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Research Article

Effectiveness of pre recorded maternal voice on neonates undergoing painful routine procedures in NICU

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Introduction

As a result of different diagnostic and therapeutic interventions or as a result of disease conditions neonates frequently experience pain. Evidence shows that new-born infants can feel pain and remember it but they cannot verbalize their pain experience and depend on others to identify, assess and manage their pain.^[1] Neonates in the neonatal intensive care unit (NICU) need to undergo numerous painful procedures. The repetition of the pain of these procedures is also now known to have deleterious effects ^[2].

New-born infants experience acute pain with various medical procedures during the period of hospital stay. Neonates use different ways to respond pain stimuli like crying, body and facial expressions. The facial expressions reflect specific and effective painful experiences. Facial expressions of pain includes lowered brows drawn together, squeezed eye, deep forehead creases, opening of lip, stretching of mouth, tongue tightening, lip pursing and voice trembling^[9] Controlling pain in new-born is very essential and beneficial as it can improve physiologic, behavioural and hormonal outcomes.

Neonatal pain response and effective management of neonatal pain, these areas are not getting much attention. Very few studies have been done till now regarding the non-pharmacological measures of pain management for neonates. Many studies show the evidence that providing dextrose as oral pacifier to the child during painful procedure can help reduce pain and it consistently reduces behavioural responses of cry duration ^[4].

Today, non-medicinal pain relief methods have attracted nursing systems as well as patients. In addition, these kinds of interventions are effective, simple and safe, and do not depend on specific time or costly equipment. Also, non-medicinal pain relief techniques are free of medicinal complications.^[5] Neonates at just 3 days of age, can recognize mother's voice and heart beats, which affect positively on their physiologic and behavioural responses. They are able to differentiate their own mother's voice from other voice and it is no surprise that child prefers its mother's voice to those of strangers.^[6]

There are several studies on effect of auditory stimuli such as recorded music, live song on premature babies which showed a reduction in stress and improvement in unstable vital signs and physiologic performance. The neonates exposed to his/her own mother's voice has lower heart rate, higher sucking rate, more relaxed look and less crying and bodily motions. In stressful situations a mother's voice can soothe the baby by reducing the level of cortisol, the stress hormone and increasing level of oxytocin, the social bonding hormone.^[7]

There are advanced and effective methods for controlling the pain caused by surgery and major procedures in neonates; while, there aren't any appropriate pain control method for minor procedures. Therefore, appropriate pain reduction techniques should be employed during painful procedures.^[8] Currently in NICU of present setting babies are receiving gauze soaked dextrose during any painful procedure which act as a good oral pacifier to reduce the pain in new-born babies. Several studies have revealed exposing babies to auditory stimuli in form of music can also have a positive impact on pain reduction in new-born babies during procedures, hence the present study aims to compare the effectiveness of maternal voice with routine existing practice on pain response of the neonates who need to undergo some painful procedure in NICU

Method

The goal of the study was to assess effectiveness of pre-recorded maternal voice on pain response of neonates undergoing painful routine procedure in NICU. The babies who were born at gestational age>28 weeks, undergoing blood sampling and clinically stable with normal audiometry function were eligible for blood sampling events. The babies who were with respiratory support, affected by pathological condition and congenital anomalies, hearing loss (BOA) and receiving pain medication or analgesic drug treatment were not selected for blood sampling. In this study only blood sampling with 24-26 gauze needle was included for sample to maintain homogeneity of sample, all other blood sampling procedures like iv cannulation, heel prick, capillary filling were excluded because pain perception is different in each type of procedures.

Behavioural observation assessment tool was used to check the auditory function of new-borns Mothers who were coming for giving KMC to their babies, or expressing breast milk for feeding were selected for recording of voice, Permission with informed consent was taken from mothers. In NICU counselling room mothers were made seated comfortably and asked to sing a lullaby or any soothing talk for their own babies. With sound level intensity maintenance between 45-60 Dba using BENETECH sound level meter mother's voices were recorded and played using a SONY tape recorder.

In intervention group maternal voice was played 5 min during and 5 minutes after the painful procedures. In control group baby was provided with gauze soaked in dextrose solution during painful procedures. Data was analysed using SPSS 19. Independent and dependent't' test were used to compare mean difference of pain response between during sampling and after sampling score.

Ethical permission was taken from institutional Ethical Committee and Department of Neonatology. The tool reliability was checked using rater interrater reliability(r=0.82).

Findings

The analysis of the data was done based on the objective of the study, i.e. to evaluate the effectiveness of pre-recorded maternal voice for neonates undergoing painful routine procedures. The presentation of the analysed data was as follows:

Variables	Frequency(f)	Percentage(%)			
Age of the baby(in days)					
0-10	9	9			
20-30	1	10			
Gender					
Male	9	90			
female	1	10			
Gestational age					
SGA	10	100			
Birth weight					
LBW	8	80			
VLBW	2	20			
Mode of delivery					
Elective LSCS	3	30			
Emergency LSCS	6	60			
Other	1	10			
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Majority 90 %(9) of the babies were between 0-10 days of age and 1 %(1) was between 20-30 days of age group. Majority of the babies were male (90%) and only 10% was female baby. All the babies (100%) were small for gestational age. Most of the babies 8(80%) were LBW and only 2 (20%) were VLBW. Out of all respondents 3(30%) had elective LSCS, 6(60%) had emergency LSCS and only 1(10%) had other mode of delivery.

Pain score	During sampling	After sampling	Mean differences	р	t
Control	3.52±0.81	3.05±0.59	0.47	0.021	2.12
Intervention	3.52±0.81	3.15±0.43	0.42	0.001	2.12

n(40)=2.02, p<0.05

Both maternal voice and dextrose solution are effective in reducing pain response of neonates during blood sampling

Table 2 Comparison of pain score during and after blood sampling within control and interventiongroup

variables	Intervention group n=21	Control group n=21	Test statistics p value
Post score	3.15±0.43	3.52±0.81	t=2.12 p=0.001

p<0.001

Post score in intervention group was 3.15 with that of control group which is 3.5, to test the significant difference paired t tests was computed which indicated the pre post score receiving maternal voice was significantly and clinically lower than those received routine care

Table 3 Effectiveness of maternal voice on pain response of new-borns

Discussion and conclusion

This study aimed to assess the effectiveness of maternal voice on pain response of new born during painful blood sampling. Addition of recorded maternal voice during blood sample collection resulted in decrease in pain perception of neonates. Mean pain score showed a significant reduction in intervention group than control group. Both the intervention were effective in decreasing the pain response in new-born during sample collection but with comparison to the control group i.e. dextrose solution group the intervention group i.e., maternal voice group has responded well to the pain stimuli during blood sampling procedure. Neonates were more calm and consolable during sampling when they were exposed to their own mother recorded voice. The result clearly indicated that maternal voice was more significant non- pharmacological pain control intervention than dextrose solution.

A study conducted by Oh et al evaluated the effect of hearing music on response to pain during needling concluded that the music group has lower NIPS score than control group ($5.6\pm1.1 \text{ vs.} 6.5\pm0.7$, p=0.006). [9]

A similar study by Lowey et al also concluded that music intervention significantly reduced in the frequency and duration of episodes of inconsolable crying and improved physiological measures including heart rate, respiratory rate, and oxygen saturation. ^[10]

The present study is in strong support with study conducted by G Chirio whose findings indicated that infants in the maternal voice group had significantly lower PIPP scores (p=0.00002) and improvement in oxygen saturation (p=0.0283).^[11] The current practice in NICU showed usage of dextrose solution during any painful procedure on day to day practice. A study by Nora Haouari supported current practice indicated that there was a significant reduction in overall crying time and heart rate after three minutes in the babies given 50 %sucrose as compared with control group. ^[12] The study findings are also supported by Elliott M Blass, that the infants who drank 2 ml of 12% sucrose solution prior to blood collection cried 50 % less during the sampling procedure than did the control group infants who drank 2 ml sterile water.^[13]

This study limited to only one method of blood sampling and only among new-borns. The conclusion drawn from the study are music therapy was proven effective in reduction of pain response of neonates during painful stimulus. This study recommends that further studies should be conducted on music therapy as a pain management therapy for new-born babies during painful procedures in NICU. Non pharmacological management of pain can be included as part of nursing education. The intervention shall be used by nurses in NICU as part of daily care for neonates. Studies related to effectiveness of pre-recorded maternal voice in reducing response of new-borns are less in number. Hence the scope of similar studies is open to researchers which shall help the institution to start new policy.

Recommendation

This study recommends that further studies should be conducted on maternal voice as a pain management therapy for new-born babies during painful procedures in NICU. Pre recorded voice can be introduced in NICU as a non-pharmacological management of pain among new-borns.

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