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REVIEW ARTICLE

EFFECT OF NESTING ON PAIN DURING HEEL -STICK PROCEDURE AMONG TERM NEONATES: A PROSPECTIVE CLINICAL TRAIL

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ABSTRACT

The essential criterion of neonatal intensive care unit is prevention of pain among preterm and term neonates. Evidences suggested that a painful procedure at early life affects the neuro developmental outcome in their future. Though it is a minor procedure like heel prick or changing diaper, neonates perceive it, as a painful procedure. Neonatal pain management is an important nursing care aspect while they care the babies in intensive care units. Some pain relieving measures like kangaroo mother care, facilitated tucking, music therapy are available, it is under used. The current study was carried out to assess the effect of nesting on pain during heel stick procedure among term neonates, JIPMER, Puducherry.

Methods: This is a prospective clinical trial study. The target population of the study was the term neonates who undergo two times heel prick procedure either in post natal ward or neonatal intensive care unit of WCH, JIPMER, Puducherry. All the available term neonates who got admitted in post natal ward and neonatal intensive care unit of WCH during the study period were the study population. Seventy three term neonates who fulfilled the inclusion and exclusion criteria were participated in this study. The pain was assessed by using standardized tool- Neonatal Infant Pain Scale (NIPS). For analyzing the data, descriptive statistics (frequency, percentage, median and inter quartile range) and inferential statistics (wilcoxson signed rank sum test, Fishers exact test) were used. All the statistical analyses were carried out at 5% level of significance.

Results: Among 73 term neonates, during heel prick without nesting, 39(53.4%) of term neonates had severe pain, 3(4.1%) had mild to moderate pain and 31(42.5%) of term neonates had no to mild pain. During heel prick with nesting, majority of term neonates 39(53.4%) had no to mild pain and only 2(2.7%) of term neonates had mild to moderate pain remaining 32(43.8%) of neonates had severe pain. The pain score median (inter quartile range) of neonates without nesting was 6(2, 7) where as with nesting it was 2(1,6).Though the percentage of neonates without nesting who had severe pain 39(53.4%) had been decreased to 32(43.8%) with nesting, the statistical significance was $p>0.05$.There was no association between level of pain with selected demographic variables such as gender & birth weight.

Conclusion: The present study revealed that all the neonates who undergone heel stick procedure had pain. Though nesting provided comfort to the baby by reducing pain during heel prick, there was no statistical significance. There is no significant association between the level of pain and the selected demographic variables. Hence many studies should be conducted in future to find a method to relieve pain among neonates during painful procedures.

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INTRODUCTION

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage (Merskey, 1979). Even healthy term neonates in their first week of life are exposed to painful stimuli during their routine care in hospital. Term neonates who are born to gestational diabetic mothers& diabetic mothers, term neonates with IUGR& low birth weight are undergoing heel prick for their blood glucose estimation during the first 48 hours of life. In a prospective study, they found that approximately neonates admitted in neonatal intensive care unit (NICU) undergo to a mean ±SD of 14±4 procedures per day. During the first of admission, neonates exposed to multiple painful procedures for their monitoring. The investigators found that analgesic therapy was given less than 35%of neonates per day, while 39.7% of neonates hadn't received any analgesic therapy (Sinno, 2003). Capillary blood sampling of term neonates via heel prick is a common procedure which is carried out by most

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of the pediatricians. In heel prick, a small incision is made using needle or lancet and a drop of blood is collected on a card or stick. It is indicated routinely in national screening of neonates for phenylketonuria (PKU) and congenital hypothyroidism. It is also used for obtaining blood glucose value in suspected or known hypoglycemic babies and for serum bilirubin estimation in certain cases of jaundice (Corbett, 1998). Neonates perceive the pain in the same way as adults. But their responses to pain are quite different from adults. Even simple procedures like changing nappy also induce discomfort for the neonates. Owing to a variety of reasons, assessment and management of neonatal pain for various procedures still lacking (Mathew, 2003). Pain management for preterm and term neonates are not well established till now. Though we achieved a lot in past few decades, we still behind in the management of neonatal pain. Neonates including premature babies exhibit various physiologic, hormonal, metabolic and behavioral responses to invasive procedures that are more notable compared to adult responses (Gardner, 2011). Though many studies were carried out for past two decades on pain and pain control among neonates, the clinical practice of pain control measures among neonates who exposed to painful procedures remains suboptimal. In an exploratory search of Medline& Lilacs, it was found that many non pharmacological interventions were shown to be effective in reducing the pain of neonates with less risk and less cost. Some of the interventions detailed in the literature were non nutritive sucking, KMC (Kangaroo Mother Care), facilitated tucking, breastfeeding and nesting (Anand, 2005). Hence the healthcare professionals should utilize these methods to ensure the qualified and tender loving care to the neonates. Among these nesting is considered as one of the cheapest and safe method of measure for providing comfort to the baby.

Nesting not only serves as a comfort measure but also helps in good positioning for neonates especially preterm neonates. It resembles uterus and provides in utero feeling for the baby. When babies positioned well in nest, it prevents the dislocated hips for preterm neonates and they get their fingers and hands to their mouth for sucking and hand clasping. It promotes muscle development and helps them to feel secure. Strategies to manage pain due to surgery, illness and major procedures exist, but means to prevent or reduce pain from diagnostic procedures including heel lance and venepuncture have been lacking till now. Nesting is convenient, cost effective requires less time and skills. Hence it is easy for the healthcare professionals to utilize the procedure for term babies to reduce pain during heel stick procedure. American Academy of Pediatrics in 2016 has updated its recommendations pertaining to neonatal pain management. The recommendations include: All health care units rendering neonatal care must have written guidelines for neonatal pain preventive measures and it consists of reducing the number of painful procedures. Feasible tools which are validated for pain assessment should be brought in practice and pain has to be assessed before, during and after painful procedures. In case of mild and less severe pain which is short term, non pharmacological pain methods can be utilized such as non nutritive sucking, swaddling, massage and skin to skin contact. These non pharmacological interventions could be utilized for mild to moderate painful procedures such as heel lance and intravenous catheterization (Motta, 2015). Comaru et al. conducted a randomized crossover clinical trial in 2009 among preterm neonates to assess the effects of postural support (nesting) protocol on physiological and behavioral stability during diaper change in Brazil. Forty babies were included in the study by using simple random sampling. All preterm neonates displayed increased distress and pain score during diaper changes. However the nested preterm neonates had shown decreased distress score (3.7±3.1) and pain score (3.3±3.9) compared with non nested preterm neonates distress score(5.0±3.9) & pain score (5.8±5.1). Hence, it concluded that providing postural support (nesting) during diaper change decreases the distress and pain ($p<0.0001$) among preterm neonates (Stein, 2016).

MATERIALS AND METHODS

A prospective clinical trial was conducted to assess the effect of nesting on pain during heel stick procedure among term neonates in post natal ward & NICU of tertiary care center, Puducherry.

Sample: The sample consisted of 73 term neonates

Sampling technique: The sampling technique used for the present study was non probability sampling i.e. convenience sampling.

Inclusion criteria: Term babies who were non nested during the study period in NICU and post natal ward.

Exclusion criteria

- Term babies with major malformations
- Term babies who were sick
- Term babies who were on opioid analgesics and sedatives.

Description of Data Collection Instrument

Section-A: Demographic Proforma

Deals with demographic variables of term neonates. It included five variables- age, sex, gestational age, birth weight of the baby, Apgar score of the baby at 5 min.

Section-B: Neonatal Infant Pain Scale (NIPS)

The Neonatal Infant Pain Scale was developed by Lawrence, Alcock, McGrath, Kay, MacMurray & Dulberg in 1993.

Description of Intervention: Nesting had been made with the use of big towel. The towel was rolled up and fixed with plasters to form an oval shape**.** Inside the oval shape, neonates had been kept for forty five minutes. The neonates had been kept in side lying position and their both upper & lower limbs brought towards midline. Like a boundary, the nest supported the neonates head, body, back, limbs and feet.

Ethical consideration: Permission was obtained from the institute (JIPMER) ethical committee, human studies. Consent was obtained from parents of neonates before starting data collection by the investigator. Assurance was given to the parents regarding the confidentiality and anonymity of study subjects.

Data Collection Procedure: The study was approved by the research monitoring committee, JIPMER and Institute Ethics

Committee (Human studies). The investigator introduced themselves to the mothers of term neonates who were not nested and rapport was established. The purpose of the study was explained to them. It was assured to them that all data will be strictly confidential and will be used only for the study purpose and consent was taken from them. Information like age, gender, gestational age, birth weight and Apgar score were collected from the case sheet. The heel prick was performed by a person not involved in the study with the use of 26 gauge needle. Among neonates who underwent first time heel prick without nesting, pain was assessed thirty minutes before the procedure, during the procedure, five and ten minutes after the procedure using NIPS. For the same neonates when they underwent second time heel prick, thirty minutes before the procedure pain was assessed and then nesting was initiated for the neonates and pain was assessed during the procedure, five and ten minutes after the procedure using NIPS.

Table 1. Demographic characteristics of term neonates

(N=73)

Variables	Frequency	Percentage (%)
Gestational Age		
37-38 weeks	34	46.6
39-40 weeks	35	48.0
41-42 weeks	4	5.5
GENDER		
Male	34	46.6
Female	39	53.4
Age In Days		
1	10	13.7
2	28	38.4
3	26	35.6
≥4	9	12.3
Birth Weight		
1.5-2.49 kg	43	58.9
≥2.5 kg	30	41.1
Apgar Score		
6	1	1.4
7	4	5.5
8	5	6.8
9	62	84.9
10	1	1.4

Data Analysis

Both descriptive and inferential statistics were used to analyze the data. The distribution of categorical variables such as gestational age, Apgar score, birth weight, age & gender had been expressed in terms of frequency and percentage. The distributions of discrete/continuous variable such as pain had been expressed in terms of median with inter quartile range. The effect of intervention on pain had been carried out by using Wilcox son's signed rank sum test. The association of level of pain with categorical variables mentioned above had been carried out using Fishers exact test. Data analysis was performed in SPSS version 22. All the statistical analysis had been carried out at 5% level of significance.

RESULTS AND DISCUSSION

Among 73 term neonates, during heel prick without nesting, 31(42.5%) of term neonates had no to mild pain, 3(4.1%) had mild to moderate pain whereas 39(53.4%) of term neonates had severe pain. With nesting during heel prick, majority of term neonates 39(53.4%) had no to mild pain and only 2(2.7%) of term neonates had mild to moderate pain, remaining 32(43.8%) of neonates had severe pain. On comparing the median (inter quartile range) pain score during heel prick without nesting is 6 (2, 7) and with nesting is 2(1, 6), but it is not statistically significant. No studies had been conducted on effect of nesting on pain during heel prick among term neonates. However some studies were done on assessing the effect of nesting on pain during diaper change and screening for retinopathy of prematurity among preterm neonates. But those study results were contradicting the present study results. Comaru et al.conducted a randomized cross over trial in 2009 to evaluate the effect of nesting during diaper change in Brazil. They found that the mean distress score without nesting was 5.2±3.2 which reduced to 1.8±2.7 with nesting. The mean pain score without nesting was 5.1±4.7 which is decreased to 1.6±2.7 with nesting. The statistical significance was $p<0.0001$.[10]

Table 2. Comparison of median pain score during heel prick without nesting & with nesting among study participants

(N = 73)

Pain during heel prick	Median	Inter quartile range	$ statistical significance(p)
Without Nesting	6	2,7	0.122*
With Nesting	2	1,6	

$ Wilcoxon Signed Rank Sum Test, p>0.05.

Conclusion

The present study was conducted among seventy three term neonates in JIPMER, Puducherry. The baseline pain was assessed using Neonatal Infant Pain Scale thirty minutes before heel prick. Again pain was assessed during, five and ten minutes after heel prick both with and without nesting. Without nesting, the median pain score was 6 (2,7) which has been reduced to 2 (1,6).These results proved that though the level of pain has reduced with nesting, it was not statistically significant. The level of pain is not influenced by demographic variables either with nesting or without nesting. The introduction of pain relieving protocol for term neonates is essential in neonatal intensive care units. Though the present study showed reduction of pain with the use of nesting, it had no statistical significant difference and it can be used as a measure for improving physiological parameters and motor system development among preterm neonates.

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