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The Effectiveness Of Giving Warm Water Compresses To Reduce Typhoid Fever

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Abstrak

Demam merupakan masalah yang timbul pada pasien yang menderita demam tifoid. Tindakan yang dapat dilakukan untuk menurukan suhu tubuh dengan menggunakan kompres hangat. Tujuan penelitian untuk mengetahui efektivitas antara pemberian kompres hangat daerah axilla dan daerah femoral terhadap penurunan suhu tubuh pasien demam tifoid. Metode penelitian menggunakan quasi experiment dengan rancangan nonequivalent control group (pretest-posttest). Sampel penelitian berjumlah 30 responden. Hasil penelitian pada kelompok kompres hangat di axilla sebelum ($\bar{x}$ =38,43°C) dan sesudah ($\bar{x}$ =37,52°C), pada kelompok kompres hangat di femoral sebelum ($\bar{x}$ =38,43°C) dan sesudah ($\bar{x}$ =37,91°C). Uji paired t test menunjukkan ada perbedaan suhu tubuh sebelum dan sesudah diberikan kompres hangat di axilla dengan ρ value 0,000 dan di femoral ρ value 0,000. Uji independent sample t test menunjukkan ada perbedaan antara pemberian kompres hangat di axilla dan di femoral terhadap penurunan suhu tubuh pada anak demam dengan ρ value 0,000. Hasil dari penelitian ini bisa digunakan untuk bukti terbaru untuk keefektifan penggunaan kompres hangat di area axilla dan femoral anak.

Kata Kunci: Demam, Kompres Hangat, Daerah Axilla, Daerah Femoral

Abstract

Fever is a problem that arises in patients suffering from typhoid fever. Actions that can be taken to reduce body temperature by applying warm compresses. The study aimed to determine the effectiveness of warm compresses between the axilla and femoral regions in reducing the body temperature of typhoid fever patients. The research used a quasi-experiment with a nonequivalent control group (pretest-posttest) design. The research sample amounted to 30 respondents. The results of the study in the axilla warm compress group before (x^{-}=38.43 ° C) and after (x^{-}=37.52 ° C), in the femoral warm compress group before (x^{-}=38.43 ° C) and after (x^{-}=37.91 ° C). The paired t-test shows a difference in body temperature before and after being given a warm compress in the axilla with a ρ value of 0.000 and in the femoral ρ value of 0.000. The independent sample t-test shows there was a difference between giving warm compresses in the axilla and in the femoral to reduce body temperature in children with fever with a ρ value of 0.000. The results of this study can be used as updated evidence for the effectiveness of using warm compresses on both the axilla and femoral area of children.

Keywords: Fever, Warm Compress, Axilla Area, Femoral Area

Pendahuluan

Typhoid fever is a bacterial infection caused by salmonella typosa, which affects a person's body as a whole and is characterized by a fever. This disease is transmitted through consuming food or drinks contaminated by the feces or urine of an infected person. One clinical sign and problem in patients suffering from typhoid is fever or an increase in body temperature that exceeds normal

body temperature above 37.5 C (Suratun & Lusianah, 2010). Typhoid fever is a disease that resides in the small intestine and can cause continuous symptoms caused by salmonella typosa. A public hospital in Switzerland mentioned that 24% of all visits during 2011-2012 were because of fever (Piller & Herzog, 2019).

According to data from the WHO (World Health Organization), 11–21 million cases of typhoid fever and approximately 128 000–161 000 deaths annually. Most cases occur in South and South-East Asia and sub-Saharan Africa (World Health Organization, 2018). The age of 5-14 years is the age of children who do not pay attention to personal hygiene and indiscriminate eating habits, so they can contract typhoid fever (Artanti, 2013).

Several actions can be taken to maintain body temperature, including pharmacological and non-pharmacological therapies. Pharmacological therapy includes medical or antipyretic drugs and non-pharmacological therapy, one of which is through warm compresses. Giving warm compresses to areas with a lot of vascular will expand the vasodilation area, then strong vasodilation of the skin will allow the acceleration of heat transfer from the body to the skin up to eight times more (Rahmawati et al., 2013).

Based on the data obtained through observation and interviews with the parents of patients with children suffering from typhoid fever who experienced an increase in body temperature that day, it was found that four out of six patient parents applied warm compresses to the forehead area (frontal) and two others did warm compresses in the axilla and femoral area. After the researcher asked how the results of the decrease in body temperature in the child after giving the compress, four parents of the patient said the fever went down after being compressed, but only a moment later, it rose again, and the other two parents of the other patients said the child's body temperature fell, but at night it increased again.

With the importance of handling fever and independent action in nursing interventions outside of collaborative pharmacological treatment, the researchers are interested in proving the effectiveness of giving warm compresses to the axilla and femoral areas in reducing the body temperature of typhoid fever patients carefully.

Bahan Dan Metode

Participant characteristics and research design

The research design used in this study was a quasi-experimental design with a nonequivalent control group (pretest-posttest) design.

Sampling procedures

The population in this study were children of pre-school age, school age to early adolescence (5-14 years) male/female in Banjarmasin who experienced typhoid fever with increased body temperature.

Sample size, power, and precision

The research sample was obtained using a sampling technique, namely consecutive sampling. The number of subjects required was met, namely 30 research samples consisting of 15 samples for those who received warm compresses in the axilla area and 15 samples who received warm compresses in the femoral area.

Instrument
This research utilized instruments such as observation sheets and digital thermometers. A digital thermometer was used to gauge clients' body temperature on *the axilla* (armpit), which took around two to three minutes or until the alarm rang, which signals the temperature has been gauged. This procedure was done before and after the treatment. Treatments were done according to the warm compress's SOP and body temperature check's SOP.

Research Procedure
The research subjects were chosen according to inclusion criteria. The sample was divided into two groups: compress on the *axilla* and compress on *the femoral.* Body temperature was checked before and after the intervention using a compress.

Data analysis :
Data analysis in each sample group warm compresses in the axilla and on the femoral area using Paired T-Test with the previous normality test results with Uji Kolmogorov Smirnov (Asymp. Sig.0.743). Analyze the differences between the two groups using Independent Sample *T*-Test. The study from (Suntari C, Astini, & Sugiani, 2019) mentioned differences in the effectiveness of regulating body temperature with the warm compress method and the Tepid Water Sponge compress with a significance value of p = 0.0001.

Hasil Dan Pembahasan

Differences in body temperature before and after warm compresses are given on the Axilla

Table 1. Correlations of Giving Warm Compress to the Axilla Area Group

Warm Compress in Axilla Area	Mean (°C)	SD	Correlation	Paired T-Test ρ value
Pre-test Treatment	38,43	0,54	0,980	0,000
Post-Test Treatment	37,52	0,46		

Based on the table, the results of the Paired T-Test statistical test, the value of ρ value = 0.000 ≤ α = 0.05, means that there was a difference in body temperature before and after being given treatment in the warm compress group in the axilla area to decrease the body temperature of children with typhoid fever. The table shows that the average body temperature in the warm compress group on the axilla before being treated was 38.43 ° C, and after being treated, it was obtained at 37.52 ° C. It can be seen that a decrease in the mean value of body temperature between before and after treatment is 0.91 ° C. The Paired T-Test statistical test results showed that the value of ρ value = 0.000 α ≤ 0.05, meaning that there was a significant difference in body temperature before and after being given a warm compress on the axilla in a child with typhoid fever. In addition, the correlation value in the warm compress group in the axilla area was 0.980, which showed that giving warm compresses to the axilla area had a very strong effect on reducing the body temperature of children with typhoid fever.

This study's results align with the journal Wardiyah, Setiawati, & Setiawan (2016); at RSUD Dr. H. Abdul Moeloek Provinsi Lampung showed that applying warm compresses to the axillary and forehead areas had an effect in reducing body temperature in fever clients. The decrease in body

temperature of clients who are compressed with warm water in the axillary area averaged 0.0933 ° C. This showed that using the treatment effectively takes care of typhoid fever. The reason is that children's bodies would judge that the body's temperature was warmer than expected, and eventually, the body would decrease the temperature control in the brain to not increase their temperature even more (Kartini et al., 2019).

The results of this study also follow the theory put forward by Tamsuri (2014), which states that the armpit area has large veins that have excellent vasodilation processes in lowering body temperature and are very close to the brain, which is where the hypothalamus is the body temperature control sensor. This is supported by the theory offered by Potter, Perry, Stockert, & Hall (2010), which states that applying warm compresses provides a physiological reaction in the form of vasodilation of large blood vessels and increases heat evaporation from the skin surface. The anterior hypothalamus signals the sweat glands to release sweat through tiny ducts on the skin's surface. Sweat will evaporate, so there will be a decrease in body temperature. Giving a warm compress to the axilla as an area with large blood vessels to stimulate the hypothalamus preoptic area to reduce body temperature (Hamid, 2011).

Based on the researcher's analysis, supported by research-related journals, it can be concluded that this action is useful for dilating blood vessels, accelerating heat exchange between the body and the environment, and lowering body temperature in the periphery. In addition, it can prove and support that non-pharmacological action; namely, a warm compress on the axilla area, can reduce body temperature in children who experience an increase in body temperature, especially typhoid fever patients.

Differences in body temperature before and after warm compresses are given to the femoral area

Table 2. Correlations of Giving Warm Compress to the Femoral Area Group

Warm Compress in Femoral Area	Mean (°C)	SD	Correlation	Paired T-Test ρ value
Pre-test Treatment	38,43	0,32	0,974	0,000
Post-Test Treatment	37,91	0,29		

Based on the table, the results of the Paired T-Test statistical test value ρ value = 0.000 ≤ α = 0.05, meaning that there are differences in body temperature before and after being given treatment in the warm compress group in the femoral area to decrease the body temperature of children with typhoid fever. Therefore, the average body temperature before being treated with warm compresses on the femoral is 38.43 ° C, and after being given the treatment, it is obtained at 37.91 ° C. It can be seen that the mean value of body temperature before and after treatment is 0.51 ° C. The Paired T-Test statistical test showed that the value of ρ value = 0.000 α ≤ 0.05, meaning that there was a significant difference in body temperature before and after being given warm compresses in the femoral patients with typhoid fever. In addition, the correlation value in the warm compress group in the femoral area was 0.974, which showed that giving warm compresses to the femoral area strongly decreased the child's body temperature.

The results of this study follow the theory made by Kozier, Erb, Berman, & Snyder (2010), which states that applying warm compresses to the femoral area is an area with large blood vessels,

namely arteries in the femoral veins with many arterial branches, where the temperature will move from the blood to the surface of the skin through the walls of blood vessels. In addition, the epidermal skin in the groin is thinner than elsewhere, thus accelerating the release of heat from blood vessels in the layer to the skin surface. Giving a warm compress is done in the femoral area because the area with the location of the large blood vessels, which is the center for controlling core temperature, is in the hypothalamus preoptic area. When warm temperature-sensitive receptors in the hypothalamus are stimulated, the effector system sends signals that trigger sweat production and vasodilation.

This statement is supported by Mohamad (2012) that applying warm compresses to areas of the body will provide a signal to the hypothalamus through the spinal cord. When heat-sensitive receptors in the hypothalamus are stimulated, the effector system emits signals that initiate sweating and peripheral vasodilation. Changes in the size of blood vessels are regulated by the vasomotor center in the medulla oblongata of the brain stem, under the influence of the anterior hypothalamus, causing vasodilation. This vasodilation causes the dissipation of heat energy through the skin to increase (sweating); it is hoped that a decrease in body temperature will occur so that it reaches a normal state again. The vasodilation that occurs due to warm compresses can dilate arterioles, resulting in decreased resistance, increased O2 (oxygen) intake, and decreased smooth muscle contraction in blood vessels (Potter et al., 2010).

Based on the researchers' analysis, strengthened by related research, it can be concluded that giving warm compresses to the femoral area can reduce body temperature in children with fever or increase body temperature. A warm compress on an area of the body will provide a signal to the hypothalamus through the spinal cord. When heat-sensitive receptors in the hypothalamus are stimulated, the effector system sends signals to initiate sweating and peripheral vasodilation. This vasodilation causes the dissipation or loss of heat through the skin to increase, resulting in a decrease in body temperature.

The difference in the effectiveness of giving warm compresses on the axilla and warm compresses on the femoral against the decrease in body temperature in children with typhoid fever

Table 3. Comparation Test of Giving Warm Compress between the one in Axilla Area and in Femoral Areas

	Treatment	*Mean*	*SD*	*ρ value*
Difference in Body Temperature Change	Warm Compress in Axilla Area	0,91	0,13	0,000
	Warm Compress in Femoral Area	0,51	0,07	
	The Difference	0,4		

Based on the table of statistical test results of the Independent Sample T-Test, it was found that ρ value = 0.000 ≤ α = 0.05, meaning that there was a significant difference between giving warm compresses to the axilla group and giving warm compresses to the femoral group to reduce the temperature of children with typhoid fever. The value of the difference in body temperature changes between giving warm compresses to the axilla area and warm compresses in the femoral area is 0.4 ° C, where changes in body temperature decrease are greater in warm compresses in the

axilla area than warm compresses in the femoral area, as evidenced by the mean value of warm compresses in the axilla area. That is, 0.91 ° C (0.13) is greater than the mean value of the femoral warm compress at 0.51 ° C (0.07). Based on the table shows that the value of the difference in body temperature changes between giving warm compresses to the axilla area and warm compresses in the femoral area is 0.4 ° C, where changes in body temperature decrease are greater in warm compresses in the axilla area than warm compresses in the femoral area, as evidenced by the mean value. The warm compress axilla area is 0.91 ° C greater than the mean value of 0.51 ° C femoral warm compress.

The results of the Independent Sample T-Test statistical test showed that the value of ρ value = 0.000 $\alpha \leq 0.05$, it can be concluded that there is a significant difference between giving warm compresses to the axilla area and giving warm compresses to the femoral area to reduce the temperature of children with typhoid fever. This shows that a warm compress on the axilla is more effective in lowering body temperature than on the femoral. The results of this study indicate that applying warm compresses to the axilla and the femoral both reduces body temperature; it is just that the decrease is more pronounced in warm compresses on the axilla. This happens because there are many large blood vessels in the axilla area and many apocrine glands (Corwin, 2009).

The above statement is in accordance with the theory according to (Potter et al., 2010) that applying a warm compress to the axilla as an area with large blood vessels is an attempt to stimulate the hypothalamus preoptic area to lower body temperature. The warm signal carried by this blood to the hypothalamus will stimulate the preoptic area resulting in the release of signals by the effector system. This signal will cause more body heat dissipation through two mechanisms: dilation of peripheral blood vessels and sweating.

Based on the study's results, it is known that the axilla and femoral areas are the location of large blood vessels to provide stimulation to the hypothalamus preoptic area to reduce body temperature. However, the results of this study indicate that applying warm compresses to the axilla area is more effective than applying warm compresses to the femoral area. The effectiveness of temperature reduction in the axilla region compared to the femoral area, although both are large blood vessels, is more effective because the axilla area is closer to the brain, which is the center of body temperature control.

The results of this study are also in accordance with the theory put forward by (Tamsuri, 2014), which states that the axilla area has a large vein that has an excellent vasodilation process ability to reduce body temperature and is very close to the brain, which is the location of the body temperature control sensor, namely the hypothalamus. According to Guyton & Hall (2009), warm compresses in the axilla area are quite effective because of the vasodilation process. A warm compress in the axilla area is better because more receptors signal the hypothalamus.

The decreasing temperature in the femoral area is due to its location far from the brain, so the decreasing temperature is through the spinal cord. According to (Potter et al., 2010), a warm compress on an area of the body will signal the hypothalamus through the spinal cord because giving warm water to that area of the body will signal to the hypothalamus through the spinal cord. When heat-sensitive receptors in the hypothalamus are stimulated, the effector system gives off a signal to initiate sweating and peripheral vasodilation. Changes in the size of blood vessels are

controlled by the vasomotor center in the medulla oblongata of the brain stem, under the influence of the anterior hypothalamic causing vasodilation. This vasodilation causes the discharge or loss of energy or heat through the skin to increase (indicated by the body sweating), then the body temperature can decrease or normalize.

The above statement is supported by the theory of Tamsuri (2014), which states that an increase in body temperature in children occurs due to the inability of the heat loss mechanism to compensate for excessive heat production and can also be caused by other factors, one of which is room temperature, where the temperature transfer between humans and the environment nor room temperature occurs mostly through the skin. The difference in environmental temperature can affect a person's temperature regulation system. If the temperature is measured in a very hot room and the body temperature cannot be changed by convection, conduction, or radiation, the temperature will be high. Body temperature can exchange with the environment, meaning body heat can be lost or reduced due to a cooler environment. When the environmental temperature is cold, or the temperature of the blood circulation drops, the hypothalamus will carry out activities to increase heat production.

The mechanism of reducing the temperature with a warm compress is that the body will interpret the temperature outside as hot enough. Thus, the body will lower the temperature control in the box, so it does not increase body temperature regulation anymore. In addition, a warm external environment will open the peripheral blood vessels in the skin to widen or vasodilate and open the skin pores, making it easier to expel heat (Potter et al., 2010).

This statement is supported in the journal by Ayu, Irwanti, & Mulyanti (2015), which stated that a warm external environment would make the body interpret that the temperature outside is hot enough that it will reduce the temperature control in the brain that it does not increase the body temperature control anymore, it will also open the skin pores so that it makes it easier to expel heat from the body and otherwise.

As health workers who provide nursing care to children, nurses must manage children's fevers appropriately. One of the independent interventions that can be done is by applying warm compresses to the body, especially on the axilla or femoral area. Nurses must also collaborate with doctors in treating fever pharmacologically by providing safe antipyretic drugs for children.

Kesimpulan

There was a significant difference in giving warm water compresses to the axilla area to decrease the body temperature in typhoid fever patients with a value of ρ value = 0.000 $\leq \alpha = 0.05$. There was a significant difference in giving warm water compresses to the femoral area to decrease the body temperature in typhoid fever patients with a value of ρ value = 0.000 $\leq \alpha = 0.05$. There was a difference in the effectiveness between giving warm water compresses to the axilla area, and the difference between giving warm water compresses to the axilla and femoral areas to decrease the body temperature in typhoid fever patients with a value of ρ value = 0.000 $\leq \alpha = 0.05$.

The researcher believed that this study could be used to give more evidence for others to utilize warm compresses to decrease children's fever. Another researcher can also use this study to

reference the difference between using water compress on the axilla or femoral areas. Further researchers could analyze parents' response to using warm water compress on their children.

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