

Effect of Kaleidoscope as Distractor on Pain

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Abstract

Background and Objective: Pain is a ubiquitous experience for any individual; especially for a child. Distraction during painful procedures like venipuncture has been found to reduce child's response to pain during venipuncture. The study was conducted to assess the effect of Kaleidoscope as a distraction tool on pain in children during venipuncture. *Material and Methods:* The design used for the study was True Experimental post test only design. The study was conducted among children between 3-12 years admitted in the paediatric ward and attending paediatric outpatient unit of Jipmer, Puducherry. Hundred samples who fulfilled the inclusion criteria were assigned randomly to experimental and control group. Kaleidoscope was shown to child and the care giver in the experimental group before the procedure and its functioning was explained. Then the child was allowed to look through the kaleidoscope during the procedure and the pain assessment was done using FLACC pain scale. The child in the control group underwent venipuncture without having kaleidoscope as a distractor and the pain was assessed using FLACC Scale. *Results:* The comparison of pain scores between the groups showed that mean pain score in the experimental group and in the control group was 5.46 ± 1.581 and 6.36 ± 1.439 respectively and the differences between the groups were found to be statistically significant ($p < 0.01$). The study showed that pain was associated with the age of children undergoing venipuncture and not found to be associated with other variables. *Conclusion:* The study concluded that Kaleidoscope is effective as a distractor in reducing pain in children during venipuncture. This technique emphasizes the concept and importance of providing atraumatic care to children.

Keywords: Kaleidoscope; Distractor; Pain; Effect.

Introduction

Children are an important asset to any society as their health determines the future of the nation. They are usually referred to as an epitome of endless energy and are constantly on the move; exploring it with their exuberance and curiosity. Every relationship, adventure or an endeavor which they encounter in life has a lasting impact on the way they deal with their tomorrows.

Illness and hospitalization are a major source of stress to both child and parents. Varied factors influence child's reaction to hospitalization which includes family's previous medical experience, the developmental level, child's interaction with the caregiver, the severity of the illness, the complexity of the medical procedure.

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Pillitteri (2010) quoted that the concept of pain is altogether unique. For children, pain is not just a sensation that hurts them: it confuses them to the core as they may not be always able to anticipate it, understand its cause or cannot explain its presence. This in turn makes it difficult for them to explain why it will go off.

Chambers (2009) expressed that pain and discomfort are discernible during many medical procedures. Pain, when left untreated can lead on to acute repercussions in the form of increased release of chemicals and hormones in the body, hyperglycemia, and decreased pain threshold. The long term consequences of inappropriate management of procedural pain include cognitive deficits, disorders of learning, poor motor performances and attention deficit. The inadequate pain management of procedures that disrupts the integrity of body tissues could lead to an increase in child stress and diminished coping abilities. So the nursing action should be aimed at helping the child establish the pre stress psychological state so as to conserve the child's energy by maximizing existing coping mechanisms and mobilizing resources for

dealing with any stressful experience.

Recent advances in the field of pain management indicate that the use of the science of mind to divert the child's attention from painful stimuli in children has gained significant momentum. Various methods of distractions are being employed which includes guided imagery, books, video games, kaleidoscopes, music.

Cilebiuglou (2009) expressed that a kaleidoscope is a toy through which various shapes and colours observed when looked in with one eye while rotating it. It contains various coloured beads. As it is turned over the level of the eye, beads move and combine the appearances in the mirrors. Thus, various appealing designs are formed and observed as the light reflects between the mirrors of the kaleidoscope. When a kaleidoscope is turned, designs vary according to the movement of beads and the same design rarely occurs. Hence, in each turn, different designs strike children's interest.

In clinical postings the investigator has seen that children are exposed to painful procedures with little attempt to reduce the pain associated with it and has felt the need for an easily usable, child centered distractor to effectively reduce the level of pain experienced by the children. Considering all the above facts the investigator found that it is very essential to conduct this study to determine the effectiveness of kaleidoscope in reducing the level of pain in children undergoing venipuncture.

Material and Methods

A true experimental post test only design was used to collect the data in this study. The study was conducted in a tertiary care hospital. The study consisted of 100 participants, 50 in control and 50 in experimental group.

Inclusion Criteria

Included all children admitted to the pediatric ward and attending the pediatric outpatient department of Jipmer, aged between 3 and 12 years, whose parents were willing to give consent and who were conscious and mentally alert.

Exclusion Criteria

Was all children who were critically ill, visually impaired, have neurological impairment, actively convulsing during venipuncture and punctured twice

to get the access to vein.

Sampling

Sampling method for the study was simple random sampling technique using computer generated random numbers.

Instruments

The instrument consisted of 2 parts. Part one of the tool consisted of demographic and clinical characteristics. Part 2 is the FLACC pain assessment scale.

Data Collection Procedure

Ethical clearance was obtained from institution's ethics committee. Informed written consent obtained from parents of children (3-12 years) undergoing venipuncture. The samples were assigned to experimental and control group by using simple random sampling technique using 'computer generated' random numbers. All the venipuncture were carried out in the treatment room of the pediatric ward or the outpatient department. The investigator established a rapport with the child and the caregiver. In the experimental group; Kaleidoscope was shown to child and the caregiver in the experimental group before the procedure and its functioning was explained. The child operates the kaleidoscope and looks through it during the procedure. The investigator assists the child to hold the kaleidoscope. The images inside a kaleidoscope are based on the principle of multiple reflections of coloured objects on typically three mirrors set at 60 degree angle to each other. The child looks into one end and light entering from the other end creates colourful symmetrical patterns inside as one of the cylinders is rotated. The distraction via kaleidoscope began just before the phlebotomy and continued until the end of the phlebotomy. During venipuncture, pain assessment was done using observation method based on the FLACC scale. The child in the control group undergoes venipuncture without having kaleidoscope as a distractor and the pain was assessed using FLACC scale.

Ethical Considerations

The approval for the research proposal was obtained from Ethics Committee. Permission to carry out the study was obtained from the head of pediatric department. Informed written consent was obtained from caregivers of the children participating in the

study. Assurance was given to the subjects that the anonymity and confidentiality would be maintained.

Data Analysis

Descriptive statistics (frequency, mean and standard deviation) and inferential statistics (independent 't' test) were used in the study. The comparison of demographic and clinical variables between the groups was carried out with chi-square. The pain score was expressed as mean with standard deviation and the comparison of pain score between the groups was carried out using Independent student t test.

Results

- ❖ Highest percentage of children were between 3-6 years of age in both control (40%) and experimental group (64%). The proportion of male children who were included in the study was more than the number of female children. Experimental group had 52% male children and in the control group male children were about 60%.
- ❖ Majority of the children suffered from acute illness. Only 22 percent of children in experimental and 12 percent children in control group had chronic ailments. Hospitalisation was a novel experience for over 70 percentage children in both experimental and control groups.

- ❖ Majority of children (70% in the control group and 74% in experimental group) underwent venipuncture within few hours of being in the hospital. For nearly half the study subjects in both the groups, venipuncture was a new experience as 52% children in experimental group and 46% children in control group have not undergone venipuncture previously.
- ❖ Over 90% of the children in both groups had either of their parents present with them during venipuncture. Seventy six percent of venipuncture in experimental group and 78% venipuncture in the control group were carried out to collect blood and the rest were done to insert a cannula into the vein.
- ❖ The comparison of pain scores between the groups showed that the mean pain score in the experimental group and in the control group was 5.46 ± 1.581 and 6.36 ± 1.439 respectively and the differences between the experimental and control groups were found to be statistically significant ($p < 0.01$).
- ❖ The results of the study showed that pain was associated with the age of children undergoing venipuncture ($P < 0.01$).
- ❖ Pain was not found to be associated with other variables like gender, type of illness, history of previous hospitalizations, number of venipunctures in the current admission, number of days in the hospital, size of the needle and purpose of venipuncture.

Table 1: Distribution of study participants in relation to demographic and clinical characteristics in the experimental and control groups (N=100)

Sample characteristics	Experimental group (n=50)		Control group (n=50)		χ ²	P value
	Frequency	Percentage	Frequency	Percentage		
Age						
3-6 years	32	64	20	40	6.29*	
6-9 years	11	22	15	30	df=2	.048
9-12 years	7	14	15	30		
Gender						
Male	27	52	30	60	.367	.343
Female	23	46	20	40	df=1	
Types of illness						
Acute	39	78	44	88	1.77	.143
Chronic	11	22	6	12	df=1	
History of previous hospitalization						
Yes	13	26	15	30	.198	.512
No	37	74	35	70	df=1	
Hospitalization						
OPD	37	74	35	70	1.41	.7
Admitted in hospital	13	2	15	4	df=1	.01

Previous venipuncture						
Nil	26	52	23	46	.414	.8
Once	18	36	21	42	df=2	13
Twice	6	12	6	12		
Presence of caregiver						
Father	13	26	14	28	1.77	.1
Mother	35	70	33	66	df=2	43
Others	2	4	3	6		
Size of the needle						
22 G	19	38	17	34	.174	.4
23 G	31	62	33	66	df=1	18
Purpose of venipuncture						
Blood collection	38	76	39	78	.056	.5
Insertion of cannula	12	24	11	22	df=1	00

*p<0.05

Table 2: Effect of kaleidoscope as a distractor on pain (N=100)

	Experimental group (n=50)		Control group (n=50)		't' value	'p' value
	Mean	SD	Mean	SD		
Pain score	5.46	1.58	6.36	1.44	t=2.977**	.004

**p<0.01

Table 3: Association of pain scores with variables in control group (N=50)

Variable	n	Mean	SD	F or 't' value	'p' value
Age					
3-6 years	32	6.90	1.20	F=15.544	.003**
6-9 years	11	6.09	.94		
9-12 years	7	4.28	1.11		
Gender					
Male	30	6.30	1.53	t=0.035	.722
Female	20	6.45	1.31		
Types of illness					
Acute	44	6.41	1.48	t=0.649	.52
Chronic	6	6.00	1.09		
History of previous hospitalization					
Yes	15	6.00	1.46	t=1.162	.251
No	35	6.51	1.42		
Hospitalization					
OPD	35	6.46	1.40	t=1.0	.402
Admitted in hospital	15	6.50	2.12		
Previous venipuncture in current admission					
Nil	23	6.22	1.563	F=2.865	.067
Once	21	6.81	1.08		
Twice	6	5.33	1.63		
Size of the needle					
22 G	17	5.94	1.39	t=1.495	.141
23 G	33	6.58	1.43		
Purpose of venipuncture					
Collecting blood	39	6.48	1.43	t=1.181	.243
Insertion of cannula	11	5.91	1.44		

*p<0.01

Table 4: Association of pain scores with variables in experimental group (N=50)

Variable	N	Mean	SD	't' or F value	P value
Age					
3-6 years	20	6.75	1.48	F=25.74	*.002
6-9 years	15	5.13	.74		
9-12 years	15	4.067	.80		
Gender					
Male	27	5.52	1.34	t=0.281	.782
Female	23	5.39	1.85		
Types of illness					
Acute	39	5.54	1.68	t=0.657	.514
Chronic	11	5.18	1.17		
History of previous hospitalization					
Yes	13	5.31	1.38	t=0.400	.691
No	37	5.51	1.66		
Hospitalization					
OPD	37	5.43	1.63	t=0.946	.426
Admitted in hospital	13	5.42	1.38		
Previous venipuncture in current admission					
Nil	26	5.0	1.38	F=2.509	.092
Once	18	5.89			
Twice	6	6.16			
Size of the needle					
22 G	19	5.58	1.42	t=1.495	.141
23 G	31	5.39	1.68		
Purpose of venipuncture					
Collecting blood	38	5.34	1.52	t=1.181	.243
Insertion of cannula	12	5.83	1.50		

*p<0.01

Discussion

The comparison of pain scores between the groups showed that the mean pain score in the experimental group and in the control group was 5.46 ± 1.581 and 6.36 ± 1.439 respectively and the differences between the experimental and control groups were found to be statistically significant ($p < 0.01$).

The above finding were supported by the following studies.

A study was conducted by Cilebiuglou, Kucukoglu and Tufekci on the effectiveness of kaleidoscope in relieving pain among 206 children undergoing venipuncture showed that there was significant difference in the level of pain experienced by children in the experimental and control group. The mean scores (3.14 ± 0.41) of the intervention group and the mean scores (3.80 ± 1.42) of the control group was statically significant ($t = 7.602$, $p < 0.001$).

A study (1994) was conducted in United States by Vessey and Mc gill to investigate the effectiveness of kaleidoscope a distraction technique in reducing a child's perceived pain and behavioral distress during an acute pain experience. Hundred children between the age groups of 3 years to 12 years were selected and assigned to experimental and control group by random sampling. The pain scores obtained in the experimental (6.4 ± 1.17) and the control groups (8.2 ± 1.35) were significantly different.

Canbulat, Inal and Sonmezer (2013) compared the effect of kaleidoscope with the control group which received standard care. The study conducted in Turkey consisted of 188 children between 7 and 11 years old who were randomly allotted to three groups. Pain was assessed using Wong-Baker FACES pain rating scale. The kaleidoscope group (3.10 ± 2.16) had lower pain levels than the control group (4.44 ± 3.64). Interestingly, the study result showed there was no significant difference in pain

levels of children of different age and gender. But children who were previously exposed to venipuncture had more tolerance to the pain producing stimuli than those who were not previously exposed to it.

Carlson, Broome and Vessey (2000) compared the use of a kaleidoscope for distraction with standard care. The study was done in New Mexico with a two-group randomized design and studied 384 children in 13 children's hospitals. FACES pain rating scale was used to assess the pain level of children. Significant differences in pain were noted between the group using the kaleidoscope and the control group. The study concluded that using a kaleidoscope produce positive results on children undergoing venipuncture as the instrument produces varied patterns of images and hence the novelty of it never wears off.

Pourmovahed et al assessed the relation between pain and age in children between 3-12 years old found that the mean score of pain severity in the children of 10-12 years (4.6±0.8) old was lower than those of 6 to 9 years old (5.2±1.3). 6-9 year old children had a lower pain score when compared to children between 3-6 years (6.4±1.2)

Conclusion

Distraction is an effective method of managing pain in children during venipuncture. Kaleidoscope is effective as a distractor in reducing pain in children during venipuncture. This emphasizes the concept and importance of providing a traumatic care to children. Providing the child with kaleidoscope is a low cost intervention that can be effectively used in children. Distracting child with kaleidoscope can help to ease pain and discomfort in children.

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