

# Artikel

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# The effect of kaleidoscope on pain relief during venipuncture procedure in children in Padang, Indonesia

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**ABSTRACT:** Various nursing actions and treatment procedures in hospital often cause pain in sick children. The purpose of this study is to analyze the effectiveness of distraction with kaleidoscope to pain and vital signs. A quasi-experimental investigation was developed in Emergency Department of Dr. M. Djamil Hospital Padang, West Sumatera Province, Indonesia. Consecutive sampling technique was applied and selected as many as 20 children. The children were randomly divided into two groups. Mean pain score in experimental group was 0.80 and in control group was 3.40 using Wong Baker Faces Pain Rating Scale (WBF-PRS). Mann-Whitney U indicated that there were differences both groups ( $p=0.038$ ). Kaleidoscope therapy could decrease diastolic blood pressure ( $p=0.018$ ) and respiratory rate ( $p=0.024$ ). Kaleidoscope is a very effective distraction during venipuncture to minimize pain and physiological response. It is suggested that nurses can apply distraction as a routine care especially when applying medical procedure.

## 1 INTRODUCTION

Pain is a subjective experience that commonly occurs in children which is caused by actual or potential tissue damage. Pain in children is difficult to identify accurately. Consequently, pain management can be ineffective and cause negative impacts such as increased intensity, frequency, duration, or degree of pain-related damage to the children's bodies (Truba & Hoyle, 2014). Pain could have a bad influence for physical, emotional, behavioral, cognitive, and psychological aspects (Czarnecki et al, 2011; Taddio et al, 2010). Adverse effects can occur such as fear, anxiety, denial for subsequent procedural (Czarnecki et al, 2011; Taddio et al., 2010), syringe phobia (Taddio et al., 2010), aggressive behavior and distrust of health care workers (Czarnecki et al, 2011). In addition, on physical aspect can affect body systems like cardiopulmonary function, metabolism and immune system (Czarnecki et al, 2011).

Venipuncture is one of minor medical procedures that are performed and cause acute pain in children (Satorova & Hrazdilova, 2011). Venipuncture is the second higher procedure which can cause moderate to severe pain in children (Stevens et al., 2011), whereas Hartling et al. (2013) stated that venipuncture and intravenous infusion are the most common procedure in the emergency department.

Professional nurses should understand the importance of pain management (Wong, Lau, Palozzi, & Campbell, 2012). Pain management are divided into two approaches, namely pharmacological and non-pharmacological (Taddio et al, 2010). Distraction is one of non-pharmacological interventions that distracts children's attention from painful stimuli (El-Gawad & Elsayed, 2015), a cognitive-behavioral approach to decrease pain during invasive procedural on children in the emergency department (Wente & Cleveland, 2013). Distraction is nursing intervention that is easy, inexpensive, effective (Bagheriyan et al, 2012), and adjusting vital signs as the physiological response of pain (El-Gawad & Elsayed, 2015; Kiani et al, 2013).

Many experimental studies on distraction reduce pain significantly, including kaleidoscope (Birnie, et al, 2014). Kaleidoscope is a toy that attracts children's attention when they look into it so they would not focus on the pain of invasive procedures (Tüfekci, Celebioğlu, and

Küçüköğlü, 2009). Canbulat et al (2013) stated that using kaleidoscope may result in lower pain score in school age children during venipuncture. In Indonesian, the study of distraction with kaleidoscope as a pain management is still not found. Thus, the purpose of this study was to determine the effect of distraction using kaleidoscope as a pain relief for children who undergo venipuncture.

## 2 METHODS

The method was a quasi-experimental which aims to provide an overview of each variables and determine the effect of distraction using kaleidoscope in reducing pain score and changing the vital signs of children who undergo venipuncture. The population was children who visited the emergency department. Sampling method was consecutive with the total samples of twenty.

Inclusion criteria were 1) aged 6-11 years old; 2) take a venipuncture; 3) able to communicate verbally and non-verbally; 4) parents are willing to be a respondent. Exclusion criteria were 1) in critical condition; 2) uncooperative parents. The research was conducted from August 11th to October 3rd, 2016 in Emergency Department Dr. M. Djamil Hospital, Padang. Data collection was conducted using the Wong Baker Faces Pain Rating Scale (WBF-PRS), wrist blood pressure, and stopwatch.

This study had obtained ethical clearance from Ethical Commission Faculty of Medicine, Universitas Andalas. The parents were provided written informed consent prior to data collection. Confidentiality was guaranteed regarding information and the child's identity. Statistical test applied to prove the hypothesis was Mann-Whitney U because of the data were not normally distributed ( $p < 0.05$ , Shapiro Wilk).

## 3 RESULTS

Table 1 illustrates that a majority of children in both groups were at 9 years old. In terms of gender, the control group was dominated by male children, while the experimental group had an equal number of both sexes. In their experience of previous venipuncture, most children in the control group had a previous history. Meanwhile, more than a half of children in experimental group had the history. Next, table 2 describes that there was a significant differences in pain scores between the control and experimental with  $p$  value 0.038.

**Table 1.** Respondent characteristics by age, gender, and experience of blood sampling

Characteristics	Control	Experimental
	f (%)	f (%)
<u>Age</u>		
6 years	0 (0)	2 (20)
7 years	2 (20)	2 (20)
8 years	2 (20)	1 (10)
9 years	4 (40)	3 (30)
10 years	1 (10)	0 (0)
11 years	1 (10)	2 (20)
<u>Gender</u>		
Boy	7 (70)	5 (50)
Girl	3 (30)	5 (50)
<u>Previous venipuncture</u>		
No	3 (30)	4 (40)
Yes	7 (30)	6 (60)

**Table 2.** Comparison of pain level felt by children during the procedure

Variable	Groups	Mean	Min	Max	$p$ Value
Pain Score	Control	3.40	0	4	0.038
	Experimental	0.80	0	8	

Based on chart 1,  $p$  values of systolic and pulse rate were 0.977 and 0.225 in a sequence. This shows that there was no a significant difference on systolic and pulse rate before and after administering distraction. Meanwhile,  $p$  values of diastolic and respiratory rate were 0.018 and 0.024 respectively, which means that there were a significant difference between before and after venipuncture using kaleidoscope. Looking at the  $p$  values in control group for systolic, diastolic, pulse, and respiratory rates were sequentially 0.175, 0.614, 0.323, and 0.780. The figure shows that there were no a significant difference before and after venipuncture.

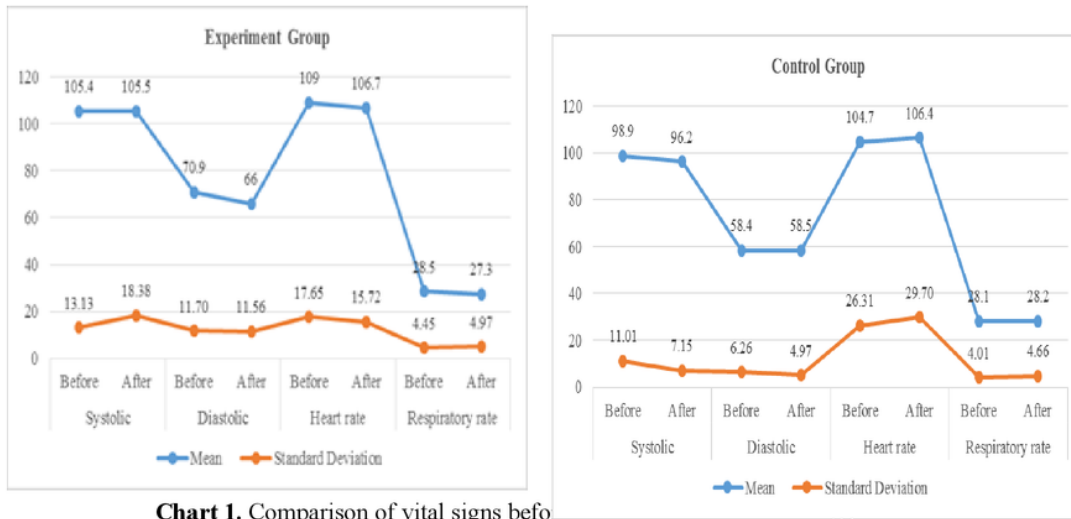


Chart 1. Comparison of vital signs before and after venipuncture.

Table 3. Vital signs' comparison between control and experimental group after procedure

Variable	Groups	Mean	SD	$p$ value
Systolic	Control	96.20	7.146	0.153
	Experimental	105.50	18.380	
Diastolic	Control	58.50	4.972	0.076
	Experimental	66.00	11.557	
Pulse rate	Control	106.40	29.703	0.978
	Experimental	106.70	15.702	
Respiratory rate	Control	28.20	4.662	0.681
	Experimental	27.30	4.968	

As displayed in table 3, all of  $p$  values were below 0.05 that means there were no a significant difference between the control and experimental group after venipuncture.

#### 4 DISCUSSION

An average pain score in the experimental group after kaleidoscope distraction was 0.80. The lowest value was 0 (no pain) and the highest was 4 (slightly more painful). Overall, most respondents did not feel any pain during venipuncture while seeing kaleidoscope. However, an average pain score of the control group was 3.40. The lowest value was 0 and the highest was 8 (very painful). Overall, most respondents felt pain ranging from slightly painful to very painful and only a few children had no pain during venipuncture. The statistical analysis proved that there was a significant difference in pain scores between the experimental and control groups. The present findings seem to be consistent with other studies discovering that kaleidoscope significantly reduced pain (Karakaya & Gozen, 2015; Canbulat et al, 2014; George & Vetriselvi, 2015).

There are possible explanations for this result. Selection of a proper distraction for children is very important, thus their attention can be diverted from the painful procedure (Bagheriyan, et



al., 2012). Kaleidoscope as a visual distraction that produce shapes and colors can be an option (Canbulat et al, 2014). It is not only its shape and color but also when kaleidoscope is circling, it would create various colors and shapes such as beads uniquely adapted to the movement (Tufekci et al., 2009). Children's attention on the kaleidoscope distracts them from painful procedural. Another possible explanation for this is the distraction can provide an analgesic effect by altering a person's emotion (Johnson, 2005). It can be changed by providing a distraction that reduces anxiety and then improves mood and motivation. As a result, the pain can be minimized because of the attention has been shifted. In addition, distraction can effectively reduce pain as well due to the child's willingness to use it. Shapes and colors inside kaleidoscope make children are willing to see it during treatment. Johnson (2005) said that the distraction would be an effective and useful method if children are willing to use it.

1 Diastolic blood pressure (BP) before venipuncture was 70.90 and declined thereafter at 66.00, with  $p$  value of 0.018. It means that there was a significant difference in average diastolic before and after venipuncture with distraction. A similar trend was found in respiratory rate where an average of 28.50 was recorded before venipuncture and decreased thereafter at 27.30, with  $p$  value at 0.024. This result is in agreement with El-Gawad and Elsayed's (2015) findings that reported a decrease of systolic, diastolic, pulse, and respiratory rate, with  $p$  value respectively 0.014, 0.023, 0.001 and 0.002, in the experimental group before and after the distraction. It means that distractions had a significant influence on vital signs.

What is surprising that kaleidoscope did not affect the systolic BP and pulse rate. In this study, there was a slight increase in systolic BP. It seems that these results are possible due to the fact that some of respondents have problems with their kidneys. Kidney problems can lead to intravascular fluid changes that have an impact on the sympathetic nervous system stimulation (Craven & Hirnle, 2009). Meanwhile, the pulse frequency slightly decreased. Distraction help minimize pain and anxiety that impact on the vital signs. In line with Farrokhnia, Fathabadi, and Shahidi (2011), distraction can reduce the chemical and physiological changes resulting from anxiety and discomfort due to invasive procedurals. It will inactivate autonomic nervous system, hence there is no an increase in vital signs. Therefore, distraction is very efficient and considered for use in each invasive procedurals.

In the control group, the current study found that the systolic and diastolic BP went down after venipuncture while the pulse and respiratory rate rose thereafter. Surprisingly, no differences were found in vital signs before and after procedural. This result is in agreement with McCellan's (2009) finding which revealed that the pulse rate did not experience any significant differences between before and after venipuncture. In contrast to Hosseini, Moeininia, and Javadi (2016) reported that there were differences in vital signs before and after a bone marrow aspiration without distraction. A possible explanation for this might be that the pain felt by the individual in the control group may cause changes in vital signs. In accordance with Farrokhnia et al (2011), the signal of pain is received by hypothalamus. Then, it stimulates sympathetic nervous system which causes an escalation in pulse rate and blood pressure and uplifts an intake of oxygen.

This study indicates that there was no difference of vital signs in both groups after procedural. These results matched those observed in earlier studies. Hosseini et al (2016) findings indicated that there was no important difference in the vital signs after procedural. These findings furthermore supported the result of Hartling et al (2013) study that also found no significant difference in pulse rate during invasive procedures between the group receiving music therapy and the control group. A possible explanation for these results may be due to the activation of autonomic nervous system which is caused by pain, anxiety, exercise, and changes in intravascular volume (Craven & Hirnle, 2009).

In this study, there were hemophilia patients in the control group. Hemophilia can cause fluid volume deficiency. Lack of fluid volume can turn down the child's blood pressure (Craven & Hirnle, 2009). This may cause the blood pressure in the control group lower than the experimental. In terms of respiratory rate, the control group had a higher frequency than the experimental group do. It may happen due to stress hospitalization of children (Craven & Hirnle, 2009). Limitations of this study is the number of samples that are lacking as well as the diagnosis of diseases is difference that may influence the vital signs.

## 5 CONCLUSION

This study concludes that distraction using kaleidoscope effectively reduces pain and vital signs's adjustment. There is a significant difference of pain scores between the experimental and the control groups. Kaleidoscope can be an option for nurses to minimize pain in children due to invasive measures such as venipuncture.

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