



THE EFFECTIVENESS OF WARM AND COLD COMPRESSES BEFORE INFUSION TO REDUCE PAIN IN CHILDREN AGED 1-6 YEARS

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ABSTRACT

Background: Infusion can cause trauma to the child. The purpose of the study was to determine whether there was a difference in the administration of warm compresses and cold compresses to pain after infusion.

Method: The research design used is a Quasi Experimental Design with a Post Test Only Non Equivalent Control group design to get a sample of 30 respondents taken by consecutive sampling. The independent variable is warm and cold compresses on pain after infusion in children and the dependent variable is pain intensity after infusion. Data was taken by using observation with Wong Baker Face scale. After collecting the data processing and proceeding with the Wilcoxon rank test statistical test which was carried out using the SPSS program.

Result: The results showed 0.000 then $p < (0.05)$, there was a difference between warm compresses and cold compresses before infusion on pain intensity.

Conclusion: Cold compresses are more dominant in reducing heat because they are better able to suppress autonomic responses, while warm compresses cause vasodilation associated with local blood vessel dilation. It is hoped that it can urge nurses to provide direct warm compress therapy and cold compresses to pediatric patients who will be given an infusion as one of the non-pharmacological therapies to reduce pain intensity.

Keywords : *Warm compress, Cold compress, Pain, Children*

INTRODUCTION

Children are the next generation of the nation whose health status needs to be considered. School-age children are very susceptible to diseases caused by environmental factors, hygiene, and unhealthy nutritional intake, so they are more likely to suffer from diseases. Children who are sick need treatment and must be hospitalized (hospitalization) for the healing process ¹.

Infusion is the second source of pain children feel the most after their illness². Pain is experienced due to mechanical stimuli received by pain receptors in almost every body tissue, these stimuli are converted into impulses that are delivered to the pain center in the brain cortex. After being processed in the pain center, impulses are returned to the periphery in the form of pain perception (natural pain). Pain receptors can respond to stimulation or stimulation. The

stimulation received by these receptors is transmitted in the form of pain impulses to the spinal cord by two types of fibers, namely A (delta) fibers, and C fibers. Pain impulses cross the spine on interneurons and are connected to the main ascending spinal pathway, namely the spinal pathway. spinothalamic tract (STT) or spinothalamic and spinoreticular tract (SRT) which carries information about the nature and location of pain³. The presence of venipuncture in the infusion can cause anxiety, fear, and pain in children².

Infusion is a technique used to puncture a vein transcutaneously using a sharp, rigid stylet performed with a sterile technique such as an angeocatheter or with a needle connected to a syringe. The main goals of intravenous therapy are to maintain or replace body fluids containing water, electrolytes, vitamins, protein, fat, and calories that cannot be maintained orally, correct and prevent fluid and electrolyte disturbances, improve acid-base balance, provide blood transfusions, provide a medium for administering intravenous drugs, and assisting with parental nutrition. The place or location of the peripheral vein that is often used for infusion is the superficial or peripheral cutaneous vein located within the subcutaneous fascia and is the easiest access for intravenous therapy. Possible infusion sites are the dorsal surface of the hand (dorsal superficial vein, basal vein, cephalic vein), inner arm (Basalic vein, cephalic vein, median cubital vein, median forearm vein, and radial vein), dorsal surface (saphenous vein) Magna, Ramus Dorsalis). Intravenous infusion is given continuously and in the long term will certainly increase the occurrence of complications. Complications of infusion are phlebitis, hematoma, infiltration, thrombophlebitis, air embolism⁴.

Some warm compress techniques, namely dry warm compresses, namely warm compresses using sand that has been heated by the sun to treat rheumatic pains in the joints. In addition, this therapy can

also reduce weight and eliminate excess weight

Warm moist compresses are compresses of this type used by means of the mediation of a device known as a hydrocollator. Namely an electric device filled with water, used to heat it up to a certain temperature. Inside this tool are dipped several compresses with varying weights that are suitable to cover all parts of the body. The therapist removes these compresses using special clamps, then folds them in a towel and places them over the patient's body so that the compresses work to relieve muscle wasting and make it flexible again. It is also to limit or prevent pain and restore blood circulation.

Warm wool compresses are compresses by heating the wool over steam and then wringing it out. This kind of compress has the advantage of being high in heat and will not injure or be harmful to the skin. This compress consists of an inner compress which is closed with a waterproof plastic cap. Also has an outer wrap made of wool to prevent or limit the entry of heat. This compress is used to relieve pain and muscle contraction. This compress can also be used 3-4 times for 5-10 minutes.

Compress gelatine (jelly) Compress this model has a feature that is able to keep hot or cold for some time. The advantage of this compress lies in the flexibility of its shape which can be matched with the limbs so that it is able to produce the desired temperature and can reach all parts of the body. The cooling process of this compress is produced through a special tool (hydrocollator) that allows the heat temperature to be regulated. This gelatine compress has the same effect and uses as a cold compress.

When giving a warm compress to a client, the temperature of the compress itself must be considered for the effectiveness of the compress in reducing pain and avoiding injury to the skin due to overheating.

Cold compresses are used to cool the injured area, which protects body tissues by slowing the metabolic rate and reducing swelling around the injury. A cold compress can range from a cloth dipped in cold water to a commercially available pad or bag that is made cold through freezing or chemical action. Cold compresses are an important part of treating soft tissue injuries such as strains, sprains, bruises, and toothaches.

According to the Amalia Journal. D on 20 April 2014 at the Surabaya Islamic Hospital. Researchers observed preschool children who felt pain due to infusion. Observations were made before the child took analgesic drugs that are commonly used at the Surabaya Islamic Hospital using the Wong-Baker scale. The data obtained in April 20 children of preschool age experienced pain in the area where the infusion was inserted with a percentage of 0 children (0%) not feeling pain, 7 children (35%) feeling a little pain, 10 children (50%) feeling a little more pain, 2 children (10%) had more pain. 1 child (5%) had severe pain, and 0 children (0%) had the most severe pain.

Pain that occurs causes new problems due to unpleasant feelings, distress, and discomfort⁴. The infusion procedure is an invasive procedure that is often performed in hospital care for children. The existence of a venipuncture procedure in the infusion can cause anxiety, fear, and pain in children⁵. The further impact is in the form of cognitive, physical, emotional, and social developmental barriers⁶.

In addition to pharmacological techniques, non-pharmacological pain management to reduce pain due to invasive infusion procedures consists of various physical and cognitive-behavioral pain management strategies. Various non-pharmacological physical interventions include massage, hot and cold compresses, acupressure, contralateral stimulation⁷. Using other measures to reduce pain in invasive procedures for infusion. Several

studies related to using cold and warm applications such as giving cold compresses and warm compresses are effective for skin stimulation⁸.

Warm compress and dry cold compress able to block the transmission and duration of pain impulses at the dorsal door based on the theory of gate control to minimize the sensation of pain due to needle sticking during infusion. Both actions can reduce pain in certain areas of the body⁹.

Giving cold compresses can cause the release of endorphins so that it will block the transmission of painful stimuli. Cold compresses using ice slow the conduction of peripheral nerve fibers and reduce the release of inflammatory mediators and nociceptors, causing a relatively rapid skin anesthetic effect. Cold compresses can reduce pain levels, reinforced by Tamsuri's theory which says that giving cold compresses is believed to increase the release of endorphins which block the transmission of painful stimuli and have the effect of reducing pain sensation, cold compresses also provide physiological effects such as reducing tissue inflammatory responses, reducing blood flow and reducing edema¹⁰.

This is because warm compresses can inhibit pain impulses to the brain due to stimulation of the A Delta nerve fibers as a gate cover, while cold compresses cause an analgesic effect to slow down nerve conduction so that pain impulses take longer and less to the brain based on gate control theory so that it can minimize the sensation of pain due to needle sticking during infusion⁹.

METHODS

This study used a Quasi-Experimental Design with a post-test-only nonequivalent control group type (Dharma, 2011). The population is children aged 1-6 years who will be given an infusion with a type of non-probability sampling, namely consecutive sampling with a total sample of 30 children who are divided into two

groups, namely 15 warm compresses and 15 cold compresses. of the 30 respondents after being given the warm compress treatment the pain scale was 1-3 totaling 1 respondent (6.7%), 4-6 totaling 12 respondents (80.0%), 7-9 totaling 2 respondents (13.3%) after being given cold compress treatment the pain scale is 7-9 to

zero and on a scale of 1-3 there are 5 respondents (33.3%) and a scale of 4-6 is 10 respondents (66.7%). The instrument used in this study was the Wong-Baker Face Pain intensity scale.

RESULT

Table 1. Analysis of the effect of giving warm and cold compresses to changes in pain intensity in children

| Pain intensity | Warm compress | | Cold compress | | p-value |
|----------------------|---------------|----------------|---------------|----------------|--------------|
| | F | Percentage (%) | F | Percentage (%) | |
| no pain (0) | 0 | 0 | 0 | 0 | 0.000 |
| mild pain (1-3) | 1 | 6,7 | 5 | 33,3 | |
| moderate pain (4-6) | 12 | 80,0 | 10 | 66,7 | |
| severe pain (7-9) | 2 | 13,3 | 0 | 0 | |
| unbearable pain (10) | 0 | 0 | 0 | 0 | |
| Total | 15 | 100 | 15 | 100 | |

The results show that of the 30 respondents after being given warm compresses, the pain scale 1-3 was 1 respondent (6.7%), 4-6 was 12 respondents (80.0%), 7-9 was 2 respondents (13.3%) after being given cold compress treatment the pain scale was 7-9 to zero and on a scale of 1-3 there were 5 respondents (33.3%) and a scale of 4-6 totaled 10 respondents (66.7%). It can be concluded that there is a difference in pain scale after being treated with warm compresses and cold compresses.

Statistical test results using the Wilcoxon Signed Rank test using SPSS for Windows version 16.0, it is known that the significance value of $p (0.000) < (0.05)$, meaning that H1 is accepted, which indicates that there is a difference in pain intensity after being given warm compresses and cold compresses.

DISCUSSION

Infusion is the second source of pain that children feel the most after their illness ². Pain is experienced due to mechanical stimuli received by pain receptors in almost every body tissue, these stimuli are converted into impulses that are delivered to the pain center in the brain cortex. After being processed in the pain center, impulses are returned to the periphery in the form of pain perception (natural pain).

The results of the analysis showed $p (0.000) < (0.05)$ There was a difference in the effectiveness of warm compresses and cold compresses before infusion on pain intensity. Cold compresses are more dominant to reduce pain intensity because cold compresses are more able to eliminate the sensation of pain due to stabbing and can suppress autonomic responses, while warm compresses cause vasodilation related to local blood vessel dilation⁷.

This is because warm compresses can reduce pain by providing heat energy through the conduction process, where the heat generated will cause vasodilation associated with local blood vessel dilation. Warm compresses can provide a warm feeling to reduce pain by dilation of blood vessels which can increase local blood flow and provide a sense of comfort¹¹.

This is because the cold compress will cause an analgesic effect by slowing the speed of nerve conduction so that fewer pain impulses reach the brain. Another mechanism that may work is that the perception of cold becomes dominant and reduces the perception of pain⁷.

In order to develop effective non-pharmacologic pain management in the field of nursing in patients who are on mechanical ventilators, nurses need to know the types of non-pharmacologic pain management that can be done by a midwife. Non-pharmacologic pain management that can be used to treat pain is music therapy, relaxation, hypnosis therapy, distraction therapy, play therapy, activity therapy, acupuncture therapy, compresses and massage. Non-pharmacologic pain management can be used in combination with pharmacologic pain management. Research results show that a combination of pharmacologic and non-pharmacologic has a better effect than using opioid analgesics alone. Non-pharmacologic pain management that can be used to treat pain in patients on mechanical ventilators in the ICU are relaxation, music therapy, touch therapy, massage therapy⁸.

The appearance of pain is closely related to the receptors and the presence of stimulation. Pain receptors can respond to stimulation or stimulation. The stimulation received by these receptors is transmitted in the form of pain impulses to the spinal cord by two types of fibers, namely A (delta) fibers, and C fibers. Pain impulses cross the spine on interneurons and are connected to the main ascending spinal pathway, namely the spinal pathway.

spinothalamic tract (STT) or spinothalamic and spinoreticular tract (SRT) which carries information about the nature and location of pain¹². The presence of venipuncture in the infusion can cause anxiety, fear, and pain in children³.

Thus the intensity of pain felt by each respondent after being given a warm compress there were still respondents who experienced severe pain. When compared with the pain felt by cold compress respondents, there was a very significant change in pain intensity so that none of the respondents experienced severe pain

The application of warm and cold compresses to the sensation of pain with artificial pricking showed that the application of heat stimulation gave little response to pain reduction when compared to cold stimulation. Cold compresses can eliminate the sensation of pain due to stabbing and can suppress autonomic responses, while warm compresses cause vasodilation related to local blood vessel dilation¹¹.

Children who must receive treatment in the hospital often gain experience from the various invasive procedures that need to be carried out. The infusion procedure is an invasive procedure that is often carried out when caring for children in the hospital, this action is done by inserting a needle into the child's vein which can cause pain. Infusion is the second source of pain that children feel the most after their illness¹³.

Efforts to reduce pain can be done through pharmacological therapy, namely by using drugs and non-pharmacological therapy without using drugs, including relaxation, hypnosis, guided imagery, massage, music therapy, warm compresses, and cold compresses. Cold compress is a suitable non-pharmacological therapy given before infusion. The Cold will cause numbness before pain occurs. Cold compresses can cause a local anesthetic effect on puncture wounds due to infusion. Cold compresses using ice slow the conduction of peripheral

nerve fibers and reduce the release of inflammatory mediators and nociceptors, causing a relatively rapid skin anesthetic effect¹⁴.

Cold compresses were chosen as an intervention to reduce pain due to infusion in this study based on the results of previous studies which showed cold compresses were more effective than warm compresses, in cold compresses, the transfer of pain perception to coldness which is more dominant is one type of transcendence that has been achieved. so that the patient feels more comfortable, while the warm compress does not have the same effect as the cold compress. Warm compresses also do not have a local anesthetic effect that can reduce local pain¹⁵.

The impact caused by invasive procedures will cause pain so children will experience anxiety and stress. Untreated pain can have a major impact on a child's life. Pain can interfere with children's activities so children have difficulty interacting with others because children are focused on the pain they feel. Other effects of pain include difficulty sleeping, decreased children's interest in activities, and increased anxiety. The inability to reduce pain can lead to helplessness and hopelessness¹.

The gate control pain defense theory of Melzack and Wall states that pain impulses can be regulated or inhibited by defense mechanisms along the central nervous system. Giving cold compresses will stimulate the descending nerve pathways to release endogenous opiates such as endorphins which are natural pain killers that come from the body. Giving cold compresses can also stimulate neuromodulators to close the defense mechanism by inhibiting the release of substances¹⁴.

According to Kozier's theory which states that with cold compresses, the transfer of pain perception to coldness is more dominant, one of the types of transcendence that have been achieved so that patients feel more comfortable, while

warm compresses do not have the same effect as cold compresses. Warm compresses also do not have a local anesthetic effect that can reduce local pain.¹⁵

Cold compresses work by stimulating the skin's surface to control pain. The cold compress given will affect the impulses carried by the A-Beta tactile fibers to dominate so that they will close and the pain impulses will be blocked. The pain felt will decrease or disappear for a while. Cold compresses are known to be effective and efficient to use as skin stimulation. In general, cold penetrates the tissue more easily than heat. When the muscle has experienced a decrease in temperature due to cold application, the effect of cold can last longer than heat due to the presence of subcutaneous fat which acts as an insulator, on the other hand, subcutaneous fat is the main barrier of cold energy to penetrate the muscle¹⁵.

1-3 minutes of cold compresses can reduce pain during the infusion procedure for school-age children¹⁶. Previous research showed that the majority of respondents who were given cold compresses for 3 minutes experienced milder pain. Mentioning the application of warm compresses for 5 minutes and cold compresses for 5 minutes against pain in school-age children during infusion, the results of cold compresses were more effective in reducing pain¹⁷.

Physiologically, in the first 10-15 minutes after giving cold compresses, vasoconstriction occurs in blood vessels. In the nursing field, cold compresses are widely used to reduce pain. Cold compresses have a physiological effect, namely reducing the inflammatory response, reducing pain, and working by releasing endorphins, thus blocking the transmission of painful stimuli¹³.

Warm and cold compresses can tolerate pain during injection. Cold compresses can reduce the pain scale significantly because it can suppress

autonomic responses so that a person can be more comfortable and relaxed. After giving warm and cold compresses, there is an effect on the intensity of pain after infusion because it slows down the speed of nerve conduction so that fewer pain impulses reach the brain. Researchers also argue that giving cold compresses can reduce pain levels during infusion because cold compresses have a physiological effect on the body to relieve pain

CONCLUSION

Cold compresses are more dominant to reduce pain intensity because cold compresses are more able to eliminate the sensation of pain due to stabbing and are able to suppress autonomic responses, while warm compresses cause vasodilation related to local blood vessel dilation.

REFERENCES

1. Wong D. Pedoman Klinis Keperawatan Pediatrik. 4th ed. Jakarta : EGC; 2012.
2. Zempsky. Clinical implications of unmanaged needle-insertion pain and distress in children, *Pediatrics*, American Academy of Pediatric. 2008.
3. Uliyah, Musrifatul & Hidayat AA. *Praktikum Klinik: Aplikasi Dasar-Dasar Praktik Kebidanan*. Salemba Medika, Jakarta; 2008.
4. Hidayat. *Pengantar Kebutuhan Dasar Manusia: Aplikasi Konsep dan Proses Keperawatan*. Salemba Medika, Jakarta; 2008.
5. Smeltzer dan Bare. *Buku Ajar Keperawatan Medikal Bedah*. Jakarta: EGC; 2002.
6. Wong DL BM. Comparison of Assessment Scale. *Pediatric Nursing*; 14; 1-9; 2009.
7. Potter, Patricia. A & Perry AG. *Foundamental of Nursing*. Buku 2 Edi. Salemba Medika, Jakarta; 2010.
8. Darmawan. *Kebutuhan Dasar Manusia*. Jakarta : Salemba Medika; 2008.
9. Berman, Snyder, Koziar E. *Buku Ajar Keperawatan Klinis Koziar & Erb*. Edisi 5. Jakarta: EGC; 2009.
10. Tamsuri, Anas. *Konsep Dan Penatalaksanaan Nyeri*. Jakarta : EGC; 2012.
11. Price. *Patofisiologi Konsep Klinis Proses Proses Penyakit*. Edisi 4. Jakarta: EGC; 2005.
12. Ester. *Nurses Guide to Home Health Procedures*. jakarta; 2005.
13. Indriyani. Kompres Dingin Dapat Menurunkan Nyeri Anak Usia Sekolah Saat Pemasangan Infus. *Jurnal Keperawatan Indonesia*. 2013 Jun;16(02):93–100.
14. Potter PA& PAG. *Buku Ajar Fundamental Keperawatan : Konsep, Proses dan Praktek*, Alih Bahasa : Yasmin Asih. Jakarta : EGC;
15. Koziar. *Buku Ajar Praktik Keperawatan Klinis*. Jakarta : EGC; 2012.
16. Asriani. Pengaruh Kompres Dingin Terhadap Tingkat Nyeri Anak Usia Sekolah Saat Pemasangan Infus Di Poliklinik Persiapan Rawat Inap RSUD Panembahan Senopati Bantul. *Jurnal Keperawatan Respati Yogyakarta*,. 2017 Jan;04(01):70–5.
17. Hendayani. Pengaruh Kompres Dingin Terhadap Tingkat Nyeri Pada Prosedur Invasif Pemasangan Infus Anak Usia Sekolah di RS Benda Kota Pekalongan. *Jurnal Keperawatan Respati Yogyakarta*. 2013 Jan;2(1):10–5.