

# Effectiveness of Two Distraction Techniques in Altering Behaviour Response to Pain among Children (1-3 years) Receiving Immunisation at Selected Immunisation Clinics in Mangalore

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**Abstract:** Immunisation is the strengthening of the defense mechanism against infection. Untreated immunisation pain causes undue distress. In addition to this, lack of pain control for injection is a barrier to immunisation. Distraction is an effective means to alter the behavioural response to pain by diverting the attention of the child from the immunisation "shot". Compared to music, toy is an effective distracter because of its audiovisual impact. The aim of the study was to compare the effectiveness of two distraction techniques in altering the behavioural responses to pain among children (1-3 years) receiving immunisation. **Method-**An experimental approach with quasi experimental design was used. The study was conducted at different immunisation clinics of Mangalore. The sample comprised of 60 children aged 1-3 years. The sample was selected using purposive sampling technique and randomly assigned to Group I, Group II and Group III. Formal written permission was obtained from the hospital authorities. Data was collected using a behavioural observation scale. Data was analyzed using descriptive and inferential statistics. **Result-**The result of the study showed that Group II had significant higher behavioural response score than that of group I ( $t_{38}=2.4897$ ,  $P<0.05$ ). ANOVA showed the significant difference among behavioural responses score of the three groups ( $F_{(2, 57)}=6.7086$ ,  $P < 0.01$ ). The findings of the study support the effectiveness of toy as a distracter compared to music. A toy can be used as a distracter in immunisation clinics to alter the behavioural responses while giving immunisation.

**Keywords:** Effectiveness; distraction, sound producing toy, music, behavioural response, pain.

## 1. Introduction

Routine immunisation bumps and bruises, and childhood illnesses mean that pain is a part of the everyday experiences of all infants and children. Younger children are particularly in need of interventions because they report more pain<sup>1</sup> and display more behavioural distress during medical process<sup>2</sup>.

Distraction is effective, especially with naïve participants. First, children in the pre-operational period of cognitive development should be more responsive in seeing the toy and enjoying sound. Second, playing with a toy in the office setting is incompatible with distress behaviour; thus decreasing the anticipating distress reaction, and third, previous studies have shown that when a nurse encourages a child to play with a toy, this generalises to parents, thus reducing parental distress and subsequently the child's distress. Finally, the duration of injection pain is relatively brief, so naïve children who are engaged in playful behaviour with the toy may not notice the brief shot pain<sup>3</sup>. It is observed that children who attended the immunisation clinics showed behavioural responses to pain during immunisation. Many children receive immunisations with little or no formal attempt at reducing the fear and pain associated with the procedure. The reasons given for this range from a belief by healthcare professionals that the immunisations are not painful or are not painful enough to warrant intervention to a belief that although shots are painful, any effective intervention would be too time consuming to be practical in busy settings. So the investigator felt the need that the distracter should be cheap,

easily available, easily usable without any additional training, and less time consuming so that it can be used easily in busy settings as well. So in the present study the investigator compares two cheap and easily available distracters – a toy and music – in altering the behavioural responses to pain in children (1-3 years) receiving immunisation.

## Objective of the Study

- 1) To determine the behavioural responses to pain among children aged between 1 – 3 years who are given a sound producing toy (Group I) as distraction while receiving immunisation.
- 2) To determine the behavioural responses to pain among children aged between 1 – 3 years who are given music (Group II) as a distraction while receiving immunisation.
- 3) To determine the behavioural responses to pain among children aged between 1 – 3 years in the control group (Group III) in which no distraction is used.
- 4) To compare the behavioural responses to pain in Group I, Group II and Group III.

## Assumptions

- 1) Pain is multifactorial.
- 2) Behavioural responses to pain are most common during the shot of injection while immunisation.
- 3) Children exhibit a wide range of behavioural responses to painful stimuli.
- 4) Children's behavioural responses can be minimised using non-pharmacological measures

### Delimitation

The study is delimited to 1-3 year-old children who are attending a selected immunisation clinic for parenteral immunisation.

### Hypotheses

H<sub>1</sub>: There will be significant difference in the severity of behavioural response score of Group I and Group II.

H<sub>2</sub>: There will be significant difference in the severity of behaviour response score of children among Group I, Group II and Group III.

Hypotheses were tested at 0.05 level of significance.

## 2. Research Design

The research design adopted for the study was quasi experimental post-test only control group design. This design, sometimes called after-only control group design, is composed of three randomly assigned groups but neither of which is pre-tested nor pre-measured in the before period of time. The independent variable is introduced into the experimental groups but withheld from the control group.

E <sub>1</sub>	X	O <sub>1</sub>
E <sub>2</sub>	X	O <sub>2</sub>
E <sub>3</sub>		O <sub>3</sub>

E<sub>1</sub>= Group I: Children receiving immunisation where a sound-producing toy is used as a distraction

E<sub>2</sub>= Group II: Children receiving immunisation where music is used as a distraction

E<sub>3</sub>= Group III: Children receiving immunisation without any distraction

O<sub>1</sub>: Observation in Group I by behavioural observation scale

O<sub>2</sub>: Observation in Group II by behavioural observation scale

O<sub>3</sub>: Observation in Group III by behavioural observation scale

## 3. Review of Literature

The review of literature has been organised under the following headings: review of literature carried out to identify behavioural responses to pain during immunization, behavioural responses measurement and assessment identifying various interventions used for reducing behavioural responses to pain.

The pain associated with immunisation is a source of anxiety and distress for the children receiving immunisations, their parents and the providers who must administer them. Preparation of the child before the procedure seems to reduce anxiety and subsequent pain. An experimental study was conducted at Rush University, Chicago, on the effect of skin refrigerant/anaesthetic and age in the pain responses of infants receiving immunisations. MANOVA revealed fewer distress behavioural responses in older infants. The findings provided further evidence that infants perceive pain and that nursing interventions for pain reduction should be tested and extended to the very young<sup>4</sup>.

A comparative study was conducted by Stanford EA, Chambes CT, Craig KD, McGrath PJ, Cassidy KL at the University of British Columbia, Canada to describe verbalisation of pain among children receiving a preschool immunisation and to examine and self-report pain intensity. Fifty-eight children between the ages of 4 years 8 months and 6 years 3 months (67% female) were videotaped while receiving their routine preschool immunisation. Results indicated that many young children do not spontaneously use verbalisations to express pain from immunisation.<sup>5</sup>

A quasi-experimental study was conducted by Bowen MA, Dommeyer MM at University of Wyoming, Laramie, USA, in a county sponsored immunisation clinic to compare the two brief inexpensive techniques, party blower and pinwheel, for children receiving immunisation. Results of the planned comparison indicated significant party blower results in the children's rating of reduced distress ( $p < 0.01$ ). ANOVA showed significant difference ( $F_{(1, 54)}=6.30, p < 0.02$ ) rated by nurses<sup>6</sup>.

An evaluative study was conducted by French MG, Painter CE, Larry LD to find the effect of an active distraction technique on pain in 149 preschool children receiving diphtheria, pertussis and tetanus immunisation in Columbus Public Health Department immunisation clinics aged 4-7 years. Children who were taught to blow out air during their shot had significantly fewer pain behaviour. Results revealed that children who were taught to blow out air during their shots had significantly fewer pain behaviours ( $p < 0.04$ ) and demonstrated a trend towards lower subjectively reported pain ( $P = 0.06$ ). In the experimental group the mean pain behaviour ( $5.24 \pm 0.56$ ) was lesser than the control group ( $5.26 \pm 0.64$ )<sup>7</sup>.

## 4. Methodology

An experimental approach with quasi experimental design was used. The study was conducted at different immunisation clinics of Mangalore, Karnataka, India. Formal written permission was obtained from the hospital authorities. The sample comprised of 60 children aged 1-3 years. The sample was selected using purposive sampling technique and randomly assigned to Group I (sound-producing toy used as a distraction during immunization), Group II (music used as a distraction during immunization) and Group III (control group received immunization without any distraction). Data was collected using a behavioural observation scale, this tool was used by the investigator to observe the children's behavioural response during immunization. It included 10 parameters, namely, looks, cooperation, cry, face, eyes, nose, arms and fingers, legs, respiration and posture. In an observation by category system the parameters were categorized according to the responses. The findings were observed and graded correspondingly. The maximum score was 20 and minimum was 1. Data was analysed using descriptive and inferential statistics.

## 5. Results

**Table 1:** Mean, median, SD and level of behavioural response to pain among children

**N<sub>I</sub> = 20, N<sub>II</sub> = 20, N<sub>III</sub> = 20**

Behavioural Responses	Mean	Median	Standard deviation	Max. obtained score	Min. obtained score	Level of behavioural response
Group I (Distraction with sound producing toy)	10.85	12	5.21	19	1	Moderate
Group II (Distraction with music)	14.85	16	4.94	20	2	Severe
Group III (Control Group)	16.20	17	4.18	20	5	Severe

Table 1 shows that mean score of behavioural responses to pain of Group III (Control Group) (16.2±4.18) was greater than that of Group II (Distraction with music) (14.85±4.94) and Group I (Distraction with sound producing toy) (10.85±5.21). Overall behavioural response in Group I where sound producing toy used as distracter was moderate and was severe in Group II where children were distracted with music and Group III (control group) where distraction was not used.

### Comparison of behavioural responses of Group I (Distraction with sound producing toy) and Group II (Distraction with music)

To compare the behavioural response to pain in Group I and Group II following hypothesis was formulated.

H<sub>01</sub>: There will be no significant difference in behavioural response score of Group I and Group II.

**Table 2:** Comparison of behavioural response score to pain between Group I and Group II

**N<sub>I</sub> = 20, N<sub>II</sub> = 20**

	Mean	SD	Mean difference	t-value
Group I (Distraction with sound producing toy)	10.85	5.21	4	2.4897 *
Group II (Distraction with music)	14.85	4.94		

t<sub>38</sub> = 2.021, p<0.05 \* Significant of 0.05 level

Table 2 shows that there was significant difference in the behavioural response score of children between Group I and Group II (t<sub>38</sub> = 2.4897, p<0.05) suggesting that behavioural response to pain was higher in Group II (Distraction with music) than Group I (Distraction with sound producing toy) (14.85 ± 4.94 vs 10.85 ± 5.21). Hence the null hypothesis H<sub>01</sub> was rejected.

### Comparison of behavioural response of pain among Group I, Group II and Group III

ANOVA was computed to compare three groups. Hence following null hypothesis was formulated.

H<sub>02</sub>: There will be no significant difference in the severity of behavioural response score of children among Group I, Group II and Group III.

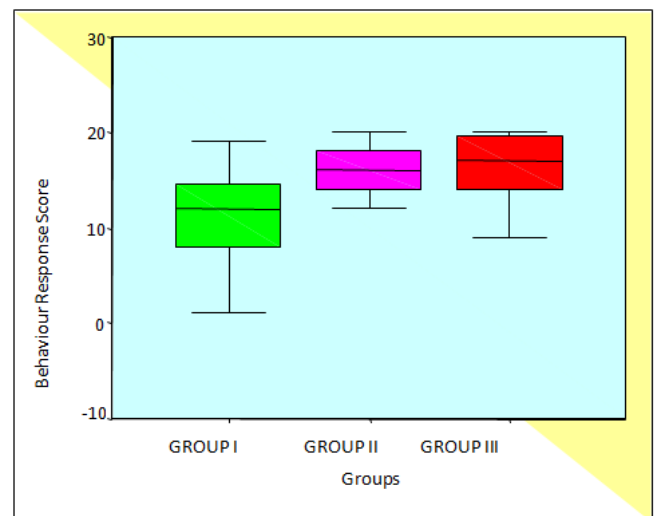
**Table 3:** Comparison of level of behavioural response to pain in Group I, Group II and Group III

**N<sub>I</sub> = 20, N<sub>II</sub> = 20, N<sub>III</sub> = 20**

Source	Sum of square	df	Mean sum of square	Variance ratio F
Total	1621.94	59		
Between groups	309.04	2	154.520	6.7086*
Within group	1312.90	57	23.033	

\* F<sub>(2, 57)</sub> = 4.98, p < 0.01 \* Significant at 0.01 level

The data presented in Table 3 shows that there was a significant difference of behavioural response score among the three groups (F<sub>(2, 57)</sub> = 6.7086, p<0.01).



**\*Figure 1:** Behaviour response score in Group I, Group II and Group III

Figure 1 - Box plot shows that median of Group III (17) was greater than that of Group II (16) and Group I (12). It is also noted that 2.5<sup>th</sup> percentile value of behavioural response score is very high in Group II (12.1) and Group III (9.4) compare to Group I (1.5).

The result of the study showed that Group II had significant higher behavioural response score than that of group I (t<sub>38</sub>=2.4897, P<0.05). ANOVA showed the significant difference among behavioural responses score of the three groups (F<sub>(2, 57)</sub>=6.7086, P < 0.01).

## 6. Discussion with other Study Findings

The study compared the effectiveness of two distraction techniques in altering the behavioural responses to pain among children receiving immunisation. The findings of the present study are discussed with the results of the other similar studies.

### Behavioural responses to pain among children receiving immunisation

The findings of the behavioural responses of children to immunisation shows moderate responses (Mean=10.85±5.21) in Group I (toy was used as a distraction) where as in the Group II (music was used as a distraction) and in Group III (control group), the behavioural

responses were severe with the mean  $14.85 \pm 4.94$  and  $16.2 \pm 4.18$  respectively. The behavioural responses shown by the children were crying, anger, aggression, kicking, hitting, facial tightening, and nasal broadening

Children demonstrate various behavioural distress. The study is supported by the study conducted at Rush University, Chicago on the effect of skin refrigerant/anaesthetic and age in the pain responses of infants receiving immunisation shows that infants demonstrated crying, body movement while receiving immunisation<sup>8</sup>. A study conducted at West Virginia University, Morgantown, USA shows that children undergoing immunisation demonstrated behavioural distress to pain. The present study was in support of this findings<sup>9</sup>.

The study is supported by the study conducted at the Department of Paediatrics, Ohio State University, College of Medicine, Children Hospital, Columbus, OH, to study the effect of an active distraction technique, blowing out air, on pain in preschool children receiving diphtheria, pertussis and tetanus immunisation. The mean score in the experimental group was  $5.24 \pm 0.56$  and in the control group the mean score was  $5.26 \pm 0.64$ <sup>7</sup>.

The study findings are consistent with the findings of a study conducted at Georgia State University, Atlanta and West Virginia University, Morgantown which indicated that infants in distraction groups displayed less distress behaviour<sup>10</sup>.

#### Comparison of behavioural responses to pain in Group I and Group II

While comparing the level of behavioural responses of Group I and Group II, it was found that there was significant difference in behavioural responses scores in the Group I and Group II at 0.05 level ( $t_{38} = 2.4897$ ,  $p < 0.05$ ). The study findings showed that compared to music, toy was effective in altering the behavioural response to pain among children receiving immunisation.

The study is supported by the study conducted at the Department of Paediatrics, Ohio State University, College of Medicine, Children Hospital, and Columbus, OH. The result revealed that children who were taught to blow out air during their shots had significantly fewer pain behaviours ( $p < 0.05$ )<sup>7</sup>.

The study finding is supported by the findings of the study conducted at University of Maryland, Baltimore County, USA, which evaluated a distraction intervention, electronic toy, designed to reduce the distress of preschool children undergoing repeated chemotherapy injection. Children who received distraction (toy) intervention demonstrated lower behavioural distress<sup>11</sup>.

A control clinical try conducted at Columbus Hospital the Ohio State University, USA, revealed that audio distraction was not an effective means of reducing anxiety, pain or non cooperative behaviours during paediatric restrictive dental procedures. The findings of the study are consistent with present study in which audio distraction music proved ineffective in altering the behavioural responses<sup>12</sup>.

#### Comparison of behavioural responses to pain in Group I Group II and Group III

ANOVA showed a significant difference of behavioural responses score among the three groups ( $F_{(2, 57)} = 6.7086$ ,  $p < 0.01$ ).

Another study conducted at University of Wyoming, Laramie, USA in county sponsored immunisation clinic to compare the two briefly in expensive distraction technique, party blower and pin wheel, for children receiving immunisation. Results of planned comparison indicated significant party blower results in the children's rating of reduced distress ( $p < 0.01$ ). ANOVA showed significant difference ( $F_{(1, 54)} = 6.30$ ,  $p < 0.02$ )<sup>8</sup>.

#### 7. Conclusion

As immunisation is a universal experience for children. Distraction is an effective means for reduction of behavioural responses to pain. It can also be used as a routine with immunisation so that children's behavioural responses can be managed in an effective way.

The findings of the study support the effectiveness of toy as a distracter compared to music. A toy can be used as a distracter in immunisation clinics to alter the behavioural responses while giving immunisation. This study concludes that toy is more effective than music in altering the behavioural responses to pain in children receiving immunisation. It is important for the nurses, who administer immunisation, to alter the painful response as much as possible. Nurses must meet the challenges in relieving the pain by distracting the children.

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