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RESEARCH ARTICLE

EFFECT OF BREASTMILK FEEDING ON PAIN DURING HEEL STICK PROCEDURE AMONG LATE PRETERM NEONATES

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ABSTRACT

Background and Objectives: Infants born preterm are particularly vulnerable to procedural stress and pain exposure during neonatal intensive care unit stay at a time of rapid and complex brain development. The low tactile threshold in preterm infants when they are in NICU renders them more vulnerable to the effects of repeated diagnostic and therapeutic invasive procedures. The aim of present study was to assess the effect of breast milk feeding on pain during heel stick procedure among late preterm neonates. **Materials and methods:** A randomized clinical trial was adopted with random sampling to select 128 late preterm neonates who fulfilled the inclusion and exclusion criteria. Infants were randomized to control and experimental groups. For the neonates in the control group, PIPP assessment had done 15 minutes before heel stick and repeated 5 and 15 minutes after the procedure. For the neonates in the experimental group, baseline pain assessment had done 15 minutes before heel stick procedure. Direct breast milk feeding or Paladai feed of 5 ml expressed breast milk of own mother provided 5 minutes before heel stick procedure. Pain score assessed 5 minutes and 15 minutes after the heel stick procedure using Premature Infant Pain Profile (PIPP). For analysing the data, descriptive statistics (frequency, percentage, median, and interquartile range) and inferential statistic (Mann Whitney u test, Pearson chi-square) were used. All the statistical significance were carried out at 5% level of significance. **Result:** The comparison of median pain scores between control group and experimental group, 15 minutes before and 5 minutes and 15 minutes after heel stick procedure showed that 15 minutes before heel stick procedure median pain score in control group and experimental group were 1 (1, 1) and 1 (0.5, 1) respectively with a statistical significance p=0.864. 5 minutes after heel stick procedure in control group median pain score was 6 (5, 6), where as in experimental group median pain score was 3 (2, 4) with a statistical significance of p<0.001. 15 minutes after heel stick procedure in control group and experimental group median pain scores were 2 (2, 3) and 2(1, 2) respectively with a statistical significance of p<0.001. **Conclusion:** The study concluded that breastmilk feeding is effective in reducing the pain during heel stick procedure among late preterm neonates. Breastmilk feeding can be adopted as a cost effective and non-pharmacological measure during heel stick procedure among late preterm neonates.

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INTRODUCTION

Alleviation of pain, is a basic right of every individual irrespective of age or size. Premature and sick infants often experiences multiple therapeutic as well as diagnostic painful procedures while hospitalized. Neonates admitted to Neonatal Intensive Care Units (NICU) frequently experiences pain and discomfort commencing with multiple iatrogenic painful procedures such as; blood collection for sugar, bilirubin, venepuncture, Vitamin K injection etc. Hospitalized neonates undergo 10 to 14 painful procedures per day, with as many as 53 procedures being reported during the first two weeks of life.

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Preterm neonates, they are more sensitive to the pain and stress associated with the iatrogenic procedures, which cannot be distinguished from neonates. Emerging studies provide convincing clinical evidence for an adverse impact of neonatal pain or stress in infants at a time of physiological immaturity, that it may influence the developing brain and thereby neurodevelopment and stress- sensitive behaviour. Kangaroo mother care, breastfeeding, soft music, skin to skin contact and cuddling the baby, will help in decreasing the stress to the baby during painful procedure. Among these breast feeding is convenient, cost effective, require less time and skills.

MATERIALS AND METHODS

A randomized clinical trial was carried out to study the effect of breast milk feeding on pain during heel stick procedure among

late preterm neonates in the Neonatal intensive Care unit, JIPMER, Puducherry.

Inclusion criteria: Preterm neonates admitted in NICU and post-natal ward, JIPMER. Preterm neonates of 34-36 weeks of gestational age.

Exclusion criteria

- Preterm neonates who were sick.
- Preterm neonates with major congenital malformation.

Sampling: Random sampling technique was used.

Instruments: The data collection proforma consisted of two parts:

Section A: Clinical characteristics.

Dealt with clinical characteristics of late preterm neonates. It included five variables- age, gender of the baby, gestational age, birth weight, Apgar score of the baby at 5 min.

Section B: Premature Infant Pain Profile.

The Premature Infant Pain Profile was developed by Stevens B, Johnston C, Petryshen P, Taddio A in 1996. The indicators were gestational age, behavioural state, heart rate, oxygen saturation and facial actions. The indicator, facial actions had three component such as brow bulge, eye squeeze and naso labial furrow. The above data's were collected by the investigator using observation technique.

Data collection procedure

The study was approved by Nursing Research Monitoring Committee, JIPMER and the Institute ethical committee (Human studies). Data collection period was 6 weeks. The study was conducted in NICU and postnatal ward JIPMER. Late preterm neonates were assigned to experimental group and control group randomly. Clinical characteristics such as age, gender, gestational age, birth weight and APGAR score were collected from the patient case sheet for both control and interventional groups. For the neonates in the control group, PIPP assessment had done 15 minutes before heel stick and repeated 5 and 15 minutes after the procedure. For the neonates in the experimental group, baseline pain assessment had done 15 minutes before heel stick procedure. Direct breast milk feeding or Paladai feed of 5 ml expressed breast milk of own mother provided 5 minutes before heel stick procedure. Pain score assessed 5 minutes and 15 minutes after the heel stick procedure using Premature Infant Pain Profile (PIPP).

Ethical consideration

Ethical clearance was obtained from the Institute Ethical Committee and human studies JIPMER. Consent obtained from the parents prior to the data collection by the investigator. Assurance was given to the parents regarding the confidentiality and anonymity of study subjects.

Data Analysis

Descriptive statistics (frequency, percentage, interquartile range) and inferential statistics (Pearson chi-square test and Mann Whitney u test) were used. The distribution of categorical variables such as gestational age, Apgar score, birth weight, age and gender had been expressed in terms of frequency and percentage. The distribution of discrete or continues variables such as pain had been expressed in terms of medina with interquartile range. The effect of intervention on pain had been interpreted out by using Mann Whitney u test. The association of level of pain with categorical variables mentioned above had been carried out using Pearson chi-square test. Data analysis was performed in SPSS version 20. All the statistical analysis had been carried out at 5% level of significance.

RESULTS

The study findings are summarized below:

- Among the 128 study participants, 73 (57%) were males and 55 (43%) were females.
- Majority of the late preterm neonates 48 (37.5%), 46 (35.5%) were born in a gestational age of 34 weeks + 6 days and 35 weeks +6 days respectively.46.1% late preterm neonates belonged to the age category of 1 day, whereas only 2.3% were at an age of 0 day. Out of the 128 study participants 120(93.8%) had been categorized into a birth weight of 1-2.49kg. Only 8 (6.3%) were above 2.50 kg. Regarding Apgar score 126 (98.4%) of the participants had a score of 9.
- In control group before heel stick procedure the median pain score was 1 (0.5, 1). 5 minutes after the procedure pain score was 6 (5, 6). 15 minutes after the procedure pain score was 1 (1, 2).
- In experimental group before heel stick procedure the median pain score was 1 (1, 1). 5 minutes after the procedure pain score was 3 (2, 4). 15 minutes after the procedure pain score was 2 (2, 3).
- The comparison of median pain scores between experimental and control group showed that, 15 minutes before heel stick procedure median pain score in control group and experimental group were 1 (1, 1) and 1 (0.5, 1) respectively with a statistical significance of p=0.864. 5 minutes after heel stick procedure in control group median pain score was 6 (5, 6), where as in experimental group median pain score was 3 (2, 4) with a statistical significance of p<0.001. 15 minutes after heel stick procedure in control group and experimental group median pain scores were 2(2, 3) and 2 (1, 2) respectively with a statistical significance of p<0.001.
- There was no significant association between the level of pain & clinical characteristics.

Analysis and Interpretation

Table 1. Clinical characteristics of late preterm neonates

Variables		Frequency (No)	Percentage (%)
Gender			
Male		73	57
Female		55	43
Gestational age			
34 weeks + 6 days		48	37.5
35 weeks + 6 days		46	35.9
36 weeks + 6 days		34	26.6
Age in days			
	0	3	2.3
	1	59	46.1
	2	39	30.5
	3	14	10.9
4 days or more		13	10.2
Birth weight			
1-2.499 kg		120	93.8
>=2.50 kg		8	6.3
APGAR Score			
	8	2	1.6
	9	126	98.4

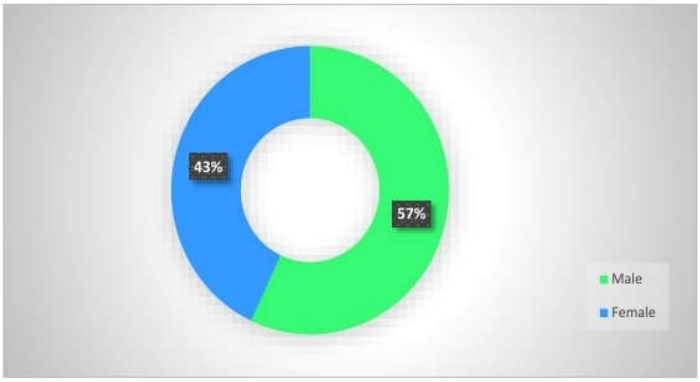

Figure 1. Gender distribution of participants

Table 2. Level of pain among late preterm neonates during heel stick procedure in control group

Categories	15 min (before)		5 min (after)		15 min (after)	
	Frequency (No)	Percentage (%)	Frequency (No)	Percentage (%)	Frequency (No)	Percentage (%)
No pain to minimal pain	64	100	51	79.7	64	100
Minimal to moderate pain	0	0	13	20.3	0	0
Severe pain	0	0	0	0	0	0

Table 3. Level of pain among late preterm neonates in experimental group

Categories	15 min (before)		5 min (after)		15 min (after)	
	Frequency (No)	Percentage (%)	Frequency(No)	Percentage (%)	Frequency(No)	Percentage (%)
No pain to minimal pain	64	100	64	100	64	100
Minimal to moderate pain	0	0	0	0	0	0

Table 4. Comparison of median pain scores between control group and experimental group

Parameter	Control Group		Experimental Group		p Value
	Median	Interquartile Range	Median	Interquartile Range	
Pain score 15 minutes before heel stick	1	0.5,1	1	1, 1	0.864
Pain score 5 minutes after heel stick	6	5, 6	3	2, 4	<0.001
Pain score 15 minutes after heel stick	2	2,3	2	1,2	<0.001

Table 5. Association between level of pain 5 minutes after heel stick procedure and clinical characteristics of late preterm neonates in control group

Variables	Level of pain				Statistical significance (p)
	No pain to minimal pain		Minimal pain to moderate pain		
	Frequency (No)	Percentage (%)	Frequency (No)	Percentage (%)	
Gender					
Male	29	82.9	6	17	0.489
Female	22	75.9	7	24.1	
Gestational age					
34 weeks +6 days	23	76.7	7	23.3	0.086
35 weeks+ 6 days	14	70.0	6	30.0	
36 weeks+ 6 days	14	100.0	0	0.0	
Birth weight					
1-2.49	49	79.0	13	21.0	0.468
>=2.50	2	100.0	0	0.0	

DISCUSSION

The study results showed that there was significant reduction in pain score of the late preterm in the breast milk feeding group and there was no significant association between the level of pain & clinical characteristics like gender, age, gestational age, Apgar score and birth weight.

The above findings were supported by the following studies:

- Osinaike et al. conducted a prospective clinical trial in 2013 to evaluate the analgesic effect of breastfeeding during venipuncture. They found that the median pain score (interquartile range) of the neonates when breastfed was 1.50 (1–2), and 4.00 (2–6) when not breastfed. The statistical significance was <0.001.25
- Codipietro et al. conducted a randomized control trial in 2008 to compare the efficacy of breastfeeding versus orally administered sucrose solution in reducing pain response during blood sampling through heel lance. Median Premature Infant Pain Profile scores were lower in the breastfeeding group (3.0) than in the sucrose-solution group (8.5), and the median group difference was -5.0. The median heart rate increase, oxygen saturation decrease, and duration of first cry for the breastfeeding group were, respectively, 13.0, -1, and 3

and for sucrose group were 22, -3, and 21. Median pain score was significantly different between the groups ($p<0.01$).

Conclusion

Breast milk feeding is an effective method of managing pain in late preterm neonates during heel stick procedure. Feeding with breast milk before heel stick procedure is a low cost intervention that can be effectively used in children and also can be easily implemented in NICU.

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