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EFFECT OF NESTING ON PHYSIOLOGICAL PARAMETERS AMONG PRETERM BABIES ADMITTED IN NICU

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Abstract

The present study is aimed to determine the effect of nesting on physiological parameters among preterm babies admitted in NICU of Amala Institute of Medical Sciences, Thrissur. Objectives are to analyze the physiological parameters among preterm babies, determine the effect of nesting on physiological parameters among preterm babies and also to find the association between physiological parameters with baseline variables. The research approach is quantitative approach and research design is cross over design. The study is based on Ludwig Von Bertalanffy, general system model. Twenty preterm babies were selected by purposive sampling technique.Samples were randomly allocated for nesting and routine care. Tools used were structured questionnaire to determine the baseline variables and physiological parameter data sheet to record physiological parameters after nesting and routine care.

The calculated 't' value and p value of heart rate is 0.26 and 0.797 respectively, respiratory rate is 0.163 and 0.109, temperature is 0.113 and 0.910 and oxygen saturation is 2.74 and 0.009 respectively after nesting and routine care. Hencethe't' value of oxygen saturation is statistically highly significant at 0.05 level irrespective of other physiological parameters that are maintained stable and showed differences but statistically not significant after nesting and routine care. The study findings depicts that, heart rate and respiratory rate were decreased, mean body temperature was increased but statistically not significant after nesting as compared to routine care. The study findings reveals that nesting is effective in sustaining stable physiological parameters among preterm babies.

Key words:nesting, physiological parameters, preterm babies, data sheet to record physiological parameters.

Introduction

Background of the study

Preterm babies are neurologically immature and physiologically unstable. They cannot tolerate environmental variations and stress which may adversely affect their neuromotor development. The preterm birth remains as one of the biggest challenges in perinatal health care globally as per the WHO statistics [2010].[1]

Preterm birth is a significant public health problem across the world because of associated neonatal mortality, short and long term morbidity and disability in later life. InIndia 3.5 million babies are born premature [National health protocol report, WHO 2017][2]and statistics of Kerala shows 10.4% [Vital statistics report, 2017].[3] Every year almost three and half million babies are born premature in India which accounts almost for 13% of births in the country.[4]

Globally 12.9 million preterm babies are born every year, representing 9.6% incidence of preterm births. In India incidence of preterm births are estimated to be 11 to 14 %. 35% of neonatal deaths worldwide is a result of preterm births and it is the second leading cause of death among under five mortality [WHO 2010]. Approximately one million babies die every year due to complications of preterm birth [WHO 2014]. More than three quarters of preterm babies can be saved with feasible, costeffectivecare, such as essential care during child birth and in the post natal period.[1]

A number of recent studies have indicated that high oxygen saturation levels above 93 - 95% are determined to premature infants when compared to lower saturation levels 85 - 93% in newborns. Oxygen saturation levels must be monitored and kept at less than 95% to prevent reactive oxygen species - related diseases such as retinopathy of prematurity and bronchopulmonary dysplasia. At the same time desaturation below 80 – 85% must be avoided to prevent cerebral palsy and optimal oxygenation of preterm babies at the bedside and making ongoing assessment of parameters in them.[2]A consistently increased heart rate is an indication of anemia, bradycardia <100 beats per min is an expected variation of prematurity as their nervous system is immature. These parameters of preterm babies are maintained and stabilized in NICU until they get mature enough to control normal function.[5]

Need and significance of study

Preterm birth is a significant public health problem across the world because of associated neonatal mortality, short and long term morbidity and disability in later life. Preterm birth is the world's number one cause of newborn deaths and the second leading cause of all child deaths under five, after pneumonia. In India out of 27 million babies born every year [2010], 3.5 million babies are born premature [National health portal report, NHP,2010][4]. According to Born Too Soon, Global Action Report on Preterm Births [2019] reports that, India tops the list of 10 nations contributing 60 percent of the world's preterm deliveries with the maximum number of preterm births with 3,519,100 of them, almost 24 percent of the total number[WHO][5] and Statistics of Kerala shows 10.4% [Vital statistics report, 2017].[3] Every year almost three and half million

babies are born premature in India which accounts almost for 13% of births in the country. [National health portal report, NHP, 2010].[4]

Preterm infants physiologic alterations can be managed by reducing heat loss in a way of preventing evaporation, conduction, convection and radiation, reducing the frequency and duration of cold exposure, monitoring both infant and environmental temperature and also by providing adequate measures to stabilize physiological parameters of the preterm babies.[6]

An experimental study was conducted by Mony K, Selvam V et al on effect of nesting on physiological parameters and sleep pattern among 21 preterm infants in NICU of MOSC medical college,kolenchery, Kerala in 2017. The study results revealed that there was an improvement in physiological parameters among preterm infants with nesting as compared to routine care, which was tested by paired t- test. There was a significant decrease in heart rate and maintained stable during quite sleep [$p<0.05$]. Respiratory rate was decreased and maintained stable but statistically not significant [$p>0.05$] in all stages of sleep. With regard to oxygen saturation, there was a significant increase during active sleep [$p<0.05$] and quite sleep [$p<0.005$]. There was an increase in meanbody temperature value in all stages of sleep and statistical significance exhibited only in indeterminate sleep [$p<0.05$]. The study concluded that nesting helps in comfort and maintains stable physiological parameters among preterm babies.[7]

Due to advancement in technology, the survival of preterm babies have improved but the quality of life among the survivors has not significantly improved. The preterm babies are anatomically and functionally immature leading to high neonatal morbidity and mortality. They are more prone to develop hypothermia, hypoxia and fluctuations of heart rate and respiration. Thus nesting is recommended to facilitate stability of physiologicalparameters among preterm babies admitted in NICU.[8]

Nesting is one of the methods used in NICU that helps to maintain position and physiological parameters in neonates and also minimizes the effect of environmental stimuli of NICU and promotes comfortable sleep. Nesting as a component of developmental care, improves sleep quality through preservation of neonate's curved limb position and reduction of sudden movements as well as immobility of the arms and legs, thus maintaining stable thermoregulation and other physiological parameters. Nesting is found to be one of the beneficial supportive interventions that can be used in the preterm babies care practice.[9]

Several literatures reveal that preterm care includes proper positioning andmaintaining of physiological parameters play a major role in the development of preterm babies. Incidence of premature death rate and developmental problems are related to improper maintenance of temperature and comfortable environment. As a nurse it is our responsibility to maintain the physiological parameters and appropriate position to provide maximum comfort and to reduce further complications. There are no much studies done on nesting on physiological parameters among preterm babies and only in selected NICU, nesting is practicing. So the researcher felt the

need to contribute newer practices in caring preterm neonates and to improve their quality of future life by providing a womb like ecology through nesting.[6]

Statement of the problem:

A study to assess the effect of nesting on physiological parameters among preterm babies admitted in NICU of Amala Institute of Medical Sciences, Thrissur.

Objectives

1. Assess the physiological parameters among preterm babies.
2. Determine the effect of nesting on physiological parameters among preterm babies.
3. Find the association between physiological parameters with baseline variables.

Hypotheses

H_1: There will be significant difference in the physiological parameters of preterm babies after nesting and routine care.

H_2: There will be significant association between the post assessment scores of physiological parameters and selected baseline variables.

Methodology

Research approach: Quantitative research approach.

Research design: Cross over design.

Setting of the study: Neonatal intensive care unit of Amala Institute of Medical Sciences, Thrissur.

Sample and sampling technique: The sample for this study consists of 20 preterm babies who meet the inclusion criteria using purposive sampling technique.

Inclusion criteria:

Preterm babies with

- 32- 37 wks. of gestational age.
- birth weight between 1.5 -2.5 kg.
- APGAR Score ≥ 7 at five minutes.

Exclusion criteria:

Preterm babies

- onventilator and critically ill.
- undergoing phototherapy.

Tools and technique

Tools used for the present study are:

Tool I: Structured questionnaire to assess baseline variables

Tool II:Physiological parameter data sheet

Tool II: Physiological parameter data sheet

A physiological parameter data sheet used to record the physiological parameters like heart rate, respiratory rate, temperature and oxygen saturation. The heart rate, respiratory rate and oxygen saturation are assessed using the multi parameter monitoring and temperature is assessed using the thermal skin probe. American Heart Association (AHA) pediatric guidelines 2020is used for the study.[10]

Data collection process

Data collection is the gathering of information from the sample unit.[11] A formal permission was obtained from the Director, Amala Institute of Medical Sciences, Thrissur. The data collection was carried out from 31- 12-2019 to 5-2- 2020. Twenty samples were selected based on the inclusion criteria using purposive sampling technique. After a brief explanation of nesting procedure, informed consent was obtained from the parents. Samples were randomly allocated for nesting and routine care. The investigator collected the base line variables such as gestational age at birth, sex, birth weight, APGAR score at 5th minute, type of delivery, diagnosis on admission and method of feeding using a structured questionnaire from the medical records of each samples. The age of preterm babies and duration in NICU from the time of admission were calculated and recorded by the investigator. Each sample was put on nesting or routine care for 2 hours as per random allocation and physiological parameters liketemperature, heart rate, respiratory rate,andoxygen saturation were assessed using a thermal skin probe and multi parameter monitoring and were recorded immediately within ten minutes after each intervention in the physiological parameter data sheet. The feeding interval of NICU was 2 hours. After nesting the baby was put on washout period for 2 hours followed by routine care for 2 hours and again physiological parameters were assessed and recorded. The subjects were comfortable and adjusted well during the study.

Results

The major findings of the study are as follows:

1. Distribution of preterm babies according to baseline variables.

- In the study population majority (90%) of preterm babies were with 35 – 37 weeks of gestational age at birth.
- Considering the age of preterm babies majority (85%) were in the age group of 1 -14 days.
- Considering the sex of preterm babies (60%) were males and (40%) were females.
- Regarding the birth weight majority (55%) of preterm babies were having 2 – 2.5 kg at birth.
- Regarding the APGAR score at 5th minute majority (90%) of preterm babies were having score 9.
- In the study population majority (55%) of preterm babies were born by caesarean section.

- Regarding thediagnosis on admission majority (75%) of preterm babies were admitted for preterm care.
- In the study population majority (85%) of preterm babies were having 1 – 14 days of duration in NICU from the time of admission.
- Regarding the method of feeding majority (80%) of preterm babies were breast fed.

2. Assessment of physiological parameters among preterm babies.

Table 1: Comparison of mean and standard deviation of physiological parameters after nesting and routine care. (n=20)

	Nesting		Routine care	
Variables	**Mean**	**SD**	**Mean**	**SD**
Heart rate	139.45	9.51	138.65	9.96
Respiratory rate	45.30	5.411	48.05	5.196
Temperature	36.47	0.272	36.48	0.286
Oxygen Saturation	99.60	0.681	98.75	1.206

Table 1 reveals that mean and standard deviation of heart rate is 139.45 and 9.51respectively after nesting and 138.65 and 9.96 after routine care, mean and standard deviation of respiratory rate is 45.30 and 5.411 respectively after nesting and 48.05 and 5.196 after routine care, mean and standard deviation of temperature is 36.47 and 0.272 respectively after nesting and 36.48 and 0.286 after routine care,mean and standard deviation of oxygen saturation is 99.6 and 0.681 respectively after nesting and 98.75 and 1.206 after routine care.

3.**Effect of nesting on physiological parameters among preterm babies**

Table 2: 't' value of physiological parameters after nesting and routine care

(n=20)

Variables	**Group**	**Mean**	**Standard deviation**	**df**	**'t' value**	**p - value**
Nesting		138.65	9.51	18	0.26	0.797
Heart rate	Routine care	139.45	9.96			
Respiratory	Nesting	45.30	5.41	18	0.163	0.109
rate	Routine care	48.05	5.196			
Temperature	Nesting	36.47	0.272	18	0.113	0.910
	Routine care	36.48	0.286			
Oxygen	Nesting	99.60	0.681	18	2.74	0.009**
saturation	Routine care	98.75	1.209			

**Significant at 0.05

Table 2 shows that the 't' value and p value of oxygen saturation is 2.74 and 0.009 respectively after nesting and routine care which is statisticallyhighly significant at 0.05 level. The 't' value and p value of heart rate is 0.26 and 0.797, respiratory rate is 0.163 and 0.109 and temperature is 0.113 and 0.910 respectively, which are statistically not significant. This shows that there is a significant difference in the oxygen saturation as compared to other physiological parameters that are maintained stable and showed differencesafter nesting and routine care. This indicates that nesting is effective in maintaining stable physiological parameters among preterm babies.

4.Analysis of association between physiological parameters with baseline variables.

Table 3:Association ofheart rate with sex

(n =20)

Variables	Category	MeanSD		't' value	df	p - value
Sex	Male	134.92	9.414	2.264	18	0.036*
	Female	144.25	8.396			

*Significance at 0.05 level

Table 3 shows that 't' value of heart rate with sex is 2.264 and p value is 0.036. Hence the association between heart rate andsex is statistically significant.

Table 4: Association ofheart rate with type of delivery and APGAR score at 5th minute

(n=20)

Variables	Category	Mean	SD	't' valuedf		p - value
Type of delivery	Normal delivery	134.78	8.65	2.17	18	0.044*
	Caesarean section	143.27	8.74			
APGAR score at 5th minute	8	144	11.31	0.703	18	0.491
	9	138.94	9.5			

*Significant at 0.05 level

Table 4 shows that't' value of heart rate with type of delivery is 2.17 and p value is 0.044, 't' value of APGAR score at 5th minute is 0.703 and p value is 0.491. Hence the association between heart rate and type of delivery is statistically significant and the association between heart rate and APGAR score at 5th minuteis statistically not significant.

Table 5: Association of heart rate with duration in NICU from the time of admission

(n=20)

Variables	Category	Mean	SD	't' value	df	p - value
Duration in NICU from the time of admission	1 – 14 days	138	9.533	1.70	18	0.017*
	14– 28 days	147.67	3.78			

*Significant at 0.05 level

Table 5 shows that 't' value of heart rate with duration in NICU from the time of admission is 1.70 and p value is 0.017. Hence the association between heart rate and duration in NICU from the time of admission is statistically significant.

Table 6: Association of heart rate with method of feeding

(n=20)

Variables	Category	Mean	SD	't' value	df	p - value
Method of feeding	Breast feed	136.81	8.34	2.93	18	0.009*
	EBM /Top feed	150	6.32			

*Significant at 0.05 level

Table 6 shows that 't' value ofheart rate with method of feeding is 2.93 and p value is 0.009. Hence the association between heart rate and method of feeding is statistically significant.

Table 7: Association ofrespiratory rate with type of delivery and APGAR score at 5th minute.

(n=20)

Variables	Category	Mean	SD	't' valuedf	p - value

Type of delivery	Normal delivery	47.89	4.75	2.103	18	0.050*
	Caesarean section	43.18	5.15			
APGAR score at 5th minute	8	41.5	7.778	1.05	18	0.308
	9	45.72	5.22			

*Significant at 0.05 level

Table 7 shows that 't' value of respiratory rate with type of delivery is 2.103 and p value is 0.050, 't' value of APGAR score at 5th minute is 1.05 and p value is 0.308. Hence the association between respiratory rate and type of delivery is statistically significant and association between respiratory rate and APGAR score at 5th minute is statistically not significant.

Table 8: Association ofoxygen saturation with type of delivery and APGAR score at 5th minute

(n=20)

Variables	**Category**	**Mean**	**SD**	**'t' value**	**df**	**p - value**
Type of delivery	Normal delivery	99.22	0.833	2.56	18	0.020*
	Caesarean section	99.91	0.302			
APGAR score at 5th minute	8	100	0	0.871	18	0.395
	9	99.56	0.705			

*Significant at 0.05 level

Table 8 shows that 't' value of oxygen saturation with type of delivery is 2.56 and p value is 0.020, 't' value of APGAR score at 5th minute is 0.871 and p value is 0.395. Hence the association between oxygen saturationand type of delivery is statistically significant and association between oxygen saturationand APGAR score at 5th minute is statistically not significant.

Study findings showed that, there is an association between heart rate with sex, type of delivery, duration in NICU from the time of admission and method of feeding, whereas there is no association between heart rate with gestational age at birth, birth weight, age of preterm baby, APGAR score at 5thminute and diagnosis on admission. There is an association between respiratory rate and type of delivery whereas there is no association between respiratory rate with gestational age at birth, birth weight, age of preterm baby, sex, APGAR score at 5thminute, diagnosis on admission, duration in NICU from the time of admission and method of feeding. There is no association between temperature and baseline line variables. Study results also showed that, there is an association between oxygen saturation and type of delivery whereas there is no association between oxygen saturation with gestational age at birth, birth weight, age of preterm baby, sex, APGAR score at 5thminute, diagnosis on admission, duration in NICU from the time of admission and method of feeding.

Recommendations

1. Practice nesting intervention for neonates in the NICU as a standard for the developmental and supportive care.
2. A similar study can be done in different setting with large sample size.
3. A similar study can be conducted to assess the effect of nesting on physiological parameters and sleep pattern among preterm babies in the same setting with large sample size.
4. A similar study can be conducted to assess the effect of nesting on physiological parameters and comfort posture among preterm babies in the same setting with large sample size.
5. A similar study can be conducted to assess the effect of nesting on more physiological parameters among preterm babies.

Conclusion

Based on the study findings it is concluded that nesting was effective inmaintaining stable physiological parameters among preterm babies which is significant and compared well with other study. Nesting provides the optimum environment to support the position of the baby and helps to facilitate normal physical development. It can provide security and comfort to the premature babies and helps to maintain the physiological stabilityamong preterm babies. Nesting is an inexpensive and noninvasive technique which will help the preterm babies to regulate their normal physiological functioning. Thusnesting can be considered as an effective technique to engage neonatal nurses in promotive and preventive services for enhancing the physiological stability andneurological development of preterm babies in NICU.

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