Research Article

A Study to Assess the Effect of Distraction Using Rattle on Pain among Infants during IV Cannulation

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Abstract

Pain is a subjective experience and children respond to pain with behavior that depends on their age and cognitive process. The aim of this study was to assess the effect of distraction using rattle on pain among infants during IV Cannulation in Upasana Hospital, Kollam. Quantitative research approach was adopted for this study. Quasi-experimental post-test only control group design and purposive sampling technique was used to select 40 infants aged between 2 and 6 months, 20 each in the experimental group and control group at Upasana Hospital, Kollam. After obtaining consent from the concerned authorities of the hospital and participants caregiver, the study was done. Distraction using rattle provided to the experimental group for few minute during beginning to till end of the procedure. No intervention was given in the control group. Pain assessment was done by Neonatal Infant Pain Scale during procedure. The data thus collected were analyzed using differential and inferential statistics. Analysis revealed that the mean pain score of control group (5.3) was significantly higher than the mean pain score of experimental group (2.4) and calculated "*t*" value (6.74) was greater than table value (1.69) at 0.05 level of significance. There was significant association between the pain score among infants with selected demographic variables such as age in month, birth order, weight of child in experimental group and age in month, and site of cannulation in control group. Therefore, it is interpreted that the distraction using rattle among infants during IV cannulation is effective in reducing the pain.

Keywords: Effect, distraction, rattle, pain, infants, IV cannulation

Introduction

Pain is the most common reason for physician consultation in most developed countries. It is a major symptom in many medical conditions and can interfere with a person's quality of life and general functioning. Simple pain medications are useful in 20–70% of cases. Psychological factors such as social support, hypnotic suggestion, excitement, or distraction can significantly affect pain's intensity or unpleasantness.[1]

The neonate's degree of pain perception continues to be questioned. The young infant respond with total body movement associated with brief and loud crying that ceases with distraction. By the end of the 1st month of life, diffuse body response has decreased. During infancy, reflexive behavior is dominant. Between 3 and 10 months of age, infants are able to localize pain as they withdraw their limbs, stool, hiccough and neonates, infants, and children, medical attendance or admission to hospital often requires examination, investigations, treatment, or procedures that are associated with pain.[2]

Procedural pain may be for an isolated intervention, but not uncommonly a period of treatment or investigation requires a repeated number of such episodes. Pain in infants and children can be difficult to assess which has led to the creation of numerous age specific pain management tools and scores. Barriers in pain management in children are numerous and include inaccuracies regarding pathophysiological mechanisms of pain with statements such as "children do not feel pain the way adults do," fears regarding the use of pharmacological agents and deficits in knowledge of methods of pain assessment. These myths and other factors such as personal

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values and beliefs prevent adequate identification of pain for all children.[3]

Despite early studies, the current research supports that infants possess the anatomical and functional requirements to perceive pain. Recent studies also demonstrate that infants elicit certain behavioral responses to pain perception. Pain in infants, despite this data, remains untreated and often mismanaged. The most common pain measures used for the infants are behavioral. These measures including crying, facial expression, body posture, and movements. Pre-term or acutely ill infants, for example, do not illicit similar responses to pain due to illness and lack of energy. In addition, interpretation of crying in infants is especially difficult as it may indicate general distress rather than pain.[4]

Cannulation is a procedure commonly performed on children in hospital. It is assumed that such procedures cause a certain degree of pain. It may be part of a planned sequence of events and investigations or it may have to be carried out speedily in an emergency. During cannulation procedure, it is commonly seen that infants cry of pain, emotionally upsets the care giver and even the staff involved in the procedure. Thus, it is crucial to find methods to reduce pain while doing cannulation like procedures. Distraction while doing these kind of procedures will helps to relieve pain to an extent. It is important that distractor should be cheap, easily available, easily usable without any additional training, and less time consuming so that it can be used easily in busy setting well.[5]

A study was conducted at selected primary health-care centers at Mangalore, to assess the effectiveness of diversional therapy using bright color sound producing rattle during injection. Purposive sampling technique was used to select the sample and 60 samples were selected, 30 each in control group and experimental group (between 1 and 4 month). Neonatal Infant Pain Scale was used to assess the pain. The result shows that there was a significant difference between the mean pain score in the control and experimental groupwith the mean difference of 3.18. The value was 14.76 which is highly significant at 0.05 level of significance. In the post-injection pain score, the mean difference and SD of control group was 4.21 ± 1.34 and in the experimental group, it was 3.18 ± 0.8. The *t*-value was 3.68 at 0.05 level of significance. Thus, the study proved that the diversion therapy was effective in decreasing the pain level of infants receiving injection.[6]

Nurses are responsible for assessing the infant's pain and making an appropriate decision on pain management method. During the clinical experience of the investigator, it was observed that infants who undergone IV cannulation had intense pain and distress. The investigator noted that using distraction technique, the distress and cry of the child have reduced during the procedure. In the present study, health-care needs include reducing procedural pain such as IV cannulation pain among infants using distraction technique. Pain assessed using Neonatal Infant Pain Scale. Thus, the investigator felt the need to assess the effect of distraction using rattle on pain among infants during IV cannulation.

Objectives of the Study

The objectives of the study are as follows:

- To assess the pain among infants during IV cannulation in both experimental and control group.
- To evaluate the effect of distraction using rattle during IV cannulation in experimental group.
- To find association between the pain among infants with selected demographic variables in both experimental group and control group.

Materials and Methods

The study adopted an experimental approach, quantitative experimental post-test only control group design, was conducted in a selected hospital at Kollam with the formal permission of the concerned authority. The study population comprised of infants aged between 2 and 6 months who were undergoing IV annulation for the 1st time. The sample size was 40; 20 each in the control and experimental groups. Purposive sampling technique was used to select the sample. Tools used were Neonatal Infant Pain Scale (used with permission) and the demographic proforma consisted eight items, namely, age of child in months, gender, birth order, type of family, weight of child, duration of cannulation, site of cannulation, and size of cannula used. Neonatal Infant Pain Scale includes six parameters that were categorized according to the responses. The findings were observed and graded correspondingly. The maximum score was 7 and minimum was 0. The score was arbitrarily categorized as follows: Mild 0–2, Moderate 3–4, and Severe >4.With the consent from the parents (of the infants) to participate in the study, sample was taken for IV cannulation. The independent variable (diversion therapy-bright colored sound producing rattle) was introduced to the experimental group during IV cannulation. The parent was holding the infant. In the control group, parents were holding the infant and giving standard care (cuddling and holding the baby close). The pain was observed by the investigator during and after the procedure.

Result

The data obtained were analyzed and presented under following heading;

Section 1: Distribution of sample according to demographic variable.
Section 2: Assess the pain among infants in both experimental and control group.
Section 3: Effect of distraction using rattle on pain among infants during IV cannulation in experimental group.
Section 4: Association between the pain among infants with selected demographic variables.

Section 1: Distribution of sample according to demographic variable

The findings of the study show that based on the age in months, <½ (40%) percentage of sample belongs to 4–5 months age in

control group where as in experimental group, it was 45% of infants belongs to 4–5 months. Based on gender, <2/3rd (60%) of sample were female in control group and in experimental group, half percentage (50%) of each in both male and female. According to birth order, 65% sample belongs to second order birth in control group and in case of experimental group, more than half (55%) percentage was first order birth. No one in third and fourth position of birth order in experimental and control group. Regarding the type of family, in control group, <2/3rd (60%) sample belongs to nuclear family where as in experimental group, more than half (60%) of sample from joint family and no one from extended family. According to weight of the child, more than half (60%) of sample between 5 and 7 kg in control group and in experimental group, <½ (45%) of sample between 5 and 7 kg. Based on duration of cannulation, in control group, majority of (80%) sample had taken 4–6 min, but in experimental group, <3/4th (70%) of sample had taken 2–4 min for IV cannulation. Based on the site of cannulation, in control group, cannulation done at the left upper limb in <½ (40%) of sample and in experimental group, it is more than half (55%). In experimental group and control group, same percentage (35%) of sample used right upper limb for IV cannulation. Regarding the size of cannula used, both in control group and experimental groups, all the samples (100%) were used 24 G size cannula.

Section 2: Assess the pain among infants in both experimental and control group.

The study reveals that in experimental group, half (50%) of sample had mild pain, <½ (45%) percentage had moderate pain and only 5% had experienced severe pain during IV cannulation. However, in the control group, <3/4th (70%) of sample had severe pain, 1/4th (25%) has moderate pain, and only 5% has mild pain during IV cannulation.

Section 3: Effect of distraction using rattle on pain among infants during IV cannulation in experimental group

The findings of the present study reveal that the mean pain score was 5.3 with standard deviation 1.42 and the mean pain score in the experimental group was 2.4 with standard deviation 1.28. The mean pain score of the experimental group was less than the mean pain score of control group was statistically significant at 0.05 level. The calculated "*t*" value (6.74) was greater than the table value (t_{38} = 1.69). Hence, the null hypothesis (H_{01}) was rejected and research hypothesis (H_1) is accepted. It indicates that distraction using rattle among infants was effective in reducing pain during IV cannulation.

Section 4: Association between the pain among infants with selected demographic variables

Table 1: Demographic distribution of samples characteristics by frequency (f) and percentage (%) (n=40=100%)

Demographic variable	Control group		Experimental group	
	Frequency	Percentage	Frequency	Percentage
Age in months				
2–3	1	5	4	20
3–4	5	25	3	15
4–5	8	40	9	45
5–6	6	30	4	20
Gender				
Male	8	40	10	50
Female	12	60	10	50
Birth order				
1	7	35	11	55
2	13	65	9	45
3	0	0	0	0
4	0	0	0	0
Type of family				
Nuclear	12	60	8	40
Joint	8	40	12	60
Extended	0	0	0	0
Weight of the child				
3–5 kg	1	5	4	20
5–7 kg	12	60	9	45
7–9 kg	7	35	7	35
Duration of cannulation				
2–4 min	1	5	14	70
4–6 min	16	80	6	30
6–8 min	3	15	0	0
Site of cannulation				
Right upper limb	7	35	7	35
Left upper limb	8	40	11	55
Right lower limb	3	15	1	5
Left lower limb	2	10	1	5
Size of cannula				
24 G	20	100	20	100
26 G	0	0	0	0

The study shows that there is significant association between the pain score among control group with selected demographic variables such as age in months, site of cannulation, and in experimental group association with selected demographic variables such as age in months, birth order, and weight of the child. The calculated Chi-square (χ^2) value of these demographic variables in both control group and experimental group was greater than the table value at $P < 0.05$ level of significance. Moreover, there is no significant association with selected demographic variables in the control group such as gender, birth order, type of family, weight of the child, duration of cannulation, and size of cannula and in the experimental group, no association with the selected demographic variables such as gender, type of family, duration of cannulation, site of cannulation, and size of cannula used [Table 1].

The data presented in the above Table 2 show that the mean and standard deviation of pain among infants in control group were 5.3 and 1.42, and in experimental group, it was reduced to 2.4 and 1.28. The calculated "*t*" value (6.74) was greater than the table value (t38 = 1.69), at 0.05 level of significance. Hence, the null hypothesis (H01) was rejected and research hypothesis (H1) was accepted. Hence, it is interpreted that distraction using rattle among infants was effective in reducing pain during IV cannulation.

Discussion

In the present study, 40% of sample belongs to 4–5 month age in control group and in experimental group, 45% sample belongs to 4–5 months, 60% were females in control group and 50% each male and female in experimental group, 65% of samples are second order birth in control group and in experimental group, 55% of samples are first order birth. About 60% of sample belongs to nuclear family in control group and in experimental group, 60% from joint family. In the control group, 60% of sample were between 5-7kg, whereas in the experimental group, 45% of sample were between 5-7 kg, according to the child's weight. Based on duration of cannulation in control group, 80% takes 4–6 min and experimental group 70% takes 2–4 min. Based on the site of cannulation in control group, 40% sample left upper limb used and in case of experimental group its 55%. Regarding the size of cannulation in both experimental and control group its 24 G used (100%).

The first objective of the study was to assess the level of pain among infants. The study results reveals that 70% of sample had experienced severe pain in control group, but in experimental group, 50% of sample had mild pain. Only 5% experienced severe pain in experimental group.

Table 2: Mean, standard deviation and independent "*t*" value of pain score among infants during IV cannulation (*n*=40=100%)

Group	Mean	Standard deviation	"*t*" value
Control group	5.3	1.42	
Experimental group	2.4	1.28	6.74*

*Significance at 0.05 level

This was supported by the following study. The impact of using Musical mobiles on pain reduction in infants during vaccination. The study based on a quasi-experimental model involving a test group and a control group performed on 120 healthy infants. The result was that the pain score of the infants in the test group (during the procedure 5.13 ± 2.11 and after the procedure 1.26 ± 2.01) was lower than the scores of infants in the control group (during the procedure 6.65 ± 2.69 and after the procedure 3.61 ± 2.27).[7]

A randomized and clinical trial of experimental study was conducted in New York to assess the intensity of pain during intravenous cannulation and determine the effect of oral glucose on relief of pain during intravenous cannulation in neonates, 60 full-term neonates were allocated to two groups, experimental and control group. Pain was assessed 3 min before the procedure and the babies in the experimental group were given 2 mL of 25% dextrose orally while those in the control group were given 2 mL of distilled water and the pain was assessed during the procedure and 3 min after the procedure using CRIES instrument. The results shows that the mean pain score of the experimental group (2.27) was much lower than the control group (6.20) ($P < 0.001$). Hence, it is clear that oral glucose had helped the pain score in the experimental group during the procedure and 3 min after the procedure.[8]

The second objective was to evaluate the effect of distraction using rattle during IV cannulation in experimental group. On the present study, the mean score in experimental group (2.4) was less than the mean score in control group (5.3). The calculated "*t*" value (6.74) was greater than the table value (1.6859), at 0.05 level of significance. From this, it is clear that effect of distraction using rattle was effective in reducing pain during IV cannulation among infants and H1 was accepted.

This was consistent with the following study. Effectiveness of diversion therapy where bright colored sound producing rattles was used to distract infants during injection. The result is that there is a significant difference between the mean pain score in the control group and experimental group, which the mean difference of 3.18. The "*t*" value was 14.76 which is highly significant at 0.05 level of significance.[9]

A study was conducted in Indralaya public health centre in Indonesia, to assess the influence of mothers embrace on the level of pain during injection. Quasi-experimental design involving a sample of 24 infants and their mothers (14 control and 10 interventions) who were attending routine vaccination were included and divided into one intervention group and one control group. They received injection for the following immunization: DPT (55%), measles (29.3%), and combo (15.7%). Levels of pain as measured using FLACC and FACE (using Bakers pain scale) parameters were significantly lower for the intervention group compared to the control ($P < 0.001$,

Mann–Whitney test). Hence, it is recommended for health workers to apply this intervention as a non-pharmacological management to reduce infant pain during injection.[10]

The third objective was to find the association between the pain among infants with selected demographic variables in both experimental group and control group. The study reveals that there was significant association between the level of pain and selected demographic variables such as age, gender, birth order, type of family, weight of the child, and duration of cannulation, site of cannulation, and size of cannula used at 0.05 level of significance. The calculated Chi-square (χ^2) value of age in months, site of cannulation, birth order, and weight of child are greater than table value at $P < 0.05$ level of significance. Hence, the null hypothesis (H02) was rejected and research hypothesis (H2) can be accepted.

This was dependable with the following study. A quasi-experimental study was conducted to assess the effectiveness of music playback on intravenous cannulation pain among children in a selected hospital. The result was that mean post-test pain score of children in the experimental group was 4.1 with SD 1.33 which was significantly lower than the mean post-test pain score of children in the control group which was 7.8 with SD 1.27 with a mean difference of 3.6. The calculated "*t*" value 10.910 was greater than the table value 2.00 and is significant at $P < 0.05$ level. The analysis showed that the calculated Chi-square value for family monthly income, number of previous hospitalizations, and previous exposure of cannulation were greater than that of the table value at $P < 0.05$ level of significance.[11]

Conclusion

Injections are the universal experience for children. Diversion therapy was found to be effective for reduction of pain of infants receiving injections. Therefore, it can be used as a routine with immunization so that infants' pain can be managed in an effective way. It is important for the health professionals, who administer immunization, to take the challenge for relieving the pain by distracting the infants.

Conflict of Interest

The main limitation of the study was that the study was confined to specific geographical area which obviously imposes limits to any larger generalization.

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There is no further funding avail, the study was done at own risk and feel happy when completed this, because when it was conducted at the time were the COVID pandemic spread.

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