

Distraction Technique using a Cooling Vibrator Reduces the Pain of Vein-puncture in Children

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ABSTRACT

Background: Typhoid fever is commonly found disease at the hospital. One of the treatments for typhoid fever is intravenous fluid therapy. This procedure certainly causing pain. Actions to minimize pain to children when infusion is carried out are part of the principles of atraumatic care. One of the atraumatic principle can be performed on children is the use of vibrators and cold compresses to minimize pain.

Purpose: To determine the effectiveness of vibrator and cold compress against pain in children when taking venous blood.

Methods: This research using true experimental with a post-test in control group and divided into 2 groups, intervention and control groups. This research will determine the effectiveness of cooling vibrator. Assessing children's pain using the FLACC instrument. The study was conducted at Tidore Islands Hospital. Data processing was tested with Mann-Whitney test.

Result: Mostly respondents are 4 years old, both of them experiencing of having blood drawn before. Most of the control and intervention groups were women. There are differences pain scores founded, in the intervention group was 3.13 and in the control group was 7.87. The results of statistical tests showed that there was a significant difference in pain during venipuncture in the intervention group and the control group.

Conclusion: The statistical test show there was a significant difference in intervention group and the control group. The use of a cooling vibrator can be an alternative to reduce pain in children during venipuncture.

Keywords: Atraumatic Care; Pain; Children; Cooling Vibrator; Distraction Technique.

BACKGROUND

One procedure that is often performed is venipuncture (drawing venous blood). Children who are admitted to the hospital often undergo various invasive procedures that need to be carried out. Venous puncture is an invasive procedure that is often carried in hospitals, by inserting a needle into a child's blood vessel which is it can cause pain (Wong, D.L., Hockenberry, M., Wilson, D., Winkelstein, M.L., 2009).

Pain can cause difficulty sleeping, reduce the child's interest in activities, and increase anxiety. To reduce pain, pharmacological therapy can be done, namely using drugs and non-pharmacological therapy without using drugs such as relaxation, hypnosis, guided imagery, massage, music therapy, warm compresses and cold compresses (Dochter., 2013). The act of reducing pain, trauma and feelings of pressure in children when taking blood is part of the principles of atraumatic care.

The principle of atraumatic care can be applied both pharmacologically and non-pharmacologically. Another study conducted by (Amy L. Baxter et al., 2011) found that the use of a cooling vibrator was more effective in reducing pain than the another non-pharmacological procedure when performing venipuncture in children aged 4-18 years, but the further research needed to determine the effectiveness of cold compresses and vibrators on the early childhood.

Based on a preliminary study conducted at the Tidore Hospital, the action of reducing the pain of taking blood for children was only performed by involving parents to hold and stimulate the children to talk. The act of giving cold compresses has not been carried. So researchers are interested in conducting research on the effect of vibrators with cooling on pain in children when blood is drawn in the Tidore Islands Hospital area.

OBJEVTIVE

To determine the effectiveness of giving a vibrator accompanied by a cold compress against pain in children when taking venous blood.

METHODS

This research uses true experimental with a post-test-only control group design. Researchers divided into 2 groups, namely the intervention and control groups were taken randomly.

Group design	Treatment	Post Test
Intervention	X	I-1
Control		C-1

I-1 = Measurement of the dependent variable in the cold pack and vibration intervention group

X = Vibration and cold compresses intervention

C-1 = Measurement of the dependent variable in the control group

The population in this study were children who had blood drawn at Tidore Kepulauan Hospital. The sample in this study was selected using random allocation. Determination of the intervention group and the control group is taken randomly. Minimum of 10-20 samples each can be used. The research will use 30 child respondents and 30 adult respondents for the preliminary study.

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The inclusion criteria in this study were children aged 1-7 years, children who were not in a critical condition, children who did not suffer from red sickle cells, children who did not experience skin abrasions in the tool attachment area. Meanwhile, the exclusion criteria are if the parent/guardian did not approve the procedures during research. The research process began in March 2022 starting with the process of assembling the tool, testing it on adults. Data collection was carried out September-November 2022. The preparation and reporting of research results was carried out in December 2022.

Researchers made a vibrator with a cooler that would be tested previously on 30 adults, then after being declared and passed the ethical study, it would be applied in research. Data collection instrument using a questionnaire containing questions related to the respondent's identity and previous blood sampling experience. The data collection tools used in this study included a vibrator and cooling compress, stationery, observation sheets to assess pain and a video recorder. Data collection method : for the control group, a vibrator accompanied by cooling was placed in the vein puncture area for approximately 30 seconds to 60 seconds. Then during the puncture, the tool is shifted 1-2 cm above the vein puncture area.

During the venous puncture, the child's pain response was observed. To support pain assessment, a video recording was also carried out by a data collector who was not involved in the procedure. Data analysis used in this study are Univariate analysis, used to determine the description of identity, previous experience of blood collection and pain level when inserting IV needle. Bivariate analysis of the research was carried out to prove the hypotheses that had been formulated. Prior to the bivariate analysis, homogeneity and normality tests were carried out first. In the reality, the data is not normally distributed, then the Mann Whitney test is used.

RESULTS

Table 1. Characteristics of Respondents Based on Age in Tidore Kepulauan Hospital

Variable	Median	Min-Maks	Mean	SD	95% CI
					Lower-Upper
Control group Child's Age (Years)	4	3-5	3.87	2.78	1.41 - 4.42
Intervention Group Child's Age (Years)	4	3-5	3.93	2.76	1.38 - 4.37

Table 1 shows the mean age of children who underwent venipuncture in the control group was 3.87 years (3-5; 95% CI: 1.41 - 4.42), the youngest age in the control group was 3 years and the oldest age was 5 years. The mean age in the intervention group was 3.93 years (3-5; 95% CI: 1.38 - 4.37), the youngest age in the intervention group was 3 years and the oldest age was 5 years.

Table 2. Characteristics of Respondents Based on Experience with Previous Blood and Gender

Variable	Intervention Group		Control Group	
	n	%	n	%
Blood drawn experience				
- Ever	11	73%	9	60%
- Never	4	27%	6	40%
Seks				
- Male	7	47%	6	40%
- Female	8	53%	9	60%

Table 2 shows that the experience of having previous blood drawn at Tidore Kepulauan Hospital mostly had blood drawn before. In the control group, 9 people had blood taken, while in the intervention group, 11 people had blood taken. Based on gender characteristics, the control group and the intervention group were mostly women (53% and 60%).

Overview of Pain Levels in the Control and Intervention Groups during Vein-puncture
Data collection in this study used the FLACC instrument with 5 assessment components, namely face (facial expression), legs (leg movement), activity (activity), cry (crying) and controllability (ability to be entertained).

Table 3. Distribution of Pain Scores in the Intervention Group and Control Group in Children with Venipuncture at Tidore Kepulauan Hospital

Variable	n	Media n	Min- Maks	Mea n	SD	95% CI Lower- Upper
Control Group	15	8	6-10	7.87	1.15	7.20 - 8.52
Intervention Group	15	4	1-5	3.13	1.50	2.27 - 3.99

Based on the results of the analysis in table 3 above, the control group's average pain score obtained was 7.87 (6-10; 95% CI: 7.20 - 8.52), while in the intervention group the average pain score obtained was 3.13 (1-5; 95% CI: 2.27 - 3.99).

Analysis of Differences in Pain (Comfort) in the Control Group and the Intervention Group

The following presents the differences in pain in the intervention group and the control group in table 4.6 below.

Table 4. Analysis of Pain Differences in the Intervention Group and Control Group at Tidore Hospital

Group	N	Mean Rank	p value
Control Group	15	23.00	0,013
Intervention Group	15	8.00	

Based on table 4.6 above, the Sig Value or P-Value is 0.013 < 0.05. If the p-value < the critical limit of 0.05, then there is a significant difference between the two groups or which means that H1 is accepted.

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DISCUSSION

Overview of Pain Levels in the Intervention Group and Control Group. The results of statistical tests showed that there was a difference in the average pain score in the intervention group and the control group. The control group's average pain score obtained was 7.87 (6-10; 95% CI: 0.58 - 0.95), while in the intervention group the average pain score obtained was 3.13 (1-5; 95% CI: 0.75 - 2.38). The results of this study are in line with research conducted (Canbulat, Ayhan, & Inal, 2015), that cold compresses can relieve pain by slowing the speed of nerve conduction and inhibiting nerve impulses, causing numbness and increasing the pain threshold and can cause an anaesthetic effect. Cold therapy is widely used to reduce the process of swelling, pain, muscle spasm and the risk of cell death. Cold therapy is used in the form of ice massage, ice packs, cold bath/water immersion and vapour coolant sprays.

Assessing the level of pain can be done by looking at the response directly or indirectly. Indirect assessment includes facial expressions, crying, motor activity, and simple and complex behaviour. Assessment of physiological symptoms includes respiratory rate, heart rate, blood pressure and sweating and direct assessment using self-reporting or projection methods. This study uses the FLACC instrument which includes 5 assessment components, namely face (facial expression), legs (leg movement), activity (activity), cry (crying) and controllability (ability to be entertained). This instrument is not only able to determine pain but also can determine the comfort of the child when taking blood. Difficulty in assessing pain when the child is afraid and cries first before taking blood.

Differences in Pain Levels in the Control Group and the Intervention Group. The results of statistical tests using Mann Whitney showed that there was a significant difference in pain in the intervention group and the control group ($p = 0.013$). Cold compresses have a mechanism of pain that is transmitted from the peripheral nervous system to the central nervous system and is modulated by the gating system in the dorsal horn of the spinal cord. More specifically, the afferent nervous system which is pain receptors (A-delta fibres carry acute pain and myelinated C fibres transmit pain slowly) is blocked by nonnoxious fast-moving (A-beta) nerves. The cold sensation stimulates C fibres and blocks the A-delta which carries pain signals so that the pain felt will be reduced (Amy L. Baxter et al., 2011). Cold compresses and vibrations are considered effective for reducing pain in children during a venous puncture procedure (Amy Lynn Baxter, Leong, & Mathew, 2009; Inal & Kelleci, 2012).

The results of this study are in line with previous research. Research conducted by I Gusti Ayu Putu Satya Laksmi stated that the pain level of children in the control group was moderate pain. Meanwhile, the level of pain in the treatment group was included in the category of mild pain. The test results show that there is an effect of cold compresses on the level of pain during infusion in school-age children (Laksmi, Suryati, & Yanti, 2018). Lingga Liwa Ati said that babies who get measles immunization will experience pain that can cause excessive anxiety and even trauma, therefore it is necessary to take atraumatic care measures such as ice packs to reduce pain so that excessive anxiety and even trauma will not arise (Lingga Liwa Ati, n.d.). The inhibition of transmission and duration of pain impulses that occur in the dorsal door are based on gate control theory so as to minimize the pain sensation formed due to needle insertion during anesthesia (Mariyam, 2013).

CONCLUSION

There are differences in pain scores in the control and intervention groups. The mean pain score in the intervention group was 3.13 and the mean pain score in the control group was 7.87. The results of statistical tests using Mann Whitney showed that there was a significant difference in pain during venipuncture in the intervention group and the control group ($p=0.013$).

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