

The Effect of Vapocoolant Spray and Baby Shark Vibrator on Children's Pain during Invasive Procedure

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Abstract

Invasif procedure is a procedure that is often performed on children. This procedure is related to needles that causes pain in children. Children who experienced pain during invasive procedure need treatment to avoid trauma. It is necessary to apply atraumatic care through the use of interventions that eliminate or minimize the psychological and physical distress suffered by children, one of which is the use of vibrators with music and cold compresses to minimize pain. This study aims to determine the effectiveness of giving a baby shark vibrator compare with vapocoolant spray against pain in children undergoing invasive procedure such as injection and venipuncture. The researcher divided the respondents into 2 groups, the intervention group (baby shark vibrator) and the control group (vapocoolant spray) which are taken randomly with a total of 60 children participating in this study. The assessment of children's pain using the FLACC instrument (face, legs, activity, cry and consolability). The results of statistical tests showed that there was a no significant difference in pain in the intervention group and the control group ($p=0.077$). The use of a baby shark vibrator can be an alternative to reduce pain in children during invasive procedure because for some children, it is more convenient and distracting.

Keywords: Vibrator baby shark; vapocoolant spray; invasive procedure; pain; children

INTRODUCTION

During the process of growth and development, children often experience sick conditions that cause children to receive hospital treatment. Children who receive treatment at the hospital often gain experience from various invasive procedures that they undergo, including the installation of infusions. This invasive procedure is one of the initial invasive procedures that will determine the success of the next procedure (Astuti dan Khasanah, 2017). This action causes pain due to contact with the needle so that the child is afraid to experience it again. Pain is a universal experience that serves as an important sign that the body is not functioning or is damaged (Vaajoki, 2013). Pain in children that is not treated immediately will have a physical and behavioral impact.

Pain in children can cause a decrease in quality of life, where the results showed that two thirds of the sample reported in children who experienced recurrent pain experienced a decrease in quality of life four times compared to children without recurrent pain. Aspects of the Health-Related Quality of Life (HRQOL) assessment include physical, emotional, social, school and welfare assessments. The physical impact of pain is divided into acute (short-term) effects, which are characterized by increased metabolic rate and cardiac output, impaired insulin response, increased cortisol production, and increased fluid retention. The chronic (long-term) impact, where pain lasts continuously and for a long

time, will increase stress on children and result in the inability to carry out activities (Petersen, Hagglof dan Bergstrom, 2009).

The concept of nursing care in children today needs to apply the principles of atraumatic care. This therapeutic care includes the prevention, diagnosis, treatment or cure of acute and chronic conditions (Hockenberry dan Wilson, 2012). The principle of atraumatic care can be applied both pharmacologically and non-pharmacologically. Pharmacological techniques can be done in various ways, including the use of EMLA cream, lidocaine and L.M.X.4. Management of pain relief non-pharmacologically when taking blood consists of various physical and cognitive-behavioral pain management strategies. Various non-pharmacological physical interventions include distraction, massage, hot and cold compresses, acupuncture, contralateral stimulation (Bowden dan Greenberg, 2010; Gatchel dkk, 2014). Non-invasive pain management is an independent nursing function. Sometimes, other strategies need to be tried and changed until the patient finds an effective means of reducing pain (Wente dan Richfield, 2013).

Non-pharmacological methods to reduce pain during invasive procedures have been proven to be effective and efficient for pediatric patients (Wente dan Richfield, 2013). Distraction is the most frequently performed action, however, the use of cold compresses and vibrators has not been studied to reduce pain in children. The action of cold compresses provides a cooling sensation and relieves pain by slowing the speed of nerve conduction and inhibiting nerve impulses, causing numbness, increasing the pain threshold and can cause an anesthetic effect.

Children with younger ages have different cognitive developments with older children, this will affect the ability to tolerate pain. In addition, differences in the level of age and development of children will affect the methods used in reducing pain in children (Hockenberry dan Wilson, 2012). Actions that combine various methods to reduce pain and reduce children's distress need to be done (Wente dan Richfield, 2013). This study compared the use of vapo-coolant spray with a baby shark vibrator on pain in children.

METHOD

This is an experimental study; sample selection is taken randomly consisting of patients who were admitted to the pediatric department between the dates August-October 2022 and had invasive procedure. Approval was obtained from the ethics committee of Poltekkes Kemenkes Mataram, and written informed consent forms were obtained from all patients. The study included patients aged 0-7 years who were stable and did not have skin abrasion and the child is not suffering from red sickle. Exclusion criteria included those that did not give written consent forms, patients with allergic reactions to the spray ingredients or cold tolerance, unstable condition. When one of the researchers in charge of the patients who met the inclusion criteria was in pediatric room, the researcher was informed and the patients were selected. Patients who met the criteria were randomized whether they were in the vapo-

coolant spray group or the baby shark vibrator group. In the spray group, the spray was applied to all patients in the same way by the manufacturer after the venipuncture site was prepared and cleaned according to the protocol. The nurses who will perform the invasive procedure were given training prior to the application. The same nurse performed both the pain measurement and the procedure. Spray application with ethyl chloride spray was sprayed at a distance of 10-15 cm from the application area for 5-10 seconds, after waiting for about 60 seconds and the skin was whitened, needle was inserted into a peripheral vein. This region was used in all patients. Baby Shark Vibrator developed by researchers which consists of a vibrator that can emit baby shark songs and a separate cooling gel. Cooling gel and vibrator are placed over the vein area to be stabbed for 30 seconds, then the baby shark's singing voice is used as a distraction for the child when the vein is being punctured (figure 1).



Figure 1. The Use of Baby Shark Vibrator

Age, gender, and previous infusion experience of all patient groups were recorded. Side effects were observed after the application. The Face, Legs, Activity, Cry, Consolability (FLACC) to measure pain, was used. This study was approved by Poltekkes Kemenkes Mataram Ethics Committee. Informed written and oral consent was obtained from each participant before the study began. The principles of confidentiality and anonymity were explained to each participant. Data obtained were analyzed using SPSS for Windows version 21.0. Quantitative variables mean \pm standard deviation and categorical variables as the number of cases (%) expressed. In comparing the differences between groups, quantitative independent-t test for variables, chi-square for categorical variables test used Data were presented in tables.

RESULT

60 children participated in this study and were divided into 30 children in the vapo-coolant spray group and 30 children in the baby shark vibrator group. The mean age of children in the control group (using vapo-coolant spray) was 3.03 years (1-7; 95% CI: 2.45-4.08), the youngest age in the control group was 1 year and the oldest was 7 years. The mean age in the intervention group (using a baby shark vibrator) was 3.10 years (1-6; 95% CI: 2.62-3.84), the youngest age in the intervention group

was 0 years and the oldest age was 7 years. Most of them had had previous infusions in both groups and most of them were male. The average pain score in the vapo-coolant spray group was 5.10 and in the baby shark vibrator group 4.00, it can be seen in table 1.

The characteristics of respondents in this study are identified directly which can be seen in the following table:

Table 1. The Average Pain Score in the a Vapocoolant Spray Group and Baby Shark Group

No	Group	n	Mean	Min- Mak	SD	95% CI	<i>p value</i>
1.	Vapocoolant spray (control group)	30	5,10	1-8	2,023	4,20-6,60	0,77
2.	Baby Shark Vibrator (Intervention group)	30	4,00	0-8	2,665	2,46-4,21	

The results of statistical tests using the t test showed that there was no significant difference in pain in the intervention group and the control group ($p>0.05$).

DISCUSSION

Pain in children needs special attention because it will have an impact on the child's stressor level and will have an impact on trauma and do not want to do invasive procedures in the future. Children with younger age have different cognitive development with older children, this will affect the ability to tolerate pain. In addition, differences in the level of age and child development will affect the methods used in reducing pain in children (Hockenberry & Wilson 2014). Age is one of the factors that influence pain response. Children have high levels of anxiety and distress compared to adolescents and adults. Children <7 years of age have a high level of anxiety and a fairly high fear. The age of this child is very influential on the perception of pain in children because the higher the age of the child, the child can tolerate the pain experienced (Azari dan Woferst, 2015).

The results showed that most of the children had had an invasive procedure before. The administration of I.V line, is one of invasive procedures that often performed on hospitalized children. Repeated invasive procedures increase the risk of trauma to the child. Lack of knowledge causes children to feel excessive fear such as fear of damage to the skin during injection procedures or taking venous blood, and assume that these actions will cause body parts to leak. Nurses are comprehensively responsible for providing nursing care that minimizes trauma to children through an atraumatic care approach⁴. The use of a vibrator accompanied by music and cooling is one of the efforts to implement atraumatic care to reduce pain and reduce the risk of trauma when a child is undergoing invasive procedures.

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 uses a vapo-coolant spray which has a cooling effect when sprayed and the intervention group uses a baby shark vibrator which is a combination of vibration, cooling and distraction interventions using songs. The results of this study are in line with research conducted by 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 anesthetic effect (Canbula, Ayhan dan Inal, 2015; Baxter dkk, 2011).

The results of statistical tests using independent t test showed that there was no significant difference in pain in the intervention group using the baby shark vibrator and the control group using vapo-coolant spray ($p=0.077$). However, the baby shark vibrator intervention group had a lower average pain reduction compared to the vapo-coolant spray group. Both interventions use a cold mechanism to reduce pain. 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, afferent nervous system receptors that are pain receptors (A-delta fibers carry acute pain and myelinated C fibers transmit pain slowly) are blocked by noxious fast-moving (A-beta) nerves. The cold sensation stimulates C fibers and blocks the A-delta which carries pain signals so that the pain felt will be reduced (Baxter dkk, 2011). Cold compresses and vibrations are considered effective for reducing pain in children during venipuncture procedures (Inal dan Kelleci, 2012; Baxter AL, 2009).

The results of this study are in line with previous researches. Research conducted by Bhadauria, et al. stated that cooling the injection area can reduce pain perception during local anesthesia in patients who have high levels of anxiety and fear. In addition, research by Mohiuddin, et al., resulted in the ice group having lower pain perception compared to the gel topical group (Mohiuddin dkk, 2015).

The intervention group had lower pain because the coolant derived from the cold gel causes vasoconstriction and reduces tissue metabolism and the flow of inflammatory mediators during needle penetration into the tissue and activates unmyelinated nerve fibers that block pain pathways which will result in an increase in pain threshold upon stimulation. considered as dangerous as anesthetics (Davoudi, 2016). Inhibition of transmission and duration of pain impulses that occur at the dorsal door is based on gate control theory so as to minimize the pain sensation that is formed due to needle insertion during anesthesia (Ballard dkk, 2019). The pain receptors that usually play a role are unmyelinated C nerve fibers and myelinated A nerve fibers. The action of cold compresses works by reducing pain transmission through the smaller diameter of the C nerve fibers and activating the faster and larger transmission of A-beta nerve fibers. This process will increase the pain threshold. A-beta nerve fibers transmit vibrational and tactile stimuli to the skin and stimulate pain inhibition in the spinal cord.

In addition to using a cooling compress, this study also uses a vibrator that produces vibrations that can spread the cold feeling in the vein puncture area, besides that the vibrator can emit “baby shark” music as a distraction that makes children calmer. This device is relatively safe to use and does not interfere with the procedure when venipuncture is performed.

CONCLUSSION

Vapocoolant spray and baby shark vibrator can be used to reduce pain in children with invasive procedures.

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