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Effectiveness of distraction cards on pain control among children after invasive procedure

Saju Shrestha[1], Rachana Maharjan[2], Manju Nepal[3]

[1]Asst. Prof., Norvic Institute of Health Sciences & Technologies (Purbanchal University), Kathmandu, Nepal; [2]Nursing Incharge, Patan Hospital, [3]Assoc. Prof., Lalitpur Nursing Campus, School of Nursing & Midwifery, Patan Academy of Health Sciences, Lalitpur, Nepal

Abstract

Introduction: Painful medical procedures in childhood may have long-term negative effects on development and future tolerance of pain. Distraction techniques using distraction card divert children's focus from grievous stimuli and are very simple and effective methods of reducing stress and pain. The study aimed to assess the effectiveness of distraction cards on pain control among hospitalized children after an invasive procedure.

Method: A true experimental study (posttest only control design) was conducted among 50 children aged 5-12 years (25 interventional and 25 in control) using a distraction card. Wong Baker FACES Pain Rating Scale was used to assess the level of pain immediately after IV cannulation and blood sample collection within 1 minute in both groups, and data was analyzed by descriptive and inferential statistics using SPSS version 16.

Result: The mean age of children in control group was 7.36±1.43 and in intervention group was 8.04±2.08. There was no statistical difference of age and sex in control and intervention group. The present study revealed that the mean pain score of participants in interventional group (2.36±0.490) was lower than mean pain score of participants in control group (3.72±0.458). The pain score immediately after the invasive procedure; IV cannulation and blood sample collection, was significantly lower in the interventional group compared to the control group ($p<0.001$).

Conclusion: The Distraction card was effective in reducing pain during invasive procedure. Therefore, it can be implemented as a useful measure to reduce the pain after invasive procedure.

Keywords: Distraction Cards; Invasive Procedure; Level of Pain; Wong Baker FACES Pain Rating Scale

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Correspondence: Ms. Saju Shrestha, Norvic Institute of Health Sciences & Technologies (Purbanchal University), Kathmandu, Nepal. **Email:** shresthasaju5@gmail.com

Introduction

Pain and fear during medical procedures such as venipuncture are among the most distressing experiences for children in hospital settings. The hospital environment, invasive interventions, and separation from familiar surroundings can intensify anxiety and emotional distress in pediatric patients, leading to negative short- and long-term psychological effects.[1,2] Studies have shown that unmanaged procedural pain may cause heightened physiological stress and behavioral disturbances, thereby reducing cooperation during treatment and affecting recovery.[3,4,5]

While pharmacological interventions can reduce pain, their routine use during minor procedures is often limited due to cost, side effects, and resource constraints in low- and middle-income countries.[5,6] Non-pharmacological distraction methods, such as music therapy, audiovisual aids, animated cartoons, and tactile distraction, have gained increasing attention as simple, effective, and child-friendly alternatives.[7,8,9,10] These techniques work by diverting the child's attention from the painful stimulus to more engaging sensory inputs, reducing both perceived pain and anxiety.[11,12] Research has demonstrated that such distraction strategies can significantly lower pain scores, heart rate, and distress behaviors during venipuncture.[13,14,15]

Among various distraction methods, audiovisual aids and interactive visual stimuli have shown particular promise due to their strong engagement of cognitive and emotional processes.[16,17,18] Animated cartoons and video-based interventions effectively minimize procedural discomfort while improving the hospital experience for children.[19,20,21] However, evidence from Nepal and other similar contexts remains limited. This study, therefore, aims to assess the effectiveness of distraction cards on the level of pain among children immediately after an invasive procedure in hospitalized children. The findings may support wider integration of non-pharmacological pain management strategies in pediatric care in resource-limited environments.

Method

This is an experimental post-test only control design that was conducted from 2020 Apr to 2021 May in the pediatric, orthopedic, Ear, Nose, and Throat (ENT) and surgical wards of Patan Hospital, Patan Academy of Health Sciences (PAHS), Lalitpur, Nepal. The aim was to evaluate the effectiveness of distraction cards on pain control among children after Invasive Procedure. Ethical approval of the study was obtained from the Institutional Review Committee (IRC) of PAHS (Ref: PNC 2008251427). A simple random sampling technique (lottery method without replacement) was used to select eligible children for the study. Both male and female children between 5-12 years of age undergoing invasive procedures (IV cannulation and blood sample collection) were included in the study. Children having chronic illness, having pre-existing pain during an invasive procedure and previous experience of similar invasive procedure within six weeks were excluded.

A total 50 participants were enrolled, 25 in interventional group and 25 in control group. The sample size was determined by using power analysis.[9] The participants were allocated to interventional and control group randomly through lottery method without replacement. At first 4 lottery chits (2 even and 2 odd numbers) were made before selecting a sample and shuffled in a small pencil case from which each participant (children) had to take one chit; the participant with the chit having even numbers were allocated to interventional group and those with odd numbers were allocated to control group.

Written informed parental consent was obtained from all the parents of child for which generic PAHS format in Nepali was used. Verbal assent was taken from the child . Parents and children were informed about the type and purpose of the study, issues of confidentiality, and voluntary participation. Also, the significance, benefits, and harms of the study, liberty to withdraw from the study at any point of time, and intervention process were well explained to parents and children before they participated in the study. The rights and confidentiality of the participants were respected in all phases of the study. Confidentiality was maintained throughout the study by coding in the questionnaire separately and using the data only for necessary academic purpose.

Sociodemographic characteristics including age and gender were obtained through parent interviews. Pain intensity was assessed using the Wong–Baker FACES Pain Rating Scale, a validated self-report tool for children.[20] Permission for its use was obtained through the foundation's official research website. The scale presents six faces ranging from a smiling face at 0 ("no hurt") to a crying face at 10 ("hurts like the worst pain imaginable.")

Routine care, including explanation of the procedure, preparation of equipment, and site selection, was provided by the ward nursing staff. All invasive procedures (intravenous cannulation and blood sampling) were performed by nurses not involved in intervention delivery or data collection, ensuring procedural uniformity. The distraction intervention and pain assessment were conducted exclusively by the researcher.

Before the procedure, the doctor's order and patient identification were verified. The child and parent

were oriented about the use of distraction cards. The child was made comfortable in a seated or lying position, and an age-appropriate distraction card was selected based on cognitive development. During the procedure, the researcher displayed the card for 1–2 minutes and engaged the child with short, friendly questions printed on the reverse side (e.g., "Can you name this cartoon character?") The distraction cards were developed and validated by the researcher, with a content validity index (CVI) of 0.93. Within one minute after the procedure, the child rated their pain using the Wong–Baker FACES scale, and the score was recorded by the researcher. Children in the control group received routine care only. Pain assessment was conducted similarly within one minute post-procedure using the same tool.

Field editing was done after completion of the intervention by assessing the instrument for any errors, mistakes, omissions and duplication. Coding and classification of the data were done. The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16. The analysis and interpretation were done on the objective of the study using descriptive statistics and inferential statistics. The descriptive statistics were used to calculate frequency, mean, standard deviation, and percentage of socio-demographic data.

Data were checked for normality using Shapiro Wilk Test as data were not normally distributed, Mann Whitney 'U' test (nonparametric test) was used to compare the pain score between interventional and control group. Inferential statistics (chi square test) was used to test homogeneity of variable in interventional and control group.

Result

Out of 50 participants (25 in the interventional and 25 in the control group). in the intervention group, 13(52.00%) were aged 5–7 years, while in the control group, 12(48.00%) participants were aged 9–12 years. The mean age in the intervention group was 8.04±2.08 years, and 7.36±1.43 years in the control group. Regarding gender, the intervention group included 13(52.00%) boys, while the control group had 19(76.00%) boys, Table 1.

Table 1. Socio-demographic characteristics of interventional and control groups (N=25)

Variables	Interventional Group n (%)	Control Group n (%)
Age		
5-7 years	13(52.00%)	10(40.00%)
7-9 years	3(12.00%)	3(12.00%)
9-12 years	9(36.00%)	12(48.00%)
Mean±S.D	8.04±2.08	7.36±1.43
Gender		
Boy	13(52.00%)	19(76.00%)
Girl	12(48.00%)	6(24.00%)

There were no statistically significant differences between the interventional and control group with respect to age and gender, Table 2.

Table 2. Statistical comparison of socio-demographic characteristics in interventional and control groups (N=25)

Variables	Interventional Group n (%)	Control Group n (%)	χ^2	p value
Age				
≤ 7 years	13 (52.00)	10 (40.00)	0.725	0.395
> 7 years	12 (48.00)	15 (60.00)		
Mean ±SD	8.04±2.08	7.36±1.43		
Gender				
Boy	13 (52.00)	19 (76.00)	3.125	0.077
Girl	12 (48.00)	6 (24.00)		

Chi Square test. Note: p <0.05: significant at 95% confidence interval

In the interventional group, 16(64.0%) children experienced *'mild pain'* and nine (36.00%) children experienced '*moderate pain'*. No children in this group reported '*severe pain'*. In the control group, none of the children reported '*mild pain*, seven (28.00%) children experienced '*moderate pain'*, and 18(72.0%) children experienced '*severe pain',* Table 3.

Table 3. Comparison of level of pain in interventional and control groups (N=25)

Level of pain	Control Group n (%)	Interventional Group n (%)
No pain	-	-
Mild Pain	-	16(64.00%)
Moderate Pain	7 (28.00%)	9(36.00%)
Severe Pain	18 (72.00%)	

The findings showed that the overall mean pain score in the interventional group was lower than in the control group. The mean pain score in the intervention group was 2.36, and in control group was 3.72. Calculated Mann- Whitney U test value was (31.5) with p<0.05. Hence, there was a significant difference in pain score between the interventional and control groups, Table 4.

Table 4. Comparison of pain score in interventional and control groups (N=25)

Group	N	Mean±SD	Mann Whitney U Test	p-value
Interventional	25	2.36±0.490	31.5	<0.001*
Control	25	3.72±0.458		

*p <0.05 significant at 95% confidence interval

Discussion

Among the children participated in the study, there were no statistically significant differences between interventional and control group with respect to age and gender.

The present study revealed majority of the children in control group experienced severe pain whereas none of the children in intervention group

experienced severe pain. This could be attributed to the effectiveness of distraction cards during invasive procedure.

The current study showed that the mean pain score during invasive procedure using distraction card in interventional group was whereas in control group 3.72±0.458. The mean pain score was less in intervention than in control group at 0.05 level of significance with p<0.001, which showed that there was significant difference in level of pain during invasive procedure using distraction card. Distraction is defined as a strategy, whether cognitive or behavioral, that draws a child's attention away from noxious pain stimuli.[10] The gate control theory of pain reveals that pain receptors send the pain signals to the brain and when the distracters is used, it can block certain pain pathways and decrease the amount of perceived pain Thus, using distraction cards during invasive procedure can be effective in reducing the level of pain in children.[21]

Previous studies addressing non pharmacological methods, such as cartoon videos, origami, had confirmed pain reduction in children when they were subjected to invasive procedures.[14] Pain reduction was also reported in previous studies when using various distraction methods during painful medical procedure.[22] Finding of many study indicates that distraction technique i.e distraction cards are effective in reducing pain during invasive procedure.[10,15]

In a prospective, randomized controlled trial conducted in Turkey among 120 children aged 7-12 years, three different distraction methods (squeezing a soft ball, balloon inflation and distraction cards) were used to assess pain and anxiety in children during phlebotomy. They found that the pain level was determined at a lower level in the distraction card group as compared to other method, that is 1.86±2.28, Ball Squeezing 1.93±3.03, Balloon group 2.803.69 and in control group 2.86±3.30, respectively.[23]

In a prospective randomized clinical trial conducted in Egypt in 7-12 years children used distraction cards, Buzzy and balloon inflating, for assessing pain and anxiety levels in children during phlebotomy. Although pain was determined at a lower level in the distraction card group, it was not statistically significant (p>005). Although this situation was not statistically significant, it is clinically significant.[24]

The study findings might help nurses working with the children to use non-pharmacological method (distraction cards) for reducing level of pain during invasive procedure. The study findings would be reference material for future studies in providing the baseline data.

There were several limitations in the study. It was limited to only 6-12 years old children. The sample size was small i.e., 50. It was limited to only selected invasive procedures.

The effectiveness of distraction methods may vary based on age, developmental stage, and individual preference. Therefore, exploring various techniques can help identify the most appropriate interventions for different pediatric settings (using balloon, storytelling, using kaleidoscope etc.) in children during invasive procedure. Studies can also be conducted in different population like infants undergoing vaccination using other forms of distraction, based on the participant's interest.

Conclusion

There was significant difference in level of pain in experimental and control group while using distraction cards among hospitalized children after invasive procedure. Based on the finding of the study, it can be concluded that distraction card was effective in reducing the level of pain immediately after invasive procedure such as intravenous cannulation and blood sample collection.

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Conflict of Interest

None

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None

Author Contribution

This research was a requirement for the thesis of the Masters of Nursing program, and the author is accountable for the concept, design, literature review, data collection, data analysis and draft manuscript.

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