

The effective of cold compress in reducing pain before insertion of IV or blood draw in school-age children

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Abstract

Background: The invasive procedure of insertion of IV or blood draw is carried out by inserting a needle into a vein, causing pain in the child. As a result, children find it difficult to interact with other people, have difficulty sleeping, decrease their interest in doing activities, and increase anxiety. One non-pharmacological measure to reduce pain is giving a cold compress using a cool gel pack.

Method: The purpose of this study was to determine the effect of cold compress on pain during insertion of IV or blood draw in school-age children. Respondents in this study were school-age children (7-13 years) who were given a cold compress before insertion of IV or blood draw in the insertion of IV area which was divided into 2 groups, namely the intervention group with 20 respondents and the control group with 20 respondents. The research design used Quasy Experiment with Two Group Post Test Design.

Results: The research results were obtained the pain measurement tool using the Numerical Rating Scale in the intervention group was in the mild pain category (1-3) as many as 18 (90%), while in the control group it was in the severe pain category (7-10) as many as 20 (100%), so it can be concluded that there is an effect of cold compress on pain during insertion of IV or blood draw in school-aged children with p-value: 0.000 ($p < 0.05$).

Conclusion: Cold compress are effective in reducing pain before insertion of IV or blood draw in school-age children and it is hoped that the hospital can provide education to parents about the importance of cold compress in pain management in children.

Keywords: Blood Draw; Cold Compress; Insertion of IV; Pain Management; School-Age Children

INTRODUCTION

Children are the next generation of the nation that deserves attention and every child has the right to achieve optimal cognitive, social, emotional behavioral, and health development (1). Based on the *Profil Anak Indonesia* in 2023, the percentage of the population of children aged 0-17 years in 2022 was 79,489,510 people (28.82%) with the highest provinces, namely East Nusa Tenggara (34.68%), West Sulawesi (33.70%), Southeast Sulawesi (33.46%), North Maluku (32.83%), and Riau (32.51%) (2). Children are not only the foundation and future of the nation but also a group that is vulnerable to various health problems (3).

Children's health is the best investment parents can make for their children's future, and is an important aspect in efforts to maintain quality of life and sustainable

development. The role of parents in maintaining children's health is very important. Parents must also be active in monitoring their children's health, especially in school-age children (4).

School-age children are prone to various diseases, especially those caused by environmental factors, hygiene, and unhealthy nutrition (5). In addition, the immune system in children who are not yet perfect can cause children to become sick. When they are sick, children sometimes need therapy that requires them to be hospitalized. The percentage of children who have been hospitalized in the past year based on the place of hospitalization in 2022, namely Private Hospitals (42.31%), Government Hospitals (35.71%), *Puskesmas/Pustu* (12.21%), Clinics/Joint Doctor Practices (6.86%), and Doctor/Midwife Practices

(3.64%) (2). Hospitalization that occurs in children is one of the unpleasant experiences for both children and parents (6). One of these experiences is nursing procedures that cause pain in children, namely intravenous therapy (7).

Intravenous therapy aims to introduce a certain amount of fluid into the body through a needle, into a vein (return vein) to replace the amount of fluid and food substances lost in the body and as a route of parenteral drug administration for a long time. The benefit of intravenous therapy is to correct fluid and electrolyte imbalances in the body. One of the intravenous therapy procedures is infusion or blood collection (6) (8).

Infusion or invasive blood collection is the most common painful procedure performed on children during hospitalization (9). In hospitalized children, blood is often drawn for diagnostic tests. Infusion or blood collection in children is not easy because children have small and fragile blood vessels, so infusion or blood collection is often found due to failed intravenous cannulation (10). This results in pain in children. Pain reactions that appear in children vary according to their age. Children will tend to act aggressively as self-defense, act by expressing themselves verbally by hissing, screaming, and crying, and can act dependently by closing themselves, and not cooperating in nursing procedures (11) (10).

Untreated pain has a major impact on a child's life. Pain can interfere with children's activities so that children find it difficult to interact with others because children focus on the pain they feel. In addition, children have difficulty sleeping, decreased interest in activities, and increased anxiety. The inability to reduce pain can lead to helplessness and hopelessness (12). Various efforts are made by nurses to reduce the effects of trauma and pain in children due to invasive procedures in accordance with the principles of atraumatic nursing (13) (14). Pain management can be done with pharmacological and non-pharmacological measures (15). Pharmacological measures are measures that use analgesic drugs to reduce pain. Pharmacological measures usually have side

effects, so it is preferable to take non-pharmacological measures because they can help reduce pain perception, make pain more tolerable, and increase analgesic effectiveness. One of the non-pharmacological measures that can be taken is the administration of cold compresses (16) (17).

Cold compress is one of the nursing actions that can reduce blood flow to the infusion installation area and reduce edema bleeding which is thought to have an analgesic effect by slowing the speed of nerve conduction so that fewer pain impulses reach the brain (12). The purpose of applying a cold compress is to relieve pain by numbing the area, slowing the flow of pain impulses, and increasing the pain threshold due to edema or trauma, causing a local anesthetic effect, narrowing blood vessels, reducing local blood flow, and reducing tissue inflammatory response (18) (19) (20). Cold compresses are given for 3-5 minutes (until anesthesia is felt) on the area to be pierced. Cold compresses are applied using a medium-sized ice pack with a temperature of $<10^{\circ}\text{C}$. The ice pack has been frozen in the freezer for 8 hours (21). Cold compress for 3 minutes on the insertion area does not cause blood vessels in the area to experience vasoconstriction. This situation is proven when the abocath needle is inserted into the vein, as a control that the infusion has been successful, marked by blood coming out of the abocath needle hole, the madrin is withdrawn then the infusion hose that has been attached is connected to the abocath needle and the roll clamp is opened to see the infusion fluid dripping smoothly (22).

Research conducted by Hassan (2022) revealed that giving cold compresses before infusion and blood collection is very effective in reducing pain without having to take a long time to distract children from the pain they will face (23). Giving cold compresses is more effective in reducing pain due to infusion procedures compared to distraction techniques by telling stories (24). In addition, there is a significant difference in pain scale between giving cold compresses using ice gel and giving deep breaths to school-age children with IVs, so that the use of cold

compresses to reduce pain intensity provides comfort to children (12).

Based on medical record data in the Gambir Nursing Room, Children and Mother Hospital of Harapan Kita Jakarta from November 23 to December 23, 2022, there were 44 visits by school-age children. Based on the preliminary study conducted by the researcher, school-age children who visit the hospital to get treatment in the inpatient room and are insertion of IV or blood draw. During the insertion of IV or blood draw process, various kinds of pain responses are shown by children, such as screaming, crying and acting aggressively such as biting, hitting, and even kicking.

The efforts that have been made by nurses to overcome the pain felt by children in the Gambir Nursing Room, Children and Mother Hospital of Harapan Kita Jakarta so far are by rubbing the child's arm using the palm of the officer's hand with the aim that the technique can reduce pain in children. In addition, parents also play a role in efforts to overcome pain in children by hugging the child to make the child feel more comfortable. However, these actions are still not effective in helping children overcome pain. In addition, these actions can also increase anxiety because children perceive the actions taken during treatment as punishment and will threaten their body integrity. Another technique used by the Gambir room based on the existing Standard Operating Procedures (SPO) is to use EMLA as pain management during insertion of IV or blood draw, but the availability of EMLA is limited. The results of interviews conducted by researchers with the Head of the Room and several nurses explained that the provision of cold compress before insertion of IV or blood draw had never been realized to overcome pain in children due to limited facilities and the absence of SPO on the use of cold compress before insertion of IV or blood draw.

Based on the description above, the researcher is interested in conducting research on the effect of cold compress in reducing pain before insertion of IV or blood draw in school-age children in the Gambir

Nursing Room, Children and Mother Hospital of Harapan Kita Jakarta.

METHOD

Research Design

The research design used was quantitative with a Quasy Experiment research design with a Two Group Post Test Design approach. The method of determining the sample is non-probability purposive sampling. The research instrument used an observation sheet to determine the description of cold compresses in reducing pain before insertion of IV or blood draw in school-age children (7-13 years) using the Numerical Rating Scale. The observation sheet used was filled in by students and nurses, and was closed. The observation sheet is divided into 2 parts, namely the child identity questionnaire and the pain scale.

This post-test study involved two groups, namely the intervention group and the control group. The intervention group was given a cold compress before insertion of IV or blood draw. Cold compress was applied for 3-5 minutes (until anesthesia was felt) on the area to be punctured. While the control group was not given a compress before insertion of IV or blood draw.

Population and Sample Research

The population and samples were taken in Gambir Nursing Room, Children and Mother Hospital of Harapan Kita Jakarta. There were 44 children, and 40 of them met the requirements to become respondents who were then divided into 2 groups, namely the intervention group of 20 respondents and the control group of 20 respondents. The inclusion criteria for this study included school-age children aged 7-13 years, children who were insertion of IV or blood draw, children with Compos Mentis (CM) consciousness, and children able to express pain with the Numerical Rating Scale. Meanwhile, infants (0-12 months), toddlers (1-3 years), pre-schoolers (4-6 years), adolescents (14-18 years), children who were not insertion of IV or blood draw, children with decreased consciousness, and children with mental disorders were the exclusion criteria.

Materials and Research Tools

This study used Standard Operating Procedures (SOP) Pain Management with Cold Compress in the intervention group. While the control group was not given treatment. The researchers created this SOP using an observation sheet in the form of a Numerical Rating Scale pain measurement tool (Figure 1). According to Wong (2009), the instrument used to measure and assess pain intensity in children with the Numerical Rating Scale is almost the same as the Visual Analog Scale, but has numbers along the line (numbers 0-10 or 0-100). It is hoped that by using this measuring instrument, respondents will be better able to express the pain they feel (25).

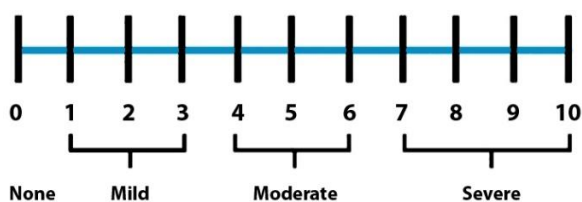


Figure 1. Numerical Rating Scale Pain Measurement Tool

Collection or Research Stages

Gambir Nursing Room, Children and Mother Hospital of Harapan Kita Jakarta became the site of this study for approximately 8 weeks starting on November 9 to December 30, 2022. Then, according to the inclusion criteria, there were 22 children in the intervention group. Of these, two patients had mental retardation, so they were not included in the inclusion criteria and left 20 children in the intervention group. The 22 children in the control group matched the number of the intervention group. Thus, the sample used in the control group amounted to 20 children.

Data Analysis

The IBM SPSS Statistics 25.0 was used to produce various kinds of trend analysis and descriptive statistics. The variables in this study were described using frequency tables, relative frequency (percent), mean, median, standard deviation, minimum value, and maximum value. To

obtain an overview of the frequency distribution of each variable observed, univariate analysis was used. Before testing the effect of cold compress on pain scale, a normality test was first conducted.

The normality test showed that the data were normally distributed with the results of the significance of the pain scale score data in the intervention group and control group before and after the intervention showing a p value > 0.05. The average pain scale using the numerical rating scale of each group after insertion of IV or blood draw, as well as the difference between the intervention group and the control group, was compared using an independent t-test.

RESULTS

According to table 1, the 40 respondents (7-13 years) in both the intervention and control groups were mostly female, with 12 (60%) in the intervention group and 11 (55%) in the control group. Based on previous experience, it was found that in the intervention group, most of the 15 (75%) had previous experience of being hospitalized, and in the control group 11 (55%). Based on the presence of parents, it is known in the intervention group and control group that all parents, namely 40 respondents (100%), accompany their children when infusion or blood collection is carried out.

Table 1. Frequency Distribution of Child Characteristics

Variable	Intervention Group (n=20)		Control Group (n=20)	
	Σ	%	Σ	%
Gender				
Male	8	40	9	45
Female	12	60	11	55
Previous Experience				
No	5	25	9	45
Yes	15	75	11	55
Presence of Parents				
No	0	0	0	0
Yes	20	100	20	100

From table 2, it is known that out of 40 respondents (7-13 years) the average age of children in the intervention group is 9.50 with a standard deviation of 1.762 and the

minimum age of children is 7 years old and the maximum is 12 years old. Meanwhile, the average age of children in the control group is 9.10 with a standard deviation of 1.714 and the minimum age of children is 7 years and a maximum of 12 years.

Table 2. Average Age of School Children (7-13 Years)

Variable	Mean	Standard Deviation (SD)	Min - Max	N
Intervention Group	9.50	1.762	7-13	40
Control Group	9.10	1.714	7-13	

Table 3 shows that out of 40 respondents (7-13 years) the average pain scale in the intervention group was 2.10 with a standard deviation of 0.912 and a minimum pain scale of 1 and a maximum of 4. Meanwhile, the average pain scale in the control group was 7.86 with a standard deviation of 0.727 and a minimum pain scale of 7 and a maximum of 9.

Table 3. Average Pain Scale using Numerical Rating Scale in School-Age Children (7-13 Years)

Variable	Mean	Standard Deviation (SD)	Min - Max	N
Intervention Group	2.10	0.912	1-4	40
Control Group	7.85	0.745	7-9	

Based on table 4, it is known that 40 respondents (7-13 years), in the intervention group who used the Numerical Rating Scale Pain Measurement Tool, the highest pain category was the mild pain category (1-3) as many as 18 (90%), while in the control group the highest pain category was the severe pain category (7-10) as many as 20 (100%).

According to table 5, it is known that the average pain scale with the Numerical Rating Scale in the intervention group is 2.10 with a mild pain category, while in the control group the average pain scale is 7.85 with a severe pain category with a p value of 0.000. This means that a cold compress before insertion of IV or blood draw has an influence on the scale of pain felt by school age children (7-13

years) who are being treated in the Children's Room at one of the hospitals in Jakarta.

Table 4. Frequency Distribution of Pain Scale using Numerical Rating Scale in School Age Children (7-13 Years)

Pain Measuring Tool	Intervention Group (n=20)		Control Group (n=20)	
	Σ	%	Σ	%
Numerical Rating Scale				
No Pain (0)	0	0	0	0
Mild Pain (1-3)	18	90	0	0
Moderate Pain (4-6)	2	10	0	0
Severe Pain (7-10)	0	0	20	100

Table 5. The Effect of Cold Compress in Reducing Pain Before Insertion of IV or Blood Draw in School-Age Children

Variable	Mean	Trust Index 95%	p-value	n
Intervention Group	2.10	-6.228	0.000	40
Control Group	7.85	-5.200		

DISCUSSION

The results of the analysis showed that there were differences in cold compress in reducing pain in the intervention group and control group, so it can be concluded that there is an effect of cold compress in reducing pain before insertion of IV or blood draw in school-age children in the Gambir Nursing Room, Children and Mother Hospital of Harapan Kita Jakarta. According to the researchers, cold compress are able to inhibit pain receptors to the brain and thus have a positive influence in reducing pain in school-age children who will undergo medical procedures such as insertion of IV or blood draw. In addition, cold compress can be a practical solution in clinical practice, especially in the management of pain in children who are often more sensitive to pain.

This is in line with research conducted by Arkhriansyah and Surahmat (2022) which states that the average pain scale in the intervention group with cool packs is 3.93 with a standard deviation of 1.033, while in the control group the pain intensity is 7.40 with a standard deviation of 1.242. So it can be

concluded that there is an effect of cool pack (cold compress) in the intervention group and control group on pain during insertion of IV in children with a p-value: 0.000 (26). Another study conducted by Makkaraeng et al., (2024) stated that cold compresses are very effectively used during venous function actions to minimize pain and physiological responses significantly ($p=0.001$) (27).

Cold compress are one of the non-pharmacological ways used to reduce pain. This method can help relieve pain and speed up the healing process. Cold compress work by slowing down the speed of nerve transmission and inhibiting nerve impulses, which causes the area to numb and increases the pain threshold, and provides a local anesthetic effect (26). According to Hockenberry (2017) school age children are able to understand the need for pain when a procedure or action is carried out, at this age stage children are also able to demonstrate coping methods in overcoming stress due to pain resulting from the procedure, children are also able to communicate discomfort through verbal and non-verbal language (11). In this study, respondents from school age children were able to express the pain scale well using the Numerical Rating Scale.

Most respondents in both groups had previous experience of being treated in hospital. A number of pain incidents, types of pain and the intensity of previous pain experiences, including the way the child responds to pain, will influence how the child can accept pain now. Thus, past pain experiences with inadequate pain control lead to increased distress during the procedure which can lead to pain in the future (16).

Based on the results of this study, both the intervention group and the control group were accompanied by parents during insertion of IV or blood draw. The presence of parents is very important for children who will be insertion of IV or blood draw which can cause pain. Separating children from parents when taking action will cause children to be more traumatized and provide more negative memories, so it is very important for parents, especially mothers, to be present when children are insertion of IV or blood draw. For

this reason, it is hoped that the hospital can provide education to parents on the importance of cold compress in pain management before insertion of IV or blood draw in children.

CONCLUSIONS

Cold compress have an effect on reducing pain when insertion of IV or blood draw in school-aged children (7-13 years). The non-pharmacological action of cold compress can be carried out by pediatric nurses to reduce pain when insertion of IV or blood draw habitually. Apart from that, parents need to be involved in these activities so that parents can know the importance of cold compress in pain management in children.

RESEARCH LIMITATIONS

This research is limited to invasive procedures for insertion of IV or blood draw, while there are many other invasive procedures that cause pain in children with hospitalization. The results of this research can be continued in other age ranges with various combinations of pain management, such as stimulation, cutaneous massage, and distraction techniques to treat pain in different invasive procedures.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This research has been declared to have passed the ethical test with the Statement of Passing the Ethical Review from the Health Research Ethics Commission of the Health Polytechnic of the Ministry of Health of East Kalimantan with number: DL.02.03/4.3/19000/2022.

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accessed through the link <https://s.id/VideoOfLearningPainManagement>.

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