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Research Article

The Efficacy of Using Animation Distraction For Pain Relief In Young Children Undergoing Cannulation In A Rural Teaching Hospital: A Randomised Control Trial

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ABSTRACT

Background: Children undergoing invasive medical procedures experience pain, anxiety and stress. Experiences with painful needle procedures in childhood may lead to long-term negative attitudes toward clinicians, hospitals and the utilization of health care services[1]. Distraction has been shown to be an effective method of reducing pain as they can divert attention away from the painful stimuli[2]. Given the importance of pain relief in the child, it is important to establish the most reliable, safe and low-cost intervention in this rural teaching hospital.

Objectives: To assess the effectiveness of an animation distraction in alleviating pain measured using the Wong Baker FACES pain-rating scale in children undergoing venous cannulation in the paediatric ward of a rural teaching hospital.

Methodology: This parallel group, single blinded, randomised control trial was undertaken in children between 3 to 8 years of age, undergoing venous cannulation. A total of 64 children were randomised into two groups by permuted block randomisation with allocation concealment. A nature animation was shown to children in the intervention group. Pain was assessed by Wong Baker FACES pain-rating scale at pre-cannulation, during and one and three minutes post-cannulation. The mean pain scores in the two groups were compared using the student t-test.

Results: The demographic variables in the two groups tested for homogeneity by Chi square test. The result revealed that there is significantly ($p<0.005$) less pain in children with animation distraction at initiation, at one minute, at three-minute cannulation. At zero minute (during pricking) the difference of mean score of both groups is 1.313 and $p=0.015$($p<0.05$). At one minute (after pricking) the difference in mean score was 1.938 and $p=0.002$.At third minute of pricking the difference in mean score was 3.125 and $p=0.000$($p<0.05$).The result showed the statistical significant difference of mean pain score at 0, 1,3 minute.

Conclusion: The pain score on the FACES scale is reduced in the intervention group showing that animation distraction provides effective pain relief during cannulation.This is a simple cost-effective and easily implementable measure to reduce pain.

INTRODUCTION:

"Bitter the tears of a child: sweeten them,
Deeper the thoughts of a child: quiet them,
Sharp is the grief of a child: take it from them,
Soft is the heart of child: do not harden it"
Pamela Glenconner

Cannulation is a medical procedure in which a cannula is inserted to provide an intravenous line.[1] Children undergoing invasive medical procedures experience pain which is anxiety and stress provoking. According to the International Association for Studying of Pain (IASP), pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Pain is subjective. Each individual learns the application of the word pain through experiences related to in early life.[2]In 1995, the American Pain Society (APS) challenged all health care systems, to make pain the fifth vital sign along with temperature, blood pressure, pulse and respiration. The data summary for 1992 to 2004 from the APS revealed that 70% of hospitalized children reported pain, almost 30% reported moderate pain and 15% reported extremely severe pain. [3]

Cannulation causes moderate or severe pain in a substantial number of children and adults.[4] Untreated or undertreated pain can rob children of the ability to function and can cause depression, irritability and disruption in sleeping, eating and mobility.[5,6] Unpleasant experiences with painful needle procedures in childhood may lead to the development of long term negative attitudes toward the clinician, hospital and the utilization of the health care system.[7] Bijtlerbier and Vortommen found that children with history of negative medical experience showed higher anxiety levels before a venipuncture and were less cooperative during the procedure.[8] This finding is supported by recent physiological evidence indicating that activation of the nociceptive system can alter neurogenic pathways resulting in increased sensitivity to later stimulation.[9]

Pain is especially distressing in younger children who exhibit higher degrees of anguish than older children.[10-12] Application of the word pain, through experiences in early childhood may manifest later as greater fears and phobias[2]. Thus shielding young children from pain and distress may result in leaving behind less unpleasant memories of the hospital stay.

Many methods are available to reduce pain. They can be classified into pharmacological and non-pharmacological methods. Non-pharmacological methods are widely accepted as strategies that may be used independently or in addition to pharmacological interventions. According to Jacobson use of non-pharmacological procedures to cope with pain behavior is less costly and many of them can be administered by a nurse.[13]

Distraction is anon-pharmacological method of reducing pain. Distractions have the ability to divert attention from the painful stimuli.[14] Mccaul and Malott hypothesized that the brain has a limited capacity to focus attention on stimuli. Cohen examined the use of the cartoon movie as a distracter for preschool immunization and found the child was less distressed during the procedure. [15] Another study done by Cohen et al using similar methodology found that cartoon distraction is more effective in reducing distress in children undergoing procedures under local anesthesia.[16]

Untreated or undertreated pain can rob children of the ability to function and can lead to depression, irritability, disruption of eating and mobility.[5,6] The anxiety caused by acute painful medical procedures can sensitize the children to future medical intervention. Techniques that reduce pain and anxiety, including behavioral distraction and kinesthetic methods are synergistic with analgesic use and give long term benefits for the pediatric patient.[17] To make pain tolerable, non-pharmacological methods are widely accepted as strategies that may be used independently or in addition to pharmacological interventions.[18]

Some researchers have used non-pharmacological methods such as active and passive distraction to reduce pain. Hassanpour M et al evaluated the effect of local cold therapyfor pain relief in children during penicillin intramuscular injection. In this study 90 children, aged five to twelve years, received local therapy, distraction or routine care (control group). The results showed that local cold therapy was more effective than distraction.[19]

Bellieni CV et al randomized 69 children aged seven to twelve years, undergoing venipuncture, into three groups to receive active distraction, television (passive) distraction and no distraction respectively. They concluded that television watching was more effective in pain-relief than active distraction. [20]

Lobo et al conducted a study to assess the ability of cartoon distraction to reduce pain during venipuncture in preschoolers. They selected 60 children aged three to six years, randomized into two

groups and found that cartoon distraction was an effective pain relief method in children undergoing venipuncture as it reduced the pain perception score on the Wong Baker FACES Pain scale.(21)

Cartoon distraction works on the principle of ACCEPTS. It distracts with activities contributing animation that takes attention away from the child's pain, comparison with another in a different situation produces the opposite emotions by pushing the stressful situation away and introducing positive thoughts and sensations. The cartoon distraction has the ability to jog emotions and break the connection between the person and his/her emotion of pain.(16)

In another study to evaluate the effect of self-selected distracters (i.e. bubbles, hand held video games etc.) on pain, fear, and distress in 50 children and adolescents with cancer, undergoing a procedure or venipuncture, the researchers concluded that distraction reduced fear and distress during venipuncture compared to children who received standard care.(22)

Systematic review of FACES scale for self-report of pain intensity in children shows that Wong Baker FACES (WBFS) pain rating scale has psychometric properties (reliability, validity)and it is easy and quick to use. The greatest strength of this scale may be its acceptability, given the consistent finding that the Wong Baker FACES scale was preferred by children (any age),parents and practitioners when compared with other scales. Concerning validity, WBFS has a high correlation($r>.7$) with other self-reported pain scales used at the same time and shown significant difference ($p<0.05$) in scores between the two comparable but different groups. Reliability has been proved by use of test and retest ($r>.5$) and by concordance with simultaneous observational core ($r>.4$).WBFS has a significant ($p<.05$) responsiveness to pain increasing and pain decreasing.(23)

A study conducted to assess pain in 150 children aged five to fifteen years, undergoing venipuncture showed that younger children who had previous exposure to venipuncture found that the result of WBFS were consistent with the results of skin conductance fluctuation (SCF) with a median pain score of 6 in both scales.(24)

We therefore planned this study to test the hypothesis that distraction of the child with a cost-effective method like an animation video will reduce the pain perception of the child. Therefore the null hypothesis of this study which we would like to disprove is, "Animation distraction makes no difference in perception of pain as indicated by a high score in the Wong Baker FACES pain scale at 0, 1 and 3 minutes after needle prick of cannulation.

OBJECTIVES

To assess the effectiveness of an animation distraction to alleviate pain measured by the Wong Baker FACES Pain Rating Scale in children between the ages of 3 and 8 years, undergoing insertion of a venous cannula in the paediatric ward of a rural teaching hospital.

MATERIALS AND METHODS

This parallel group, single blinded, randomised controlled trial was undertaken in children between the ages of three and eight years of age, undergoing first time venous cannulation in the Paediatric ward of this tertiary care hospital in South India. The study was registered with the Clinical Trial Registry of India. The study ID with CTRI is Ref/2016/07/011726.

The parents of children having first time insertion of cannula during current admission were interviewed. Children of parents willing to give written informed consent and fulfilling selection criteria were recruited to participate in the study and demographic and clinical data was collected. Children were included if the venous cannulation was achieved in the first or second prick. Children who were very sick or had cognitive, auditory, visual impairment or cerebral palsy were excluded. Children who had received paracetamol in the last two hours were also excluded.

The child was taken to the procedure room and comfortably seated with the arm placed on the table. The use of an infant pacifier or pre-treatment with paracetamol was avoided.

The intervention used for the Study group (Group 1)was a nature animation with both entertaining and educational value lasting four minutes. The animation, projected from a lap-top screen placed at a convenient distance, was shown to the child commencing one minute before the needle prick. The computer was not switched on in the case of children allocated to the control group (Group 2).

Children were randomized by a computer generated permuted block randomization[16] into one of the two groups. Allocation concealment from the investigator was achieved by using sequentially numbered opaque sealed envelopes. The envelope with the child's study number was opened only after the pre-cannulation FACES scale was recorded by

the investigator.The process was recorded on video. The FACES scale recording was taken at 0 (moment of needle insertion), 1 minute and 3 minutes after needle prick from the video recording with the sound erased by the blinded assessor.The primary outcome variable was the acute pain response as measured by the FACES Pain Rating Scale. (Figure 1) used with permission from the authors.

The sample size, calculated using nMaster 2.0 Sample size calculating software,[25] for a power of 90% and an alpha error of 5% was found to be 32 children in each arm of the study for an expected difference in means of 8.5 as found in the study by Kaur et al.[26]

The demographic data in the two groups were compared for homogeneity using the Chi square test and the two groups were found comparable. Three pain scores of each child were obtained on the FACES scale at 0-minute, 1 minute, and 3 minutes. Tests of proportion were applied. The mean scores in the two groups were compared using student t-test and SPSS computer software.

Figure 1. Wong -Baker FACES Pain Rating Scale

RESULTS

The study procedure is represented in the Flow diagram in Figure 1. We serially assessed 67 children in the age group three to eight years, undergoing first time venous cannulation for eligibility and enrolled 64 into the study – 32 in each group.

The demographic data was entered in the baseline table (Table 1). There were more boys than girls in this study sample. Most of the children who participated in the study belonged to the age group seven to eight year. The number of children in the age group of three to four year was equal in control group and intervention group. Over 60% of the fathers of the children were employed in skilled work followed by manual labour. The number of children whose mothers were home-makers was double the number of children whose mothers were employed in skilled wok, professional jobs and manual labour.

Of the 64 children enrolled in the study, half were school going and one–fourth of the children were attending preschool. There were twice the number of children belonging to joint families compared to children from nuclear families. Both control group and intervention group had equal number of children who were looked after by mothers at home. As far as the previous injection experience of the children is concerned, majority of them had a history of high pain, followed by medium and low pain respectively (Figure 2). The reason for admission of most of the children was viral fever. Regarding treatment a majority of the children were being given antibiotics compared to the number of children who were being given IV fluids or anti-emetics. These results are given in Table 1.

Table 1: Baseline and Demographic Data of Children

Characteristic		Group 1	Group 2
Gender	Female	10(31%)	19(54.9%)
	Male	22(68.8%)	13(40.6%)
Age	3-4 yrs	11(34kk.4%)	11(34.4%)
	5-6 yrs	8(24.3%)	11(34.4%)
	7-8 yrs	13(40.6%)	10(31.2%)
Father's occupation	Manual labour	11(34.4%)	10(31.2%)
	Business	11(34.4%)	6(18.8%)
	Skilled work	9(28.1)	15(46.9%)
	Professional	2(6.2%)	1(3.1%)
Mother'soccupation	House wife	23(71.9%)	20(62.5%)
	Skilled work	4(12.5%)	5(15.6)
	Profession	4(12.5%)	3(3.4%)
	Manual labour	1(3.1%)	4(12.5%)
Child's occupation	Home	4(12.5%)	1(3.1%)
	Pre-school	9(28.1%)	16(50%)
	School	19(59.4%)	15(46.9%)
Type of Family	Nuclear family	10(31.2%)	14(43.8%)
	Joint family	22(68.8%)	18(56.2%)
Care-giver	Mother	30(93.8)	30(93.8%)
	Grant parents	2(6.2%)	2(6.2%)
Previous cannulation history	Low pain	1(3.1%)	4(12.5%)
	Medium pain	13(40.6%)	11(34.4%)
	High pain	18(56.2%)	17(53.1%)
Diagnosis	Viral infection	15(46.9%)	12(37.5%)
	Bacterial infection	6(18.8%)	12(37.5%)
	GIT problem	12(37.5%)	7(21.9%)
	Others	12(37.5%)	1(3.1%)
Treatment	Anti-emetics- Yes	11(34.4%)	7(21.9%)
	Anti-emetics- No	21(65.6%)	25(78.1%)
	Antibiotics –Yes	10(31.2%)	17(53.1%)
	Antibiotics –No	22(68.8%)	15(46.9%)
	IV Fluids –Yes	14(43.8%)	11(34.4%)
	IV Fluids –No	18(56.2%)	21(65.6%)

Figure 2. Study Flow Diagram (Consort)

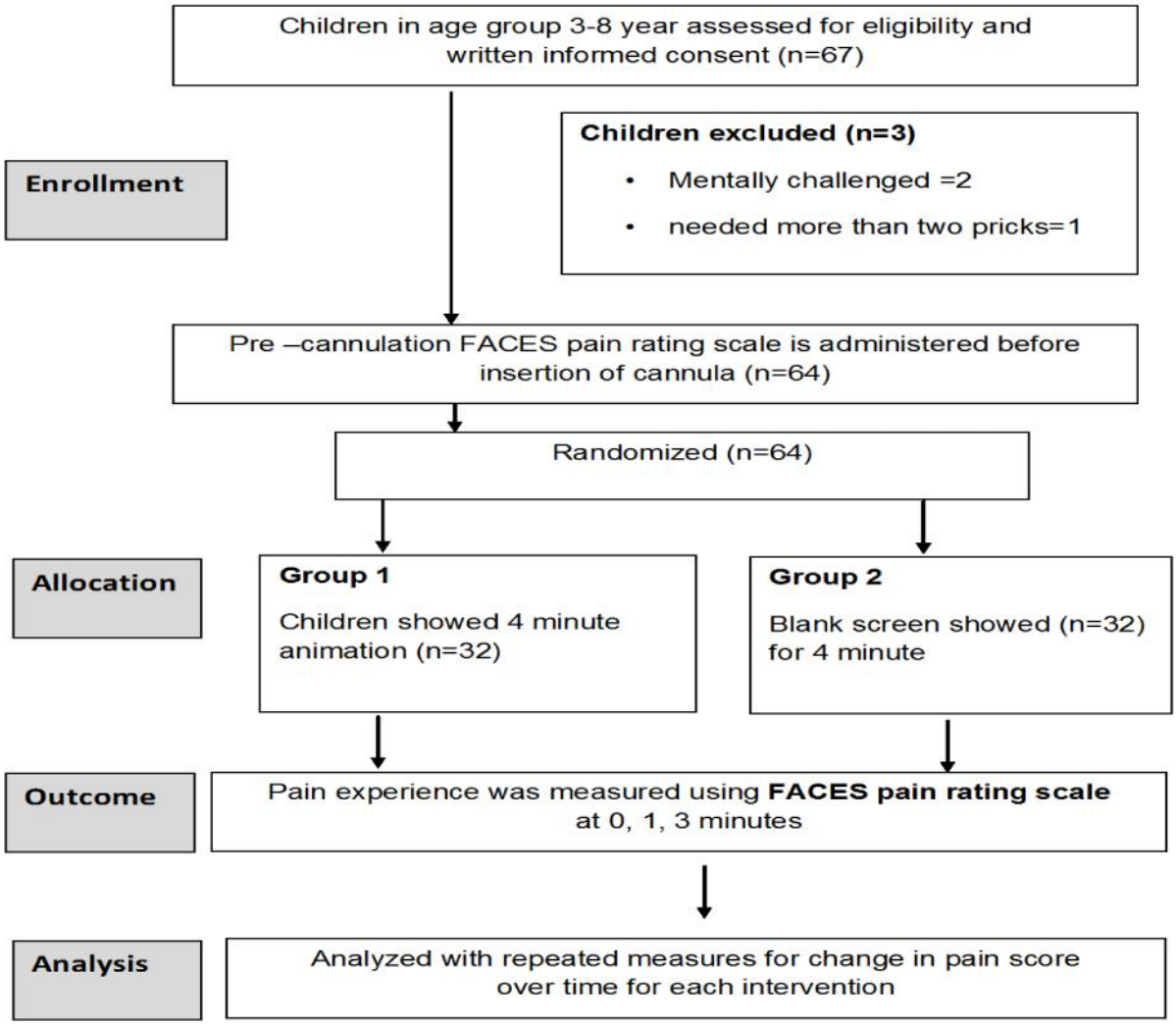

Figure 3. History of Expression of Pain at Previous Injections

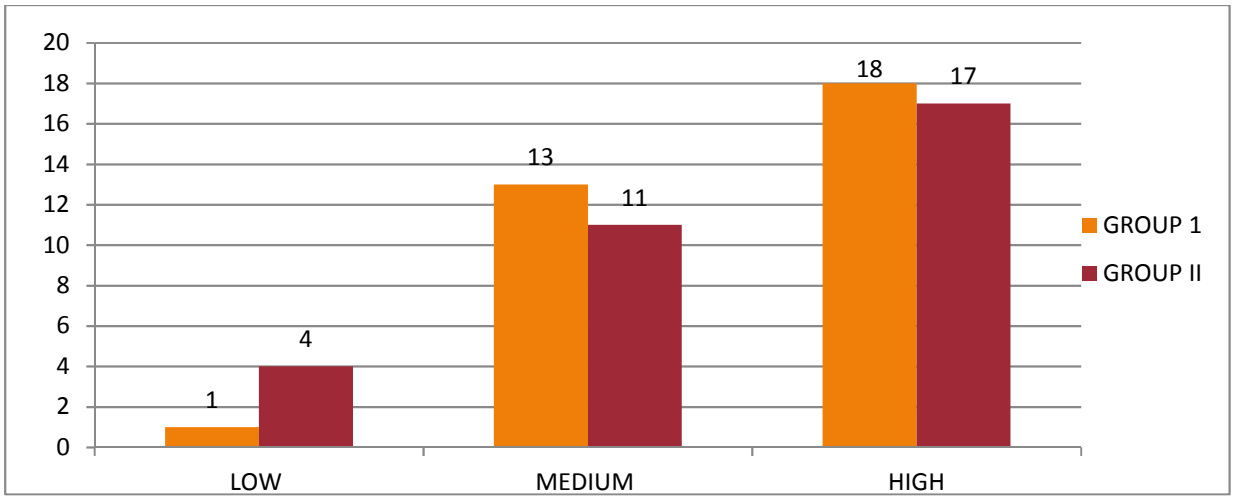

Figure 2. Historical data collected from the parents revealed that 55% of the children expressed severe pain while 37 % expressed medium pain and only 8 % expressed a low level of pain during injection.

The mean pain assessment scores using the FACES scale are given in Table 2.

Table 2. Pain Assessment Scores with Wong Baker FACES Scale

Pain assessment (FACES)	Group I		Group II		Mean difference	p value
	Mean	SD	Mean	SD		
Pre-cannulation	4.44	1.105	4.31	0.896	0.125	0.621
0 minute	7.38	2.24	8.69	1.942	-1.313	0.015
1 minute	4.38	2.562	6.31	2.334	-1.938	0.002
3 minute	1.88	1.68	5	1.76	-3.125	0

The pre-cannulation mean score difference was almost equal (p=.621) in the two groups with no significant difference between the two groups.

At zero minute the difference of mean score between groups is 1.313 ($p < 0.05$).

At one minute the difference in mean score between groups was 1.938 ($p < 0.01$).

At third minute after needle prick the difference in mean score was 3.125 and ($p<0.001$).

Figure IV. Trends in Reduction of Pain Score over Time

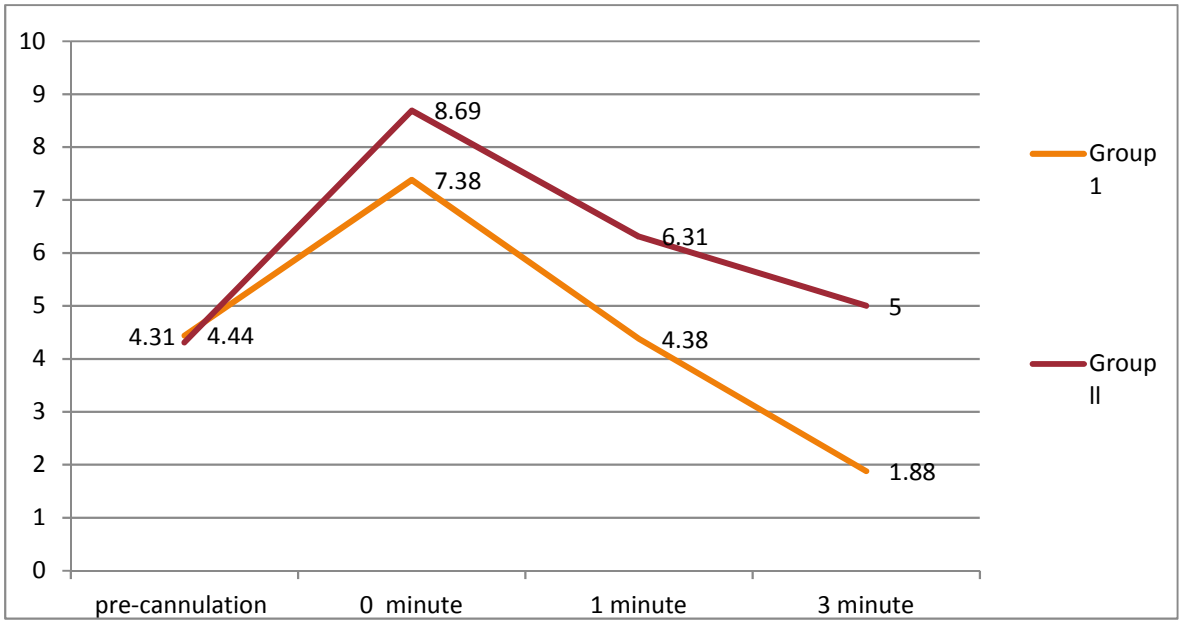

Figure IV: There was increasing relief of pain with animation distraction than without any distraction.

The mean difference in scores between the two groups increased over the three-minute period indicating there was increasing relief of pain with the video distraction in the first and third minute after cannulation.

There is a statistically significant difference in the mean pain scores at 0, 1,3 minute after cannulation, between the two groups. Therefore, the null hypothesis can be rejected as we have seen that animation distraction makes a significant difference in perception of pain.

DISCUSSION

The mean pre-cannulation score assessed without distraction after making child comfortable was similar in both groups showing that there was good randomization and the two groups were comparable. The mean score in the two groups was similar showing that without distraction the Wong-Baker FACES scores were similar. The mean scores of 4.44 in group 1 and 4.31 in group 2 indicating “a little more pain” in the FACES scale may reflect child’s anxiety and fear before the procedure.

This study showed that maximum pain "a whole lot of pain / worst pain" was obtained during cannulation. However, with animation distraction there was a statistically significant difference between the two groups showing that even severe pain can be reduced by distracting the child during the time of the painful procedure. This is consistent with the study conducted by Bellieni CV et al to assess the analgesic effect of watching television during veni-puncture.[20]In the study by Hassanpour M et al the average pain intensity was considerably reduced by local cold therapy anddistraction.[19] This study also supports the use of non-pharmacological pain management methods in children.[19] In our study we have used a non-pharmacological method which is cost-effective and child-friendly to reduce pain.

Our study also showed that besides reducing pain during cannulation, animation distraction also reduces post-cannulation pain in the first and third minute after cannulation. In fact, the mean difference continues to increase from needle prick to the first minute and from the first to the third minute. This shows that animation distraction is an effective method to decrease post-cannulation pain. This is consistent with the study of Lobo et al who used cartoon distraction to reduce veni-puncture pain among pre-schoolers and found the mean post-test pain score of children in intervention group was significantly lower than thecontrol group. [21]

Our study showed that distraction was more effective as the time passed. The mean difference was more at third minute as compared to first minute. This is consistent with the study conducted by Baljit Kaur et al to study the effectiveness of cartoon distraction on pain perception in children,during intravenous injection. [26]

Another study conducted by James J et al in children undergoing veni-puncture showed that the mean pain scores pre-veni-puncture,during veni-puncture and post-venipucturewith cartoon distraction was significantly lower than without cartoon distraction. [18].

Thus we can state that animation distraction is a safe, easy and cost-effective distraction method of reducing pain in children having cannulation.A laptop can be introduced in the treatment room to display the animation. This is an easily implementable measure which can be made standard practicce in all children who are having an intravenous cannulation.

CONCLUSIONS

On the basis of the findings of the present study, it can be concluded that the children undergoing cannulation with animation distraction experience less pain than those without distraction. Hence, animation distraction is found to be an effective non-pharmacological method of reducing pain in young children undergoing cannulation.

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REFERENCES

1. Potter P A, Perry A G. Fundamentals of Nursing. 6th ed. *Mobsy* St.Louis; 2005.902.
2. Merskey H pain term : A list with definition and notes on usage. Recommended by the ISAP Subcommittee on Taxonomy. *Pain* 1979:6: 249
3. Taddio A. Effects of early pain experience (the human literature). In: McGrath PJ, Finley A, eds. Chronic and recurrent pain in children and adolescent: progress in pain research and management Vol. 13. Seattle: IASP *Press*; 1999.p.57-74
4. Moore A, Straube S and McQuay H. Minimising pain during intravenous cannulation . BMJ. 2009; 338(http://www.bmj.com.)
5. Schechter N L, Zempshy W T, Cohen L L, McGrath PJ , McMurtry CM, Bright NS pain reduction during pediatric immunizations. *Pediatrics*. 2007 May: 119(5):e 1184-98
6. Gold JI, Kim SH, Kant AJ, Joseph MH, Rizzo As. "effectiveness of virtual reality for pediatric pain distraction during i.v placement" *Cyber psycho behave*. 2006 Apr; 9(2):207-12.
7. Pate JT, Blount RL, Cohen LL, Smith AJ. Childhood medical experience and temperament as predictors of adult functioning in medical situations. *Child Health Care* 1996; 25:281-98.
8. Bijttebier P, Vertommen H. Coping with peer argument in school age children with bully/victim problems. *Br j Educ psycho* 1998;68;387-94.

9. Woolf CJ, Salter MW Neonatal plasticity; Increasing the gain in pain. *Science* 2000;288;1765-9.
10. Schechter NL, Zempsky WT Cohen LL et al. pain reduction during pediatric immunization. Evidence based review and recommendation. *Pediatrics* 2007; 119;e1184-119.
11. Anand KJ Consensus statement for the prevention and management of pain in the newborn. *Arch pediatrAdolesc* Me2001; 155;173-180.
12. Shah V, Taddio A, Rieder MJ. HELPinKIDS Team. Effectiveness and tolerability of pharmacologic and combined intervention for reducing injection pain during routine childhood immunization; systemic review &meta-analysis. *Clinther* 2009; 31(2):S104-47.
13. Jacobson AF. Intradermal normal saline solution, self selected music and insertion difficulty effects on intravenous insertion pain. *Heart lung* 1999; 28; 114-22
14. Mc Caul KD, Malott JM. Distraction in coping with pain. *Psychol Bull* 1984 may;95;516-33.
15. Cohen LL, Blount RL, Panopoulos G. nurse coaching &cartoon distraction; An effective and practical intervention to reduce child, parent and nurse distress during immunization. *J PediatrPsychol* 1997;22;355-70.
16. Cohen LL Blount RL, Cohen RJ, Schaen ER, Zaff JF. Comparative study of distraction verses topical anesthesia for pediatric pain management during immunization. *Health Psychology* 1999;18 (6); 591-8.
17. Kuttner L management of young children's acute pain and anxiety during invasive medical procedure. *Pediatrician* 1989; 16(1-2); 39-44.
18. James J, Ghai S, Rao KLN, Sharma N, Effectiveness of cartoon as a distraction strategy on behavioral response to pain perception among children, undergoing venipuncture; *Nursing and midwifery research journal*,vol-8, No3, J. 2012.
19. Hanssanpour M, Tootoonchi M, Aein F, Yadegarfar G. The effects of two non pharmacological pain management method for intramuscular injection pain in children. *Acute pain* 2006; 8(1); 7- 12
20. Bellieni CV, Cordelli D M, Rafelli M, Ricci B, MorgeseG, Buonocore G, Analgesic effect of watching T V during venipuncture. *Journal of child psychology* 2006; 91(12): 1015-7
21. Lobo MR, Umarani J, Cartoon distraction reduces venipuncture pain among preschooler – A Quasi Experimental study *IJSR* June 2013 issue 6, Volume 2 ISSN No.2277-8179
22. Windich-Biermeier A , Sjoberg I, Dale JC, Eshelman D and Guzzette C E, Effect of distraction on pain, fear and distress during venous port access and venipuncture in children and adolescent with cancer. *Journal of Pediatric Oncology Nursing*2007 : 24(1);8-19.(Available from :htt://jpo.sagepub.com)
23. Tomlinson D, Von Baeyer C I, Stinson J N, Sung L 2010, A Systemic Review of faces scales for the self report of pain intensity in children *pediatrics*126(5);e1168-1198
24. Savino F, Vagliano L, Ceratto S, Viviani F, Miniero R, Ricceri F. Pain assessment in children undergoing venipuncture; Wong baker Faces scale versus skin conductance fluctuations. *pub med* 2013 Feb 12;1:e37
25. The Sample size was calculated by nMaster software, version 2.0 produced by the Department of Biostatistics, Christian Medical College, Vellore 632 002, Tamil Nadu.
26. Kaur B, Sarin J, Kumar Y : Effectiveness of cartoon distraction on pain perception and distress in children during intravenous injection. *IOSRJournal of Nursing and Health Science*, May-June 2014 ,e-ISSN:2320-1959. P- ISSN ; 2320-1940 Volume 3, issue 3 ver II

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