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Review Article

# Evaluate the Effectiveness of Kaleidoscope on Pain and Behavioural Responses of Children (4-10 Years) During Intravenous

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## Abstract

**Background:** Intravenous (IV) cannulation is a common and painful procedure for hospitalized children. Non-pharmacological techniques like distraction can reduce pain and anxiety. This study aimed to evaluate the effectiveness of a kaleidoscope as a distraction tool in managing pain and behavioral responses during IV cannulization.

**Objectives:**

To evaluate the effectiveness of a kaleidoscope on pain and behavioral responses during IV cannulization in the experimental group.

To compare pain and behavioral responses in experimental and control groups.

To assess the association between pain and behavioral responses with selected demographic variables.

**Methods:** A quasi-experimental non-equivalent control group design was adopted. A total of 30 children aged 4-10 years undergoing IV cannulization at the SDM Hospital Paediatric Ward were selected using a non-probability purposive sampling technique. The experimental group (n=15) was exposed to a kaleidoscope, while the control group (n=15) received standard care. Pain levels were measured using the Wong-Baker Faces Pain Scale, and behavioural responses were assessed using a Modified Behavioural Pain Scale. Descriptive and inferential statistics were used to analyze the data.

**Results:** The mean post-test pain score for the experimental group (M=0.73) was significantly lower than the control group (M=4.2) ($t=15.22$, $p<0.05$). Similarly, the mean behavioural response score for the experimental group (M=1.47) was significantly lower than the control group (M=8.33) ($t=17.27$, $p<0.05$). A significant association was found between post-test pain scores and demographic variables like family type in the experimental group and gender in the control group.

In the experimental group, 33% of children reported no pain (score 0), and 60% reported only a little pain (score 1). Meanwhile, in the control group, 53.3% reported a whole lot of pain (score 4), and 33.3% reported the worst pain (score 5). For behavioural responses, 73% of children in the experimental group displayed mild responses, whereas 67% in the control group exhibited severe behavioural responses such as crying and avoidance.

The statistical analysis further highlighted significant differences in pain and behavioural responses between the groups, reinforcing the effectiveness of the kaleidoscope as a distraction tool. Notably, variables like type of family and gender influenced outcomes, emphasizing the importance of considering demographic factors in pain management strategies.

**Conclusion:** The study demonstrated that the kaleidoscope is an effective distraction tool for reducing pain and behavioural responses among children undergoing IV cannulization. Incorporating such non-pharmacological interventions in Paediatric nursing practice can improve the quality of care and patient experience.

**Keywords:** kaleidoscope; pain management; behavioural responses; intravenous cannulization; non-pharmacological techniques

## Introduction

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Intravenous (IV) cannulization, a common yet invasive procedure, is often distressing for children, leading to fear, anxiety, and behavioural disturbances. Non-pharmacological interventions, such as distraction techniques, have proven effective in alleviating procedural pain and anxiety.

A kaleidoscope, an optical instrument with colorful patterns, can serve as a distraction tool by diverting a child's attention away from the painful procedure. This study evaluates the effectiveness of using a kaleidoscope on pain and behavioural responses among children undergoing IV cannulization.

### Objectives

To evaluate the effectiveness of a kaleidoscope on pain and behavioural responses during IV cannulization in the experimental group.

To compare pain and behavioural responses in experimental and control groups.

To assess the association between pain and behavioural responses with selected demographic variables.

## Materials and Methods

**Research Design:** A quasi-experimental non-equivalent control group post-test-only design was used.

**Setting:** The study was conducted at the Paediatric Ward of SDM Hospital, Dharwad, Karnataka, India.

**Sample and Sampling Technique:** Thirty children aged 4-10 years undergoing IV cannulization were selected using non-probability purposive sampling. The experimental group (n=15) received the kaleidoscope intervention, while the control group (n=15) did not.

**Inclusion Criteria:**

Children aged 4-10 years undergoing IV cannulization.

Parents who provided informed consent.

**Exclusion Criteria:**

Chronically ill or mentally challenged children.

Children with sensory impairments.

**Tools:**

**Wong-Baker Faces Pain Scale**: Measures perceived pain on a scale of 0-5.

**Modified Behavioural Pain Scale**: Assesses behavioural responses (e.g., crying, avoidance) on a scale of 0-10.

**Procedure:**

For the experimental group, the kaleidoscope was introduced 2 minutes before and during IV cannulization.

Pain and behavioural responses were assessed immediately after the procedure in both groups.

**Ethical Considerations:** Ethical clearance was obtained from the Institutional Ethics Committee, and informed consent was secured from parents.

**Data Analysis:** Descriptive statistics (mean, standard deviation) and inferential statistics (t-test, chi-square test) were used to analyze the data.

## Results

1. **Pain Scores:**

| Group | Mean Pain Score | Standard Deviation | t-value | p-value |
|---|---|---|---|---|
| Experimental Group | 0.73 | 0.57 | 15.22 | <0.05 |
| Control Group | 4.20 | 0.62 | | |

2. **Behavioural Responses:**

| Group | Mean Behavioural Score | Standard Deviation | t-value | p-value |
|---|---|---|---|---|
| Experimental Group | 1.47 | 0.88 | 17.27 | <0.05 |
| Control Group | 8.33 | 1.25 | | |

3. **Pain Levels by Groups:**

| Pain Level | Experimental Group (%) | Control Group (%) |
|---|---|---|
| No Pain (0) | 33 | 0 |
| Little Pain (1) | 60 | 0 |
| Slight Pain (2) | 7 | 0 |
| Moderate Pain (3) | 0 | 13.3 |
| Severe Pain (4) | 0 | 53.3 |
| Worst Pain (5) | 0 | 33.3 |

**Pain Scores**: Children in the experimental group reported significantly lower pain levels compared to the control group, highlighting the effectiveness of the kaleidoscope in distracting children during the IV procedure. Over 93% of children in the experimental group experienced no or little pain, whereas all children in the control group reported moderate to severe pain.

4. **Behavioural Response Levels:**

| Behavioural Response Level | Experimental Group (%) | Control Group (%) |
|---|---|---|
| No Behavioural Distress | 27 | 0 |
| Mild Distress | 73 | 0 |
| Moderate Distress | 0 | 6.6 |
| Severe Distress | 0 | 67 |
| Very Severe Distress | 0 | 36.6 |

**Behavioural Responses**: The majority of children in the experimental group showed mild behavioural responses, such as calmness or slight restlessness, indicating reduced anxiety and distress. In contrast, the control group showed severe and very severe behavioural responses, such as crying and resistance, underscoring the distress caused by the procedure without distraction

### Demographic Variables:

**Experimental Group:** Type of family was significantly associated with pain scores (chi-square=6.9, $p<0.05$).

**Control Group:** Gender was significantly associated with pain scores (chi-square=5.08, $p<0.05$).

**Demographic Influence**: Specific demographic variables, like family type (in the experimental group) and gender (in the control group), were associated with pain levels. This suggests that individual and familial factors may influence children's coping mechanisms during medical procedures.

## Discussion:

The findings of this study align with previous research demonstrating the effectiveness of distraction techniques in reducing procedural pain and anxiety in children. The kaleidoscope provided visual stimulation, diverting attention and reducing pain perception during IV cannulization. This non-invasive, cost-effective intervention has significant implications for Paediatric nursing practice.

## Conclusion:

The kaleidoscope effectively reduced pain and behavioural responses among children undergoing IV cannulization. This study emphasizes the importance of incorporating distraction techniques into routine Paediatric care to enhance patient comfort and satisfaction.

### Implications for Nursing Practice

**Education:** Nursing curricula should include training on non-pharmacological pain management techniques.

**Practice:** Nurses should incorporate distraction tools like kaleidoscopes in Paediatric wards to improve patient care.

**Research:** Further studies with larger sample sizes and diverse settings are recommended to validate these findings.

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