Assess and evaluate the physiological parameters of the neonates admitted in NICU, before and after Nesting in terms of Heart rate (HR), Respiratory rate (RR) and Oxygen saturation (SPO2).
2. Compare the effect of Nesting on the physiological parameters of the neonates admitted in NICU, before and after the intervention.
3. Establish the association of the effect Nesting on the physiological parameters of the neonates admitted in NICU with the demographic variables.

Hypothesis:

- H₁: There will be significant difference on the physiologic parameters of the neonates admitted in NICU, before and after Nesting.
- H₂: There will be significant association between the effects of Nesting on the physiological parameters of neonates admitted in NICU with the demographic variables.

Variables:

1. Independant: Nesting

2. Dependant: Physiological parameters viz. Heart Rate (HR), Respiratory Rate (RR), SpO₂

Inclusion Criteria: Neonates fulfilling the following criteria's

1. Gestational age ≥ 30 wks of gestation.
2. Postnatal age of 1hr of life and above.
3. Birth weight of ≥ 1.
4. Parents of admitted NICU babies willing to give consent.

5. Subjects from both gender will be involved.
6. Neonates who are admitted in the NICU and stay for two days or more.
7. Neonates admitted in NICU with spontaneous breathing without the need of assistive devices.

Exclusion Criteria:

1. All neonates on ionotropes, ventilators, septicemia, sedatives, CPAP, Oxygen, Birth asphyxia, Apnoea, RDS (Respiratory Distress Syndrome), Seizures, abnormal neurological findings, Intraventricular haemorrhage, congenital deformities and all other serious illnesses (medical or surgical).

Brief Research Methodology:

Ethical clearance was taken from the Institutional Ethics Committee, prior to the conduction of the study.

Research approach: Quantitative, Evaluative

Research Design: Quasi Experimental, One group Pre test – Post test research design.

Procedure for data collection: (O1 X O2O3 X O4)

Day 1: Pretesting of Physiological Parameters Nesting in Supine position, Post Testing of Physiological Parameters

Day 2: Pretesting of Physiological Parameters Nesting in Lateral position, Post Testing of Physiological Parameters

Sample and Sample Size: 32 Neonates admitted in NICU, IGIMS

Sampling Technique: Non Probability, Total enumerative sampling (Consecutive sampling)

Setting: NICU of IGIMS

Type of Study: Single Centred

Characteristic of study: Non Invasive procedure

Validity of the tool: The validation of the content and the tool was done by 2 Paediatric Nursing experts, 1 Paediatric Surgeon expert and 4 Paediatricians

Method of data collection:

Data collection technique and tool: Self structured Observation Checklist, Observation.

Tool: Observation Checklist

Description of the tool:

Tool I: Observation checklist consisting of 2 sections:

Section – I: Consisting of 19Items:-

- A) Demographic profile of the neonates
- B) Demographic characteristics of the neonates' mother

Section – II: Observation Checklist –

3 physiological parameters viz. Heart Rate (HR), Respiratory Rate (RR), Oxygen Saturation (SpO₂) were observed. The overall scoring in the Observation Checklist was done out of 12 as maximum score whereby it was interpreted as Severe Instability (0 - 3), Mild Instability (4 - 7) and Perfect Stability (8 - 12).

Heart Rate (HR)/ min	Grade	Remark
Less than 90 (< 90)	Bradycardia	Poor
More than 160 (> 160)	Trachycardia	Serious
90 - 160	Normal	Good
Respiratory Rate (RR)/min	Grade	Remark

Less than 30 (< 30)	Bradypnea	Poor
More than 60 (> 60)	Tachypnoea	Serious
30 - 60	Normal	Good
Oxygen saturation (SPO2) %	Grade	Remark
85% – 90%	Moderate Desaturation	Poor
Less than 85% (< 85)	Severe Desaturation	Serious
More than 90% (> 90)	Normal	Good

Procedure of Data Collection:

The neonates satisfying the inclusion criteria were selected. The study was conducted for a period of 2 consecutive days for each subject. Before the Nesting intervention, the physiological parameters of the neonates admitted in NICU were recorded through leads and probes attached to the monitors which was followed by Nesting in two different positions separately on each day viz: Supine (Day 1) and lateral (Day 2) for a period of 1 hr each. Photographs of monitors were taken for recording the HR, SpO2 while RR was calculated manually both pre and post nesting. Post nesting after 1 hr the physiological parameters were assessed again and recorded. IPAT (Infant Position Assessment Tool) was used to ensure the correct posture provided to the neonates during Nesting. Data were collected through self - structured sociodemographic performa and Observation checklist.

RESULTS:

Demographic Characteristics: Majority 50% neonates were boys, 68.75% of the neonates were between 34 – 37wks gestational age and 50% were less than seven days of age with 56.25% between the birth weight of 2kg – 3kg while 59.38% with body weight between 2kg – 3kg. 75% length of stay in NICU was between 1- 5days. 53.13% neonates' mothers belonged to rural area, 37.5% neonates' mothers were postgraduate while 90.63% were homemaker. 59.38% mothers were primigravida with 65.63% mothers delivering normally through vagina. 96.88% were hospital delivery. 93.75% neonates' mothers never heard about nesting.

Table 1: Physiological measures of the neonates in terms of stability in various position during Nesting N = 32

Stability	Severe Instability		Mild Instability	
	N	%	N	%
HR Day1 (Supine)	3	9.38	29	90.63
HR Day2 (Lateral)	2	6.25	30	93.75
RR Day1(Supine)	16	50.00	16	50.00
RR Day2 (Lateral)	13	40.63	19	59.38
SPO2 Day1(Supine)	5	15.63	27	84.38
SPO2 Day2 (Lateral)	4	12.50	28	87.50

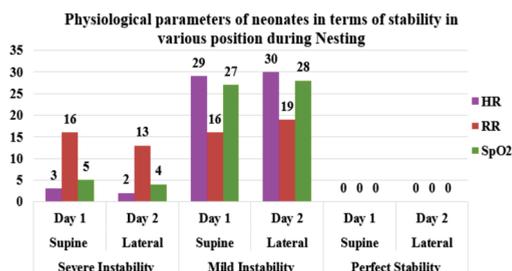


Fig 1: Bar Diagram showing the physiological parameters of the neonates in terms of stability in supine and lateral position during Nesting

Table and Fig 1 indicated that on Day 1 with supine position, 9.38% showed severe instability while 90.63% exhibiting mild stability in HR; 50% showed severe and mild instability each in RR; while 15.63% exhibited severe instability and 84.38% showed mild instability in SpO2. On Day 2 with lateral position, 6.25% showed severe instability while 93.75% exhibiting mild stability in HR; 40.63% showed severe

instability and 59.38% exhibited mild instability in RR; while 12.5% exhibited severe instability and 87.5% showed mild instability in SpO2. Though, majority neonates exhibited mild instability on both the days but with lateral position on the 2nd day, the neonates exhibiting mild instability were more, with regards to the physiological parameters in comparison to Day 1 with supine position; indicating that the effect of nesting in lateral position was far more effective in comparison to the supine position on Day 1, however both lateral and supine position fetched overall average results in Respiratory Rate on both the days with a spike on the 2nd Day.

Table 2: Description of mean and standard deviation for the effects of Nesting on the Physiological parameters of the neonates in Supine and lateral position. N = 32

Physiological Parameters		Mean	SD	SE	Paired t	P
HR Day 1 (Supine)	Pre	133.50	19.558	3.457	1.331	0.193
	Post	130.06	17.456	3.086		
HR Day 2 (Lateral)	Pre	136.06	15.204	2.688	2.156	0.039*
	Post	131.00	17.421	3.080		
RR Day 1 (Supine)	Pre	49.88	16.764	2.963	0.254	0.801
	Post	49.38	17.783	3.144		
RR Day 2 (Lateral)	Pre	49.38	16.092	2.845	0.181	0.857
	Post	49.88	16.080	2.843		
SPO2 Day1 (Supine)	Pre	94.75	3.193	0.564	1.012	0.319
	Post	94.09	3.226	0.570		
SPO2 Day2 (Lateral)	Pre	95.19	2.753	0.487	2.202	0.035*
	Post	94.09	2.855	0.505		

* p < 0.05

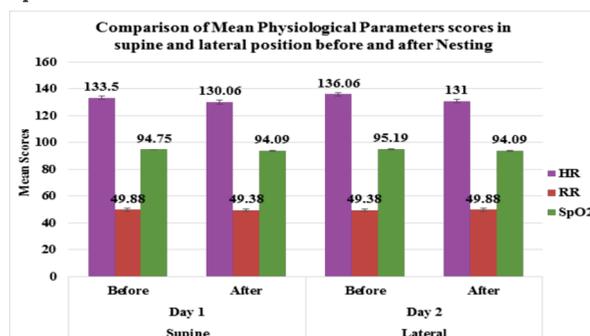


Fig 2: Bar Diagram showing the comparison between the physiological parameters of the neonates in supine and lateral position before and after Nesting

Table and Fig 2 indicated that there was significant decrease in the HR and SpO2 within the normal limits at 5% (p < 0.05) after the administration of Nesting on Day 2 in lateral position indicating that lateral position was better than supine position. Hence, null hypothesis was rejected.

DISCUSSION:

In NICU neonates get disturbed due to the effect of many factors like noise, light, lack of confined environment which can be compensated by caring them with nesting. In the present study showed that there was an improvement and stability in the Physiological parameters like oxygen saturation, heart rate, respiratory rate among the neonates with nesting as compared to routine care indicating that nesting may be effective in maintaining stable physiological parameters, which in turn is an sign of good health.¹³

- Effect of Nesting on the physiological parameters of the neonates in terms of stabilizing the physiological parameters

Findings:

- Mean physiological parameter level scores before the administration of the Nesting in supine position (HR: 133.50, RR: 49.88, SpO2: 94.75) on Day 1, was higher than

the mean level scores (HR: 130.06, RR: 49.38, SpO₂: 94.09) after the administration of Nesting. While, the Mean physiological parameter level scores before the administration of the Nesting in lateral position (HR: 136.06, SpO₂: 95.19) on Day 2, was higher than the mean level scores (HR: 131, SpO₂: 94.09) after the administration of Nesting in lateral position with a negligible difference in RR before and after the administration of Nesting (49.38, 49.88). Decrease in the physiological parameters level scores within the normal limits, of the neonates due to the effect of Nesting, was significant & not by chance. Null hypothesis was rejected.

The study was supported by the following studies:

1. Das Hima P, Pillai Sreeja G and Joyichan Molykutty (2020) indicated in their study on 60 preterm babies that there was a significant difference in heart rate, respiratory rate, SPO₂ in the experimental group after five days of nesting ($p < .05$) making it a safe and cost-effective intervention for stabilizing the physiological parameters and overall activity of preterm babies admitted in NICU.¹⁴

2. Mohamed El-Nagger Nahed Saied and Bayoumi Orban Ragab (2016) revealed in their study on 80 Premature Infants that applying nesting technique as a developmental care had a positive effect on physiological functioning, and neurobehavioral organization of premature infants.¹⁵

3. K Sr. Mony, Selvam V Dr. Indra, Diwakar Dr. Krishnakumar (2018) concluded in their study on 21 preterm infants that there was improvement in physiological parameters among preterm infants with nesting compared to routine care, with HR significantly decreased and maintained stable at $p < 0.05$ while RR was decreased and maintained stable but statistically not significant at $p > 0.05$.¹³

4. Alice Jeba J, Senthil Kumar S & Shivaprakash Sosale (2019) concluded that there was statistically significant effect of nesting on respiratory rate and heart rate at 60th minute at $p < 0.05$ but had non significant effect on oxygen saturation level.¹⁶

- Association of physiological parameters measures of the neonates regarding the effects of Nesting with the selected demographic variables.

Findings:

- Significant association existed between the HR with the demographic variables Body weight, Gestational age (wks) and Length of stay in NICU (days) at $p < 0.05$ in lateral position of nesting. Significant association existed between the RR with the demographic variables Sex and Education separately in supine and lateral position of nesting at $p < 0.05$. Significant association existed between SpO₂ with the demographic variable mother's occupation in supine position of Nesting and Postnatal age (in days) of the neonate and Residential area in lateral position of nesting at $p < 0.05$.
- The study was supported by Jasmine Rani D Jaya (2011) as there was significant association between the selected neonatal variables namely, gestational age at birth, gender. 17

Limitations:-

Limited sample size due to N Covid 19 with observations done for a small time period due to time boundaries of the study .

CONCLUSION:

There was significant decrease in the physiological parameters within the normal limits – HR, RR, and SpO₂ of the neonates especially in the Lateral position than in supine position, though much difference was not found in the RR of

the neonates in both the positions. The results supported the Modified Levine's Conservation Model of Nursing indicating that Nesting was effective as a complementary support for the neonates, in reducing the extra uterine stress by stabilizing their physiological parameters and conserving their energy thus reconstruct their lives in concert with the care given by nurses who reduced the chances of mortality thus maintaining wholeness.

Implications:

The findings of the study have valuable implications towards Nursing education, Nursing practice, Nursing administration and Nursing research with the aim to translate the evidence of this study into guidance, which healthcare professionals can give to the parents to help them make informed choices about reducing the extra uterine stress, promoting sleep and maintaining the vital signs as Nesting is an effective and secure method which in turn helps in the growth and development of the neonate.¹² Nurses should engage in preventive and promotive services for enhancing health of the preterm & LBW babies to prevent physical handicaps.⁹ It is a non pharmacological modality and developmental care, a very comfortable and easy method which can be practised by the nurses in the NICU to promote and induce hemodynamic stability.¹² Nesting or positioning of high risk neonates in the neonatal intensive care unit can be considered as an effective way of modifying the cardiorespiratory parameters.

Recommendations:

1. Similar study can be replicated to a larger sample with a control group.
2. Similar study can be conducted in home setting.

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Conflict of Interests: The author declares no conflict of interests.

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