

# The Effect of Different Distraction Methods on Pain and Anxiety in Children

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## ABSTRACT

This study has been carried out experimentally in order to determine the effects of using rain sticks and kaleidoscope on pain, anxiety and parental satisfaction during blood collection in children aged 5-12 years. This research is a randomized controlled study. The research was performed with a total of 105 children and their parents, including the Experimental Group I (Rain Stick) consisting of 35 children, the Experimental Group II (Kaleidoscope) consisting of 35 children, and the Control Group consisting of 35 children who met the sample inclusion criteria. It was adhered to the CONSORT guidelines in the study. The pain score averages of the Experimental Group I and Experimental Group II were found to be significantly lower compared to the Control Group ( $p<0.05$ ) according to the self-report of the children and the report of the parents and the researcher. When the children's Anxiety Scale-State mean scores were evaluated according to their self-evaluations, parents and researchers it was found that while there was no significant difference between the groups in terms of mean anxiety scores before the procedure ( $p>0.05$ ), there was a significant difference between the groups in terms of mean anxiety scores during the procedure ( $p<0.05$ ). It was determined that the use of rain stick and kaleidoscope were effective in reducing the level of pain and anxiety felt during blood collection in children.

## Farklı Dikkat Dağıtma Yöntemlerinin Çocuklarda Ağrı ve Anksiyete Üzerindeki Etkisi

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## ÖZET

Bu araştırma 5-12 yaş grubu çocuklarda kan alma işlemi sırasında yağmur çubukları ve kaleydoskop kullanımının ağrı, anksiyete ve ebeveyn memnuniyeti üzerine etkisini belirlemek amacıyla deneysel olarak yapıldı. Bu araştırma 1 Nisan-1 Temmuz 2022 tarihleri arasında Türkiye'nin doğusundaki bir ilin üniversite hastanesinin çocuk polikliniği kan alma ünitesinde paralel gruplarla yürütülen randomize kontrollü bir çalışmadır. Örneklem dahil edilme kriterlerini karşılayan I. Deney Grubu (Yağmur Çubuğu) 35, II. Deney Grubu (Kaleydoskop) 35 ve Kontrol Grubu 35 olmak üzere toplam 105 çocuk ve ebeveyni ile gerçekleştirildi. Araştırma verilerinin toplanmasında "Çocuk Anksiyete Skalası-Durumluluk" ve "Wong-Baker Yüzler Ağrı Ölçeği" kullanıldı. Çalışmada, CONSORT yönergelerine bağlı kalındı. Çocukların öz bildirimine, ebeveyn ve araştırmacının raporuna göre ağrı puan ortalamaları I. Deney Grubu ve II. Deney Grubunda Kontrol Grubuna göre anlamlı derecede daha düşük bulundu ( $p<0.05$ ). Çocukların Anksiyete Skalası-Durumluluk puan ortalamaları öz değerlendirmelerine, ebeveynlerine ve araştırmacılara göre değerlendirildiğinde; gruplar arasında işlem öncesi kaygı puan ortalamaları açısından anlamlı fark yok iken ( $p>0.05$ ), işlem esnasında kaygı puan ortalamaları açısından anlamlı fark olduğu bulundu ( $p<0.05$ ). Yağmur çubuğu ve kaleydoskop kullanımının, çocuklarda kan alınması sırasında hissedilen ağrı ve kaygı düzeyini azaltmada etkili olduğu belirlendi.

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## INTRODUCTION

Pain is a subjective experience which is affected through sociocultural, environmental and individual factors and which has cognitive, behavioral and emotional dimensions (Özveren, 2011). Pain has important effects on both the physical and psychological health of infants and children. Pain can cause behavioral and cognitive changes such as fear, anxiety and depression in children (Inal & Şahiner, 2015; Lago et al., 2009). Medical invasive procedures such as injections, blood collection, and vascular access are a source of pain, fear and anxiety in children. These fears experienced by children during hospitalization may lead to reluctance to participate in long-term treatment and care procedures (Taddio & McMurtry, 2015).

There are numerous non-pharmacological methods utilized in order to reduce pain and anxiety in children during medical procedures. Non-pharmacological methods utilized for pain control are simple and inexpensive to use, have few side effects and reduce the use of analgesics (Hussein, 2015). One of the most common non-pharmacological methods utilized in order to reduce pain during medical procedures in children is distraction. The distraction method is a nursing intervention which enables the child to better control and reduce pain by focusing attention elsewhere (Bulut et al., 2020; Cohen et al., 2008). Listening to music, watching cartoons, using kaleidoscope and virtual reality glasses, playing video games are some of such methods utilized by children to distract them. There are studies in the literature showing that distraction methods are effective in reducing children's pain and anxiety (Inan & Inal, 2019; Kuo et al., 2018; Miguez-Navarro, 2016).

One of the nonpharmacological methods is music interventions. Music therapy refers to a systematic intervention process to improve the health outcomes of patients (Lee, 2016; van der Heijden, 2019). Music intervention facilitates a sense of control in patients (Avers et al., 2007), provides emotional calmness, relaxation and mental distraction (Henry, 1995; Ting et al., 2022). Music therapy helps children cope with pain and stress (Colwell et al., 2013; Heijden et al., 2019).

The rain stick is an African musical instrument that imitates the sound of light rain. It is basically a long tube of dynamic components with light particles (sand, beads, various seashells, etc.) that contains static barriers (wooden pegs, etc.). When the rain stick is inverted, the particles descend towards the lower end under the influence of gravity. They collide with obstacles on their way, thus making a sound similar to raindrops. That's why it gets the name "rain stick". It is used to create atmospheric sounds or as a percussion instrument (Wolfson et al., 2019). Rain sticks are tools that have the function of helping children's sensory development as they provide visual, tactile and auditory stimuli (Ayala et al., 2020; Velásquez & Millán, 2008).

There are studies investigating the effect of the use of kaleidoscope (Canbulat et al., 2014; Karakaya & Gözen, 2016; Kunjumon & Upendrababu, 2018; Özkan & Polat, 2020; Prajapati, 2018) and music (Aydın & Canbulat Sahiner, 2017; Heijden et al., 2019; Klassen et al., 2008) on children's perceived pain and anxiety levels. There are a limited number of studies investigating the effect of using kaleidoscope and music together on reducing children's perception of pain during invasive procedures. These studies have revealed the fact that kaleidoscope and music reduce children's perception of pain (Bulut et al., 2020; Özkan, 2020). However, no study was found in the literature in which the rain stick tool was utilized as a musical intervention during the blood collection process. This study addresses gaps in the evidence base as the first to compare the efficacy of two different techniques. As such, the study provides important information on the subject. The results of this study can guide pediatric nurses in the selection of distraction methods.

The objective of this study is to investigate the effects of rain stick and kaleidoscope use on children's pain and anxiety levels and parental satisfaction during blood collection in children.

The hypotheses of this study include the following;

H1. Children to whom rain stick is applied have less pain and anxiety during blood collection.

H2. Children to whom kaleidoscope is applied have less pain and anxiety during blood rain bar.

H3. Children who receive rain sticks have higher parental satisfaction during blood collection.

H4. Children who receive kaleidoscopes have higher parental satisfaction during blood collection.

## **METHOD**

### **Type of Research, Conduction Place and Time of Research**

The randomized controlled experimental type planned study was conducted on 1 April-1 July 2022 in the pediatric outpatient clinic blood collection unit of a university hospital in a city located in eastern Turkey.

### **Population and Sample of the Research**

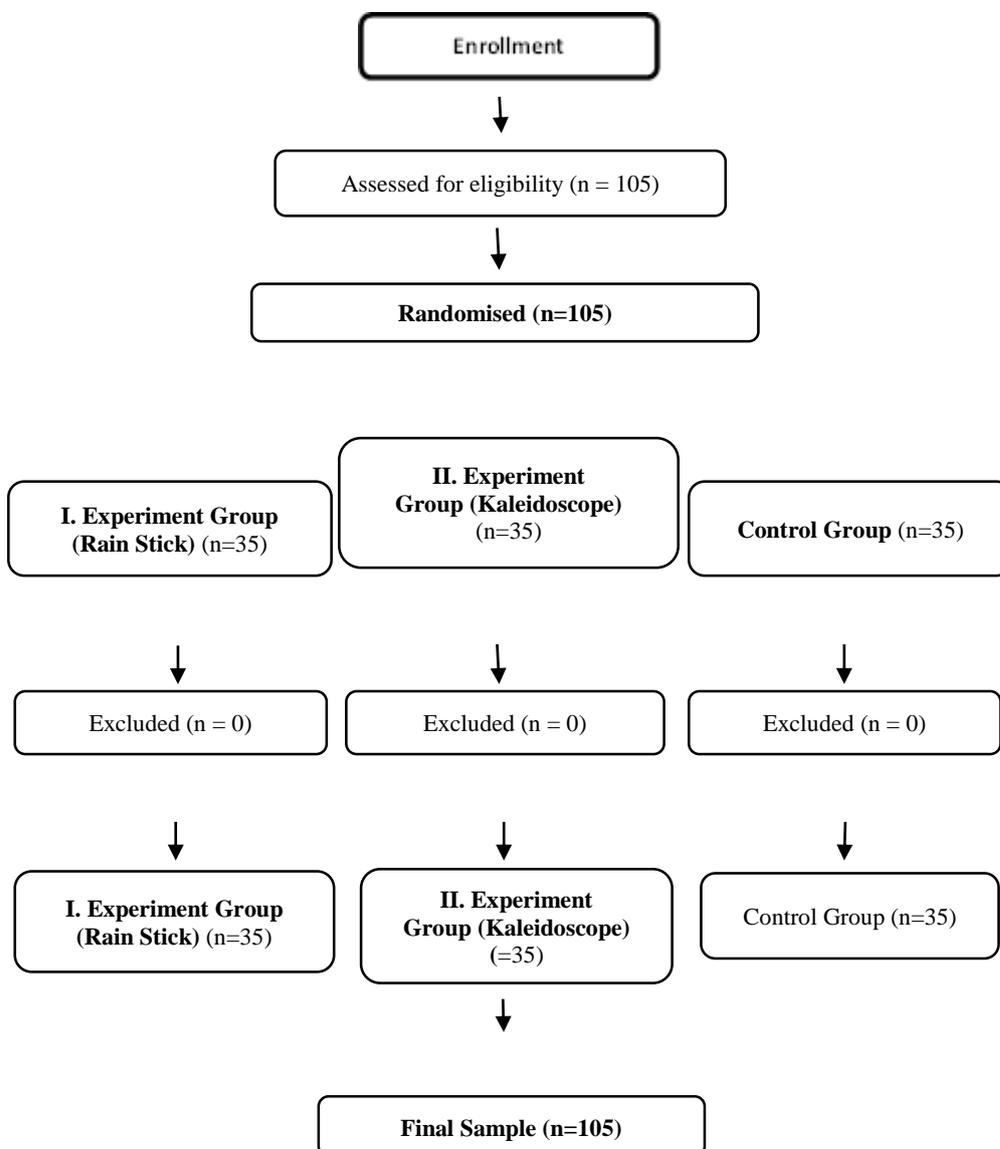
The population of the study included children aged 5-12 years who applied to the pediatric polyclinic blood collection unit of the hospital specified in April-July 2022. Number of samples in the study was calculated using the program G\*Power 3.1.9.7. Data obtained in Gerçeker et al. (2020)'s study was used in calculating the number of samples. For the Anova test, which was conducted by taking into consideration the 3-group (Experiment I, Experiment II and Control) and 4-measurement (child, parent, researcher, nurse) research design in the calculation, the sample size was calculated as 25 people for each group when the medium effect size was 0.75, 95% power, and 0.05 margin of error was taken (Cohen, 1988). Taking into account the data loss, between the dates specified, 35 children patients were included in the volunteer experimental group I (Rain stick) who met the research criteria and 35 children patients were included in the volunteer experimental group II and 35 children patients were included in the volunteer control group who met the research criteria and the study was completed with a total of 105 children and their parents. No child terminated the application or no child was removed from the sample. Children and parents who were between the ages of 5 and 12, had no hearing or vision problems, could speak and understand Turkish, had blood samples taken at the first test, and volunteered to participate in the study were included in the study.

### **Randomization**

Since it was not specified which method was used in the intervention for the children, single blinding was provided. Experimental Group I (rain sticks), Experimental Group II (Kaleidoscope) and Control group were formed by randomization of the control and experimental groups using the closed envelope method and by the simple randomization method. Groups were formed by simple randomization method by drawing lots with a closed envelope. Equal numbers of cards on which Experimental Group I, Experimental Group II and Control Group are written were placed in closed envelopes. The children were asked to choose one of these envelopes. For the child included in the application group, lots were drawn again and the group was determined (Rain stick and Kaleidoscope). In children whose groups were determined, pain and anxiety were evaluated by applying the distraction method (Rain stick and Kaleidoscope) during the procedure (Figure 1).

**Figure 1**

*CONSORT Flow Diagram*



**Data Collection Tools**

Questionnaires and scales were used to collect study data.

**Question Form**

In this section, there are 7 questions regarding the descriptive characteristics of children and parents (age, gender, age of the parent, educational status of the parent, number of children, presence of the parent with the child during the blood collection, hospital experience).

### ***Wong Baker Faces Pain Scale (WBFPS)***

This scale, which evaluates the severity of pain, is used in children aged 3-18 years. In this scale, pain scores are given to facial expressions according to numerical values, and the numerical rating of the scale varies between 0 and 10. Facial expressions rated from smiling (0 = very happy / no pain) to crying (10 = most painful) indicate emotions. As the score obtained from the scale increases, the severity of pain increases, and as the score decreases, the severity decreases. The child can more accurately tell the nurse about the pain he or she is experiencing by virtue of the drawing showing what each of the different numbers on the pain scale mean. This scale is considered as a reliable measurement tool for the Turkish population (Tsao and Zeltzer 2008) (Figure 2).

### ***Child Anxiety Scale-State (CAS-S)***

CAS-S is a thermometer-like scale with a light bulb at the bottom and horizontal lines at intervals that go up. On the scale, children are instructed to "Imagine all your anxious or frustrated feelings are in the bulb or bottom of the thermometer." "If you're a little worried or nervous, emotions can run a little high on the thermometer. If you are very, very anxious or nervous, the emotions can run high. Put a line on the thermometer that shows how worried or angry you are". To measure state anxiety (CAS-S), the child is asked to mark what he feels "right now". Before the CAS-S is filled, the child's sequencing ability is monitored. He is asked to count to ten, "Which is bigger, seven or four?" is asked to answer. Children who cannot successfully complete these tasks or do not understand the instructions are not asked to fill out the CAS-S. Following data collection, two members of the research team review and score the child's CAS-S scores. A transparent meter is placed above the child's rating with increments of ½ point marked, then the increment of ½ point is rounded to the nearest number. The score can vary between 0 - 10 (Gerçeker et al ., 2018).

### ***Patient Parent Satisfaction Form***

In order to evaluate the satisfaction of the parents with the blood collection process, it was created by the researchers as "Not Satisfied=1", "Dissatisfied=2", "Undecided=3", "Satisfied=4" and "Very Satisfied=5".

### ***Rain Stick***

The rainstick used by traditional societies is a rhythm instrument that makes the sound of rain by moving it up and down. The length of the rain stick made of bamboo is 40 cm. Inside the tool, which is closed at both ends, there are small spiral-shaped needles and thorns. The sound of drizzling rain is produced by moving it up and down.

### ***Kaleidoscope***

A kaleidoscope is a device in which colorful patterns are seen when looked into. Inside, there are three mirrors adjacent to each other with an inclination of 60 degrees. There are pieces of colored glass between the mirrors. When viewed from one end of this binocular, shape-shifting polygons are seen, often with images that will never be the same again. These patterns are produced by the reflection of light and constantly change as the binoculars are moved.

## **Data Collection**

After obtaining the necessary institutional permission from the human research ethics committee and the hospital management, parents and children who came to the blood collection room were informed about the research through the "Informed Voluntary Consent Form". Research data were collected by the researcher by face-to-face interview technique. Firstly, a questionnaire including questions such as the age of the child, the time of the last blood collection, the parent's presence with the child was applied to the parents. Before the procedure, the anxiety status of the children was assessed using CAS-S. The anxiety level was assessed by the child, parent, researcher and nurse. Subsequently, the children were asked to choose one of the sealed envelopes to ensure randomization, and they went to the blood collection room for the procedure.

Experiment Group 1 and sat on the patient's chair, the sound of the rain stick was started to be heard one minute before the blood collection. At that time, the nurse began to prepare the child for the blood collection. The tourniquet insertion procedure and the determination of the vein from which blood would be collected from the antecubital region were performed by the nurse. Blood collection was taken from the antecubital region in one go by the same nurse by means of a vacuum blood collection tube, and blood flowed to the vacuum within 5 seconds, showing that the procedure was successful. This process took about 2-3 minutes and children listened to the sound of rain sticks throughout the process. CAS-S was used to determine the anxiety level during the procedure. The anxiety level was evaluated by the child, parent, researcher and nurse. After the procedure, the children were taken out of the blood collection room and taken to the waiting room, and they were asked to determine the severity of pain they felt during the procedure. WBFPS was used to find out how much pain the child was experiencing during the blood collection procedure. Pain levels were evaluated by the child, parent, researcher and nurse. Patient Parent Satisfaction Form was used to assess parental satisfaction.

The child, who was taken into Experimental Group 2, was started to watch the kaleidoscope one minute before the blood collection procedure, as he sat on the patient's chair. At that time, the nurse began to prepare the child for the blood collection. The tourniquet insertion procedure and the determination of the vein from which blood would be drawn from the antecubital region were performed by the nurse. Blood collection was taken from the antecubital region in one go by the same nurse by means of a vacuum blood collection tube, and blood flow to the vacuum within 5 seconds showed that the procedure was successful. This process took about 2-3 minutes and the children watched the kaleidoscope throughout the process. CAS-S was used to determine the anxiety level during the procedure. The anxiety level was evaluated by the child, parent, researcher and nurse. After the procedure, the children were taken out of the blood collection room and taken to the waiting room. WBFPS was used to find out how much pain the child was experiencing during the blood collection procedure. Pain levels were evaluated by the child, parent, researcher and nurse. Patient Parent Satisfaction Form was used to assess parental satisfaction. Pain levels were evaluated by the child, his parents, the researcher and the nurse.

No interventional procedure was applied to the children in the control group. The blood collection procedure was arranged to be taken from the antecubital region in one go by the same nurse by means of a vacutainer. CAS-S was used to determine the anxiety level during the procedure. The anxiety level was evaluated by the child, parent, researcher and nurse. After the procedure, the children were taken out of the blood collection room and taken to the waiting room. WBFPS was used to find out how much pain the child was experiencing during the blood collection procedure. Pain levels were evaluated by the child, parent, researcher and nurse. Patient Parent Satisfaction Form was used to assess parental satisfaction. Pain levels were evaluated by the child, his parents, the researcher and the nurse.

## Analysis and Evaluation of Data

“SPSS 21.0 for Windows (Statistical Package for Social Sciences, IBM SPSS, Version 21.0., Armonk, NY: IBM Corp) package program” was used in the analysis of the data obtained through the questionnaire. In the evaluation of the data; percent, mean, Chi-square, One-Way Analysis of Variance, Kruskal Wallis Test and effect size were used. Descriptive features were compared with the chi-square test in the two groups. The child's self-evaluation and procedural anxiety scores regarding the pain score did not show normal distribution; the comparison of pain and anxiety scores of the two groups was evaluated by virtue of Kruskal Wallis analysis. Due to the normal distribution of pain and pre-procedural anxiety scores of the two groups at the time of blood collection, one-way analysis of variance was used to compare the mean scores of the groups. A Post Hoc Tamhane test was used in further analysis to find the difference between groups. Furthermore, the statistical significance level was taken as 0.05 in all tests. The conformity of the data to the normal distribution was evaluated using the Shao method in order to obtain statistical results,. Accordingly, the Skewness value was 0.873 while the Kurtosis value was 0.267, and it was found to have a normal distribution between -3 and +3.

## RESULTS

The descriptive characteristics of the children and parents included in the study are given in Table 1. 65.7% of the children in the experimental group I were in the 9-12 age group, 51.4% of them were girls, 77.1% of them had previous hospital experience and 71.4% of them were with their mothers during the blood collection and it was also found that the mean age of the parents was  $36.42 \pm 6.53$  years, 42.9% of them had 2 children and 34.3% of them were primary and high school graduates. 57.1% of the children in the experimental group II. were in the 5-8 age group, 60.0% of them were girls, 74.3% of them had previous hospital experience, and 85.7% of them were with their mothers during the blood collection; it was determined that the mean age of the parents was  $37.31 \pm 6.51$  years, 48.6% of them had 2 children and 34.3% of them were primary school graduates. 57.1% of the children in the control group were in the 5-8 age group, 57.1% of them were girls, 68.6% of them had previous hospital experience and 74.3% of them were with their mothers during the blood collection; it was determined that the mean age of the parents was  $37.48 \pm 4.71$  years, 48.6 % of them had 2 children and 31.4% of them were high school and university graduates. Also, as seen in Table 1 the three groups were statistically similar to each other in terms of child and parent characteristics, ( $p > 0.05$ ).

**Table 1**  
*Descriptive Characteristics of Children and Parents*

	<b>I. Experiment Group (Rain Stick) (n=35) n(%)</b>	<b>II. Experiment Group (Kaleidoscope) (n=35) n(%)</b>	<b>Control Group (n=35) n(%)</b>	<b>x<sup>2</sup></b>	<b>p</b>
<b>Descriptive Characteristics of Children</b>					
<b>Age(Year)(Mean±SD)<sup>a</sup></b>	9.17±2.07	8.22±2.00	8.02±2.35	F=2.817**	0.064
<b>Age Group</b>					
5-8 Year	12(34.3)	20(57.1)	20(57.1)	4.877*	0.087
9-12 Year	23(65.7)	15(42.9)	15(42.9)		
<b>Gender</b>					
Female	18(51.4)	21(60.0)	15(42.9)	2.059*	0.357
Male	17(48.6)	14(40.0)	20(57.1)		
<b>Child's previous hospital experience</b>					
Yes	27(77.1)	26(74.3)	24(68.6)	0.682*	0.711
No	8(22.9)	9(25.7)	11(31.4)		

The parent who is with the child during the blood draw					
Mother	25(71.4)	30(85.7)	26(74.3)	2.269*	0.322
Father	10(28.6)	5(14.3)	9(25.7)		
Parent's Descriptive Characteristics					
Age (Year) (Mean±SD) <sup>a</sup>	36.42±6.53	37.31±6.51	37.48±4.71	F=0.315**	0.735
Number of children					
1	4(11.4)	2(5.7)	3(8.6)	2.057*	0.914
2	15(42.9)	17(48.6)	17(48.6)		
3	13(37.1)	13(37.1)	10(28.6)		
4 and above	3(8.6)	3(8.6)	5(14.3)		
Educational Status					
Primary school	12(34.3)	12(34.3)	9(25.7)	4.241*	0.644
Middle School	6(17.1)	7(20.0)	4(11.4)		
High school	12(34.3)	9(25.7)	11(31.4)		
University and Above	5(14.3)	7(20.0)	11(31.4)		

<sup>a</sup>Mean ± Standard Deviation \*Chi-square \*\*One-Way Analysis of Variance

The comparisons of the groups in terms of WB-FACES and parental satisfaction mean scores are provided in Table 2. The scale was evaluated by children's self-evaluations, parents, researcher and nurse. There was a significant difference between the groups in terms of pain score averages ( $p < 0.05$ ). The effect sizes were as follows:  $\eta^2(\text{WB-Faces/self-assessment}) = 0.443$  (medium effect size),  $\eta^2(\text{WB-Faces/parent report}) = 0.522$  (big effect size),  $\eta^2(\text{WB-Faces/researcher report}) = 0.587$  (effect size),  $\eta^2(\text{WB-Faces/nurse report}) = 0.458$  (effect size). There was a significant difference between the groups in terms of parental satisfaction score averages ( $p < 0.05$ ). The effect size of parent satisfaction was determined as  $\eta^2 = 0.287$  (small effect size).

**Table 2**  
Comparison of Wong-Baker Faces Pain Scale Mean Scores by Groups

		I.	II.	Control Group (n=35)	KW	p	Effect size ( $\eta^2$ )	95% CI
		Experiment Group (Rain Stick) (n=35)	Experiment Group (Kaleidoscope) (n=35)					
		Mean±SD <sup>a</sup> (Min-Max)	Mean±SD (Min-Max)					
Procedural pain scores by WB-Faces	Self-Report	1.25±1.09 (0-4)	1.14±1.39 (0-4)	4.91±2.96 (0-10)	43.683*	<b>0.000</b>	0.443	1.92-2.95
	Parent Report	1.42±1.50 (0-6)	1.31±1.18 (0-4)	5.65±2.80 (0-10)	52.557*	<b>0.000</b>	0.522	2.25-3.34
	Researcher Report	1.02±1.22 (0-4)	1.37±1.16 (0-4)	6.05±2.93 (0-10)	58.038*	<b>0.000</b>	0.587	2.23-3.40
	Nursing Report	0.85±1.24 (0-4)	1.20±1.30 (0-4)	4.97±3.07 (0-10)	43.261*	<b>0.000</b>	0.458	1.80-2.87
	Parent Satisfaction	4.97±0.16 (4-5)	4.88±0.32 (4-5)	4.45±0.50 (4-5)	F=20.532*	<b>0.000</b>	0.287	4.68-4.85

Abbreviations: WB, Wong-Baker. <sup>a</sup> Mean ± Standard Deviation \* Kruskal Wallis Test

The comparisons of the groups in terms of Child Anxiety Scale-State mean scores are provided in Table 3. The scale was evaluated by children's self-evaluations, parents, researchers and nurses. While there was no significant difference between the groups in terms of mean anxiety scores before the procedure ( $p>0.05$ ), there was a significant difference between the groups in terms of mean anxiety scores during the procedure ( $p<0.05$ ). The effect sizes of anxiety scores during the procedure were as follows:  $\eta^2$ (CAM-S/self-evaluation) =0.546 (Effect size),  $\eta^2$ (CAM-S/parent report) =0.528 (Effect size),  $\eta^2$ (CAM-S/researcher report) =0.502 (Effect size),  $\eta^2$ (CAM-S/nurse report) =0.388.

**Table 3**  
Comparison of Child Anxiety Scale Mean Scores before and during the procedure according to the groups

Anxiety Score	I. Experiment Group (Rain Stick) (n=35)	II. Experiment Group (Kaleidoscop) (n=35)	Control Group (n=35)	Test Value	p	Effect size ( $\eta^2$ )	95% CI
	Mean $\pm$ SD <sup>a</sup> (Min-Max)	Mean $\pm$ SD (Min-Max)	Mean $\pm$ SD (Min-Max)				
<b>Self Report</b>							
Before the procedure	3.94 $\pm$ 2.62	5.42 $\pm$ 3.40	5.08 $\pm$ 3.09	F=2.267	0.109**	0.043 <sup>b</sup>	4.22-5.41
Moment of procedure	0.48 $\pm$ 0.95	0.14 $\pm$ 0.49	4.77 $\pm$ 3.20	KW=63.357	<b>0.000*</b>	0.546 <sup>b</sup>	1.24-2.35
<b>Parent Report</b>							
Before the procedure	4.62 $\pm$ 2.91	4.97 $\pm$ 2.74	5.31 $\pm$ 2.99	F=0.493	0.612**	0.010 <sup>b</sup>	4.41-5.52
Moment of procedure	0.28 $\pm$ 0.66	0.25 $\pm$ 0.65	4.80 $\pm$ 3.41	KW=61.321	<b>0.000*</b>	0.528 <sup>b</sup>	1.20-2.35
<b>Researcher Report</b>							
Before the procedure	4.02 $\pm$ 1.85	4.40 $\pm$ 1.97	5.20 $\pm$ 2.58	F=2.682	0.073**	0.050 <sup>b</sup>	4.11-4.96
Moment of procedure	0.34 $\pm$ 0.63	0.54 $\pm$ 1.03	4.91 $\pm$ 3.48	KW=47.342	<b>0.000*</b>	0.502 <sup>b</sup>	1.35-2.51
<b>Nursing Report</b>							
Before the procedure	4.20 $\pm$ 1.98	4.37-2.58	5.37 $\pm$ 2.99	F=2.192	0.117**	0.041 <sup>b</sup>	4.15-5.14
Moment of procedure	0.60 $\pm$ 1.03	0.82 $\pm$ 1.56	4.40 $\pm$ 3.35	KW=37.654	<b>0.000*</b>	0.388 <sup>b</sup>	1.39-2.48

<sup>a</sup> Mean  $\pm$  Standard Deviation <sup>b</sup> Effect Size \* Kruskal Wallis Test \*\* One-Way Analysis of Variance

Pairwise comparisons of groups for mean WB-FACES, CAM-S, and parental satisfaction mean scores are provided in Table 4. According to all evaluators, there was a statistically significant difference in pain, anxiety and parental satisfaction scores between all experimental groups and the control group ( $p<0.05$ ). It was determined that there was no significant difference between the pain, anxiety and parental satisfaction mean scores between the Experiment I and Experiment II groups ( $p>0.05$ ).

**Tablo 4**  
*Pairwise comparisons of the study groups*

Scale	Reporter	Control-I. Experiment (Rain Stick)	Control-II. Experiment (Kaleidoscope)	I. Experiment (Rain Stick)-II. Experiment (Kaleidoscope)
		P	P	P
Procedural pain scores by WB- Faces	Self Report	0.000	0.000	0.669
	Parent Report	0.000	0.000	0.928
	Researcher Report	0.000	0.000	0.383
	Nursing Report	0.000	0.000	0.381
Anxiety	Moment of procedure (Self Report)	0.000	0.000	0.216
	Moment of procedure (Parent Report)	0.000	0.000	0.878
	Moment of procedure (Researcher Report)	0.000	0.000	0.781
	Moment of procedure (Nursing Report)	0.000	0.000	0.855
Parent Satisfaction		0.000	0.000	0.964

## DISCUSSION

Pain, anxiety and fear have been identified as important health problems among children (Roth-Isigkeit et al., 2005; Canbulat Şahiner & Demirgöz Bal, 2016). Injection medical procedures such as vascular access, blood collection and vaccination are the most common and important sources of pain for children and cause anxiety and fear (Evans et al., 2009; Canbulat Şahiner & Demirgöz Bal, 2016). The American Association for Pain Management Nursing recommends that optimal pain control should be achieved before and during painful procedures. Today, a number of interventions are used in order to reduce pain and anxiety during medical procedures, and distraction is one of the most widely used and effective one (Schechter et al., 2007). Distraction is a simple and effective technique that distracts children from stimuli (Koller & Goldman, 2012). Many studies have revealed the fact that distraction methods are effective in reducing children's perceptions of pain and anxiety and increasing parental satisfaction (Koç Özkan & Polat, 2020; Karakaya & Gözen, 2016; Prajapati, 2018; Canbulat et al., 2014; Kunjumon & Upendrababu, 2018; Bulut et al., 2020; Özkan, 2020).

When we look at the comparisons of the groups in terms of WB-FACES mean scores in our study; There was a significant difference between the groups in terms of pain score averages ( $p < 0.05$ ). In effect sizes; children's self-assessment was specified as medium effect size, and parent and investigator report as large effect size. In a study by Koç Özkan and Polat (2020), it was stated that the kaleidoscope used during the vascular access procedure reduced pain scores compared to the control group. Furthermore, numerous studies in the literature (Karakaya & Gözen, 2016; Prajapati, 2018; Canbulat et al., 2014; Kunjumon & Upendrababu, 2018; Bekar et al., 2022; Güdücü Tüfekci et al., 2008) revealed the fact that the use of kaleidoscope was effective in reducing the pain perception of children during invasive procedures. In a study by Semerci and Akgün Kostak (2020), it was stated that the kaleidoscope used during blood collection was effective in reducing pain, and according to the child and parent pain report, the pain score of the kaleidoscope group was significantly lower than the control group. In the study of Karakaya and Gözen (2016), it was stated that the pain scores of the children in their self-assessment were lower than the control group. In the literature, no study was found in which the rain stick tool was

used as a musical intervention during the blood collection process. However, it is seen that the rain stick, one of the music therapy methods used in the study, has the potential to alleviate pain, promote physical rehabilitation, reduce anxiety and help manage stress (Bulut et al., 2020; Özkan, 2020; Cousin et al., 2022; Garcia Guerra et al., 2021). In a study by Bulut et al. (2020), it was stated that music therapy and the use of kaleidoscope reduce the severity of pain, fear and anxiety in procedures performed on children. Likewise, in a study conducted by Özkan (2020), it was stated that music therapy and kaleidoscope applied during bloodletting reduce pain and anxiety in children. Both the results of our study and the results of previous studies support the use of kaleidoscope and rain stick to reduce pain in children during invasive procedures.

In our study, a significant difference was found between the groups in terms of mean scores of parental satisfaction ( $p < 0.05$ ). The effect size of parent satisfaction was determined as small effect size. Kaleidoscope, which is a kind of distraction method, and rain sticks, which is music therapy, are mentioned in the literature as alternative ways to support the psychological and possibly physical health of children and parents and to strengthen communication (Cousin et al., 2022, Huang et al., 2021; Liu et al., 2020). It can be thought that this affects the satisfaction of the parents. While kaleidoscope and rain stick, which are utilized as a distraction method in the literature, seem to affect different variables, no other study has looked at parental satisfaction. However, it is stated in the literature that different distraction methods affect parental satisfaction positively (Kim et al., 2015; Le May et al., 2021; Susam et al., 2018; Schreiber et al., 2016; Rantala et al., 2020). These studies support the fact that the distraction methods applied have a positive contribution to parental satisfaction.

In our study, when the groups were compared in terms of child anxiety scale-state mean scores, it was found that there was a significant difference between the groups in terms of anxiety scores during the procedure ( $p < 0.05$ ). The effect sizes of anxiety scores during the procedure were determined as self-assessment, parent report and researcher report as large effect size. In a study conducted by Koç Özkan and Polat (2020), it was stated that the kaleidoscope used during the vascular access procedure reduced anxiety scores compared to the control group. Furthermore, in this study, it was stated in the report of the child, parent, observer and nurse that the kaleidoscope group was significantly more significant than the control group in terms of anxiety scores. Again, many studies in the literature (Bekar et al., 2022; Canbulat et al., 2014; Karakaya & Gözen, 2016) have revealed the fact that the usage of kaleidoscope is effective in reducing the anxiety levels of children during invasive procedures. In a study by Cousin et al. (2022), in which various methods of music therapy were used, it was observed that parents stated that this method reduced the anxiety levels of children and they were satisfied with this situation, their communication was strengthened and their coping with the hospital was better. It is seen that music therapy, which is used as a distraction method in the literature, has a positive effect on children's anxiety levels (Bulut et al., 2020; Özkan, 2020), and this result supports the applicability of the method.

In our study, when we look at the pairwise comparisons of the groups for the mean WB-FACES, CAS-S and parental satisfaction mean scores; According to the evaluators, there was a statistically significant difference in pain, anxiety and parental satisfaction scores between all experimental groups and the control group. ( $p < 0.05$ ). I. Experiment and II. It was determined that there was no significant difference between the pain, anxiety and parental satisfaction mean scores between the experimental groups ( $p > 0.05$ ). Both the results of our study and the results of previous studies support the use of kaleidoscope and rain stick to reduce pain in children during invasive procedures.

## **CONCLUSION AND RECOMMENDATIONS**

Rain stick and Kaleidoscope groups were seen to have less procedural pain and anxiety compared to the control groups, this result shows that the applied interventions are effective methods that can be used to reduce procedural pain and anxiety. Future studies should investigate the effects of these nonpharmacological methods on different painful procedures in children of different ages and also conduct a cost-performance analysis. Evidence-based guidelines and protocols should be developed in using these non-pharmacological methods for procedural pain and anxiety management in clinics.

## **LIMITATIONS AND STRENGTHS OF THE RESEARCH**

The research has several strengths. Evaluation of pain and anxiety related to blood collection by four different evaluators (child, parent, researcher and nurse) makes the evidence more convincing. This study is the first randomized controlled trial conducted in order to investigate the effect of Rain stick and Kaleidoscope on pain and anxiety during blood collection in children. The results obtained from the study reveal the fact that these methods can be utilized safely for the management of pain and anxiety during the blood collection procedure in children aged 5-12 years.

The research has several limitations. First and foremost, the researcher himself was not double-blind, as he randomized the participants into groups. However, pain and anxiety levels were assessed by more than one person in order to reduce researcher bias. Second, the children, their parents, and the researcher were not blinded to the assessment of pain and anxiety. Third, the sample size was small and as such the results are sample specific and cannot be generalized to blood collection procedures in children. Fourth, the fact that the study was conducted in a single center limits the generalization of the research results.

## **Ethical Approval**

Research permissions were obtained from the Erzincan Binali Yıldırım University's Human Research Ethics Committee (No: 10/03-31/05/2021) and the University Hospital in order to carry out the study. This study was conducted in accordance with the Principles of the Declaration of Helsinki. After the children participating in the study and their parents were informed about the research, it was explained that they were free to participate or not, and written and verbal consent was obtained from their parents and children. Children participating in the study and their parents were assured that their personal information would not be disclosed to others, would not be used anywhere else, and that they had the right to withdraw from the study at any time.

## **Conflict of interest**

The authors have no conflict of interest to declare.

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