

A Study to Assess the Effects of Earplugs on Selected Physiological Parameters in Neonates Admitted in Neonatal Intensive Care Units of Selected Hospitals of Sangli, Miraj, Kupward Corporation Area

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Abstract: According to the data as per WHO records there are maximum preterm births in India that counts 3.2 million which is said to be the highest number in year 2020. Babies born before 37 weeks of gestation are known as preterm babies. These preterm babies need hospitalization in NICU for further care and management. The auditory system becomes functioning at around 25-29 weeks of gestational age. However loud continuous noises can cause the organ of corti hair cells to become overstimulated in neonates leading to eventual death of these cells and gradual hearing loss. According to American academy of pediatrics the environmental sound levels should not exceed 45 db. it is still reported that NICU noise levels are between 54 and 60 db. With peaks of 120 db. Surpassing the acceptable sound levels more than 70% of the time. Therefore, compared to newborns in the general population, the frequency of hearing loss is observed to be ten times higher in those who were admitted in NICU. **OBJECTIVES** 1 -To assess the pretest score of physiological parameters (TPR and SPO2) in control and experimental group 2-To assess the post test of physiological parameters (TPR and SPO2) in experimental group 3-To compare the post test score of physiological parameters (TPR and SPO2) in control and experimental group. **MATERIAL AND METHOD** Quasi experimental with control group design was conducted to assess the Effects of earplugs on physiological parameters in neonates admitted in neonatal intensive care units. Total 100 sample were selected by convenient sampling technique as per the criteria. **RESULT** In the present study it was found that after intervention after the application of earplugs on physiological parameters in experimental group there was significant difference in post intervention parameters p value was < 0.0001 in all the physiological parameters like Temperature, Heart rate, Respiratory rate, and spo2 which are highly significant. The mean temperature and spo2 was increased in experimental group as compared to control group. The mean heart rate and respiratory rate decreased in experimental group as compared to the control group. **CONCLUSION** The study finding concluded that the application of earplugs was effective in the preterm neonates which helped them to maintain there parameters in the normal range despite the noisy environment in the NICU.

Keywords – Earplug, physiological parameter, neonates, noise reduction.

INTRODUCTION

Since many years there are still ongoing research going on to reduce noise level in NICU. Many hospitals have implemented noise reduction programs in NICU by changing setting of cardiac monitors, educating health professions regarding control of noise, followed by minimal handling techniques. Noise has been shown to affect sleep patterns in healthy infants in studies. Twelve minutes after exposure, twenty percent of newborns are awakened at 65 db. All babies, however, wake up after three minutes of noise when the noise level is raised to 70dB. These effects may be exacerbated in preterm infants, implying that keeping noise levels significantly below these levels is critical for achieving restful sleep. Sleep disruption can affect infant growth and feeding patterns, and term infants exposed to higher decibels of noise have lower EEG response thresholds. Some of the

strongest support for nursery noise recommendations comes from sleep response

In India and foreign country, evidence based practiced and advancement in the machines, ventilators and giraffe incubators have changed the scenario of NICU globally, due to this there is high quality care and treatment provided to the neonates. Moreover, babies born with 28 weeks gestation are admitted in NICU the goal is to help these babies to survive. It is very challenging for the health care professionals because neonatal hearing loss (NHL) is one of the four main disorders that severely affect preterm neonates, along with cerebral palsy, intellectual disability, and vision impairment.¹ As it is mentioned that the most important time for the development of the neurosensory portion of the auditory system is between 25 weeks of gestation and 6 months of age.

Many neonates need long time follow up to the age of adolescence as they suffer from neurological, behavioral problems, hearing disorders because of high sound level in Nicu .In addition one of the studies says than due to sudden loud noise the baby had agitation, hypoxia and increased intracranial pressure so it can cause a negative impact on the child's neurological system Structural aspects required for audition are well developed by 20 weeks of gestation. A functional vestibular system develops by 29 weeks of gestation and that the fetus is able to hear, is indicated by observations of blink-startle responses to vibro-acoustic stimulate on during antenatal ultrasonography around 24 weeks of gestation. Fetus can respond to auditory stimulus originating both inside and outside Therefore. an infant's hypothalamic-pituitary axis may be negatively impacted by sound levels exceeding 68 dB, which could cause disruptions to the baby's critical parameters Elevated decibel levels in the neonate generate cortisol and other stress hormones, and worsening the infants vital parameters and keeping them in the intensive care unit (NICU)

In NICU, the sound level may be increased due to several sources like infant crying alarms, ventilators, pulse oximeters. infusion pumps. Radiant warmers, staff conversation and parental visits therefore it is mandatory to reduce the noise level in nicu. When assessed the noise levels coming from technology that is frequently used in NICUs (critical care units). It was noted that the sound level increased to 73 dB with cardio-respiratory alarms, 68 dB with endotracheal suctioning, and 83 dB with telephone ringing. Marik, To protect neonates from noise pollution the use of earplugs or earmuffs can be applied in the protocols of the hospitals.

The **aim** of this study is to protect the neonates from loud sounds and prevent them from various complications in the future that can be caused due to nicu environment

METHODS

The research approach adopted for the present study was quantitative research approach. The research design used for the present study was quasi experimental control group design. In present study, the independent variable was application of earplugs. The present study setting was selected as per need and criteria. The research study was done in selected areas of Sangli- Miraj- Kupwad Corporation area. Population of the study were 0-28 days old neonate admitted in NICU. The target population of the study was 0-28 days old neonates admitted in

neonatal intensive care unit of Sangli- Miraj Kupwad Corporation area. The accessible population of the study community areas at Sangli- Miraj Kupwad Corporation area. The samples were 0-28 days neonates who are admitted in Nicu from Sangli. Miraj, Kupwad corporation area

Inclusion criteria were Neonates of age between 2 to 28 days, Neonates with Gestational age between 32 to 37weeks, Neonates with Birth Weight of 1.5 to 2.5 kg, Mothers those who are willing to participate in the study, Neonates with normal hearing. The exclusion criteria were Neonates with auditory system involvement like undeveloped external ears and hearing loss,

Neonates who are critically ill. Mothers who are not willing to give consent. Neonates who are suspected for intracranial hemorrhage. The sample size was obtained using Cochran's formula The sample size comprised of 100out of which 50 were in experimental group and 50 were in control group. convenient sampling technique was used in this study. The data collection tool included development of tool along with observational checklist . Development of tool was done based on the study objectives. Data collection tool was prepared by doing extensive review of literature. After an extensive review of literature, referring the books and journals, abstracts, research articles, discussion with guide and expert opinions the tool was developed for the data collection. The tool was divided into 2 sections

Section-1- Demographic variable

Section -II Observation checklist for assessing physiological parameters

To ensure the content validity of the tool, the tool was submitted to experts. With suggested corrections needed changes were done after the discussion with guide and final tool was prepared. Along with that, . Complete research proposal along with data collection tool was presented in front of research committee for approval. Approval was given by Institutional ethics committee of Bharati Vidyapeeth (Deemed to be) university, College of Nursing, Sangli. Permission was obtained to conduct pilot study and main study. Informed written consent was obtained from each parent of neonates prior to conducting the study. Data was collected from 100 neonates who met the study criteria The collected data was encrypted, organized, analyzed, and explained using explanatory statistics. Tables and graphs are used to illustrate results

RESULT

Based on the objectives of the study, analysis and explanation of the results were presented in following sections:

- SECTION 1: -Frequency and percentage distribution of Demographic variables
- SECTION II: - Pretest and post test score of physiological parameters
- SECTION III: -Comparison of posttest score between experimental and control group

Table-1 SECTION 1: -Frequency and percentage distribution of Demographic variable (n=50 + 50)

Variables		Experimental group		Control group	
		frequency	Percentage	frequency	Percentage
Age	1 to 10 Days	46	92	46	92
	10 to 20 Days	4	8	4	8
Gestation in weeks	32 - 34	25	50	25	50
	35 - 37	25	50	25	50

Shows that maximum percentage of neonates were in the age group between 1 to 10 days in the both the group that is 92% in control and experimental group respectively as compared to the age group between 10 to 20 days. Gestational in weeks equal number of percentages is seen in both the group that is 50% in experimental and control group.

PRE AND POST TEST SCORE OF PHYSIOLOGICAL PARAMETERS IN CONTROL GROUP

TABLE 2.1 PRE AND POST TEST SCORE OF PHYSIOLOGICAL PARAMETERS IN CONTROL GROUP
(n = 50+50)

VARIABLES	CONTROL GROUP Pretest			CONTROL GROUP Posttest		
	M	SD	Pvalue	M	SD	Pvalue
Temperature	36.71	0.2089	0.5011	36.67	0.3120	0.9453
H/R	145.12	12.2013	0.8178	150.10	18.0150	0.7358
R/R	49.62	5.8649	0.3790	54.00	6.3419	0.4446
SPO2	95.94	1.5517	0.9481	94.74	2.1864	0.2964

There is no statistical difference as p value for physiological parameters is greater than 0.05 . So, it does not show any significant difference in physiological parameters such as Temperature, Heartrate, Respiratory rate and spo2.

PRE AND POST TEST SCORE OF PHYSIOLOGICAL PARAMETERS IN EXPERIMENTAL GROUP

TABLE N0.2.2 PRE AND POST TEST SCORE OF PHYSIOLOGICAL PARAMETERS IN EXPERIMENTAL GROUP n=(50+50)

VARIABLES	EXPERIMENTAL GROUP Pretest			EXPERIMENTAL GROUP Posttest		
	M	SD	Pvalue	M	SD	Pvalue
Temperature	36.73	0.2238	0.5011	37.14	0.1758	<0.0001
H/R	148.28	11.9791	0.8178	126.18	10.0423	0.0054
R/R	52.08	6.4197	0.3790	42.82	4.6543	0.9980
SPO2	96.18	1.6868	0.5118	99.40	0.5406	<0.0001

There is significant difference in physiological parameters after the intervention in all the variables like Temperature, Heartrate, Respiratory rate and spo2 so the intervention is effective

TABLE 3 COMPARISION OF POST TEST SCORE BETWEEN EXPERIMENTA L AND CONTROL GROUP
(n=50+50)

Parameters	Group	Mean	SD	t value	P value	Result
Temp	Exp	37.26	0.0286	11.08347	< 0.0001	Significant
	control	36.66	0.1150			
H/R	Exp	123.12	79.6514	-13.633	< 0.0001	Significant
	control	152.14	143.9188			
R/R	Exp	42.90	24.5408	-10.3319	< 0.0001	Significant
	control	55.14	45.6331			
SPO2	Exp	99.69	0.2168	16.20465	< 0.0001	Significant
	cntrol	94.34	4.9966			

The mean temperature of experimental group is more than control group after the intervention Heart rate and respiratory rate is less in experimental group after the intervention as compared to control group The spo2 is more in experimental group as compared to control group. This shows that the Temperature is increased H/R and R/R is decreased and spo2 is increased after intervention hence the intervention is effective

DISCUSSION

The findings of present study have been discussed as per the objectives of the study. The finding of the study shows that the intervention of application of earplugs on physiological parameters is significantly effective on neonates admitted in nikuman when compared together it was statistically found that there is highly significant difference among the experimental and in control group. A similar kind of study was conducted to evaluate the effect of earplugs on physiological parameters on the preterm infants during nebulization therapy of Emanuel University hospital (kasr Al Ainy) Egypt (2018). A quasi-experimental group studies 30 infants were involved in control group and later in experimental group there was a mean change in heart rate oxygen saturation systolic and diastolic BP and Respiratory rate during and after a nebulization session ($p < 0.000$)

In present study total mean of control group in the selected parameters shows that there is reduction in mean of Temp and spo2 and more in H/R and R/R during the posttest. While. mean of experimental group was seen high in Temp and spo2 and low in H/R AND R/R. The p value is < 0.0001 which is highly significant so the intervention is effective in experimental group than control group.

According to the tested values Null hypothesis is rejected. means there is significant change in physiological parameters after the application of earplugs in experimental group, in comparison there was highly significant difference in Temperature. Heart rate. Respiratory rate and spo2

Similarly, DaWanda et al in 2022 titled the effects of earmuffs and earplugs used on preterm infants towards oxygen saturation an pulse who studied the impact of earplugs on vital signs in the Nicu documented that the linear elevated in the Heart rate was significantly decreased within the earplugs group as compared with control group during intervention ($138.15 \pm 15.91, 147.53 \pm 16.94$).

CONCLUSION

In the present study the effects of earplugs on selected physiological parameters were assessed before and after application of earplugs in control and experimental group. findings of the study clearly indicates that there was significant difference in all the parameters like Temp heartrate, respiratory rate, and spo2 in experimental group than in control group Hence the hypothesis is rejected at 0.05 level of significance.

As the study found that application of earplugs on physiological parameters is effective in reducing the physiological parameters. However., The application of the earplugs must be done during the morning hours which is the busiest time in the NICU and also should be included as a routine care. The study supports that pediatric nurses need to accept the effects of noise on physiological parameters in neonates and identification of appropriate intervention like earplugs to improve the physiological parameters. To incorporate them in their daily practice a educational programmed is needed to to raise awareness among the nurses working in the NICU and other health care providers.

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