



Original Research

The Difference Between the Conventional Warm Compress and Tepid Sponge Technique Warm Compress in the Body Temperature Changes of Pediatric Patients with Typhoid Fever

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ABSTRACT

Introduction: The use of warm compresses and warm sponge techniques as a modality therapy for the management of fever in typhoid children has a good influence. The purpose of this research was to learn of the differences between conventional warm compress and the tepid sponge technique as related to the body temperature changes of pediatric patients with typhoid fever. A fever that does not get a good standard of treatment can cause dehydration, neurological damage and febrile seizures.

Methods: The research design was quasi-experiment with two groups pre-post test. The population was taken from the Kampili Community Health Center while the 20 samples were taken using the purposive sampling technique. Conventional warm compresses were placed on the forehead, while warm tepid sponges were compressed and placed on the forehead, armpits and the folds of the thighs simultaneously.

Results: . The data of the results were significance tested using the General linear model repeated measure (p value 0.03 for conventional warm compresses and p value 0.01 on a warm compress tepid sponge technique).

Conclusion: Statistically, the warm compress tepid sponge technique is more meaningful and qualitatively, the temperature change is better after the compression.

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INTRODUCTION

Typhoid fever is a systemic infection caused by Gram negative bacteria *Salmonella Typhi*. This bacteria are on food or drinks associated with poor hygiene and areas with poor sanitation. Typhoid fever is a serious health problem and it is a major cause of infant morbidity and mortality in developing countries (Almeida & Almeida, 2008). Fevers that do not get a good treatment can cause dehydration, neurological damage and febrile seizures (Arbianingsih, 2011).

A report from the WHO revealed that 21 million cases and > 600,000 deaths every year worldwide are due to typhoid fever. Developing countries have the highest number of typhoid fever cases caused by the rapid population growth, increased urbanization and limited water and health service hygiene (Gebreyesus

& Negash, 2015) Areas with high endemicity include Central Asia, South Asia, Southeast Asia and South Africa (Almeida & Almeida, 2008). A study conducted in urban areas in some Asian countries focused on children aged 5 - 15 years showed that the incidence of positive blood cultures reached 180-194 per 100,000 children in South Asia in those aged 5-15 years. It was 400-500 per 100,000 population in Southeast Asia and in Northeast Asia, it was less than 100 cases per 100,000 population (Burnside dan M.C Glynn, 2014).

In Indonesia, typhoid fever should get serious attention from various parties because this disease is endemic and threatens public health. The problem is increasingly complex with increasing carrier cases (carrier) or relapse and resistance to the drugs used, thus making it more difficult for treatment and

prevention efforts to respond. In 2008, typhoid morbidity in Indonesia was reported to be 81.7 per 100,000 population, with the distribution according to the age group being 0.0 / 100,000 population (0-1 years), 148.7 / 100,000 population (2-4 years), 180, 3 / 100,000 (5-15 years) and 51.2 / 100,000 (= 16 years). This figure shows that the highest number of sufferers is in the 2-15 years old age group (Kemenkes, 2006)

One effort to reduce fever is with a warm compress. According to the research, a warm compress can be used as an independent act by the nurses to help to reduce the patient's body temperature (Surakarta & Ambarwati, n.d.) Conventional warm compresses (forehead area) can reduce the body temperature but warm compresses on the forehead produce insignificant decreases in temperature (Edbor, Arora, & Mukherjee, 2011).

Another action used to reduce heat is a tepid sponge. Tepid sponging is a procedure used to improve the control of body heat loss through evaporation and conduction, which is usually done in patients who have a high fever. The purpose of the tepid sponge action is to reduce the body temperature in patients who have hyperthermia (Gebreyesus & Negash, 2015). The tepid sponge technique is more effective at lowering the body temperature in the first 15 minutes. The research carried out combining mothers with the tepid sponge technique showed that it can reduce the body temperature better than just using profen mothers only (Hidayati, 2014).

According to a study conducted by (Kania, 2015), the reduction of the body temperature using a warm sponge with antipyretic drugs was significantly faster than using only antipyretics and paracetamol. However, the effects of discomfort were milder.

Based on the background phenomenon of the above problems, the researchers wanted to examine the difference between a conventional warm compress and the tepid sponge technique related to the body temperature changes of pediatric patients with typhoid fever.

MATERIALS AND METHODS

This research was conducted using a quasi-experimental technique. A quasi-experiment explains the relationship used as a basis to predict a phenomenon (Kanj et al., 2015). The types of design used were two groups of pre-test post-tests. The sample totaled 20 people, consisting of 10 in the conventional warm intervention groups and 10 people in the group for the tepid sponge technique. The sample in the research were children aged 3 - 12 years old (preschool and school years) who had been admitted to the Kampili Health Center Inpatient Room, who had typhoid fever based on a medical diagnosis (temperature; 37,20C - 39,50C) and who had received fluid therapy and antipyretic therapy.

This study used the research instrument of observation sheets for the body temperature research method, in addition to conventional warm

compress equipment, tepid sponge warm compress equipment, a wrist watch, stationery and a mercury thermometer for the axillary measurements. Measuring the body temperature was done using a mercury thermometer because it has a 99% accuracy rate. Mercury responds to body temperature and it is not related to other factors such as battery usage or damage as might happen to a digital thermometer machine.

The location of this study was in the Inpatient Room of the Kampili Community Health Center, Pallangga District, Gowa Regency. To determine the effect of the conventional warm compress and tepid sponge technique warm compress on the body temperature changes of pediatric patients with typhoid fever, the data was analyzed using the General Linear Model-Univariate test. In addition, the General Linear Model - Repeated Measure test was also used to determine whether there were significant differences in the variables that were measured repeatedly.

RESULTS

Based on the results of the research conducted on the 20 respondents using a conventional warm compresses and the tepid sponge technique, [Table 1] shows the demographic data, namely the distribution of respondents based on the highest age at 7 - 12 years especially in reference to the tepid sponge techniques (60.0%). Conventionally, those between the ages of 3-6 years old and 7-12 years old were comparable (50% each), while the distribution of respondents by sex was that (70%) were women in the conventional warm compress group while the sexes were split by 50% each in the tepid sponge technique. The variable data on the form and duration of the fever suffered after 4-6 days of compressing was so for as many as 13 respondents (65%), which is the duration of fever suffered the most. The distribution of the respondents based on length of the treatment performed was 1 day of treatment for 13 respondents (65%), which was the most common treatment time. [Table 2] shows that the distribution of the respondents based on the level of fever was, for the conventional warm compresses in the pre-test measurements, at the highest febrile level, namely 38.50C. The highest sub-febrile value was 37.90C. For the tepid sponge technique, the highest score was 38.60C and the highest sub-febris was 38.20C. The highest temperature compressed in this research was 38.60C compressed with the tepid sponge technique. [Table 3] After the General Linear Model-Repeated Measure test is carried out the following results: Temperature changes between the pre-test and post-test in the conventional warm compress groups were as follows: in the 5 minutes after compressing, the p value was 0.07 ($p > \alpha$) or $0.07 > 0.05$, which means that conventional warm compresses are not statistically significant but they are able to reduce the average body temperature by 0,150C in quality. At 15 minutes, the p value was 0.01 ($p < \alpha$) or $0.01 < 0.05$, which

Table 1. Distribution of the Respondents Based on their Demographic Data

Respondent's Characteristics	Conventional Warm		Warm compress Tepid Sponge	
	Frequency (%)		Frequency (%)	
Age				
3- 6 years	5	50.0	4	40.0
7-12 years	5	50.0	6	60.0
Total	10	100	10	100
Gender				
Male	3	30.0	5	50.0
Female	7	70.0	5	50.0
Total	10	100	10	100
Old Fever suffered	Frequency		Percentage (%)	
1 - 3 days	7		35.0	
4 - 6 days	13		65.0	
Total	20		100	
Duration of treatment	Frequency		Percentage (%)	
1 day	13		65.0	
2 days	7		35.0	
Total	20		100	

Table 2. Respondent's Frequency Distribution Based on the Dependent Variables

Warm Compress	Warmth Level	Highest Value Pre-test (°C)
Conventional	Febris	38,5
	Subfebris	37,9
	Febris	38,6
	Sub-febris	38,2

Table 3. Effect of Compression on Changes in Body Temperature at Every Time of Measurement

Technique Transfer	Temperature Change	P value
Conventional (p value 0,03)	Pre-test-minute ke 5	0,07
	Pre-test-minute ke 15	0,01
	Pre-test-minute ke 30	0,78
	Pre-test-minute ke 60	0,21
Tepid sponge (p value 0,01)	Pre-test minute ke 5	0,01
	Pre-test-minute ke 15	0,01
	Pre-test-minute ke 30	0,02
	Pre-test-minute ke 60	0,11

Table 4. Effect of Compression on Changes in Body Temperature - Multivariate Analysis

Warm Technique Temperature Change	P value	
Conventional	Pillai's Trace	,003
	Wilks' Lambda	,003
	Hotelling's Trace	,003
	Roy's Largest Root	,003
	Pillai's Trace	0,01
Tepid Sponge	Wilks' Lambda	0,01
	Hotelling's Trace	0,01
	Roy's Largest Root	0,01

means that conventional warm compresses in the 15th minute after compressing caused a decrease in body temperature. At 30 minutes, the p value was 0,78 ($p > \alpha$) or $0.78 > 0.05$, which means that there is no decrease in body temperature and it even tends to increase from the pre-test value. At 60 minutes, we got a p value of 0.21 ($p > \alpha$) or $0,21 > 0.05$, which means that conventional warm compresses 60 minutes after the compression do not lower the body

temperature and it even tends to increase from the pre test value.

The temperature changes between the pre-test and post-test in the warm compress group for the tepid sponge technique were as follows. In the 5 minutes after compressing, it got a p value of 0.01 ($p < \alpha$) or $0.01 < 0.05$, which means that the tepid sponge technique affects the decrease in body temperature. At 15 minutes, p value 0.01 was obtained ($p < \alpha$) or $0.01 < 0.05$, which means that the tepid sponge

technique has an effect on decreasing the body temperature in the 15 minutes after compressing. In the 30 minutes after compressing, the p value was 0.02 ($p > \alpha$) or $0.02 > 0.05$, which means that the tepid sponge technique is not statistically significant but it is able to reduce the average body temperature by 0.110 C 30 minutes after compressing. At 60 minutes, the p value was 0.11 ($p > \alpha$) or $0.11 > 0.05$, which means that the tepid sponge technique does not reduce the body temperature 60 minutes after compressing, which is even higher than the pre test value [Table 4]. The effect of the compress on changes in body temperature analyzed using multivariate analysis was done to find out whether the mean of the post-test measurements differed significantly. Multivariate tests were carried out by looking at Table 4.8. From all of the tests, it was concluded that they all rejected H_0 because all of the tests produced the same p-value, which was $0.03 < 0.05$. There was a significant difference in the changes in body temperature with the conventional warm compresses. For the tepid sponge technique, all tests produced the same p-value, that is $0.01 < 0.05$. There was a significant difference in the changes in body temperature. Of the two types of compresses based on the analysis, the tepid sponge technique was more statistically significant because the p value was lower than that of the conventional warm compresses ($0.01 < 0.03$). The multivariate tests included Pillai's Trace test, Wilks' Lamda, Hotelling's Trace and Roy's Largest Root; the values of the 4 tests were also used to strengthen the results of the hypothesis.

DISCUSSION

A heat or fever conditions is where the brain fixes the body temperature above the normal setting, which is above 38.0C. However, true heat is when the temperature is $> 38.50C$. As a result of the increasing demand, the body will produce heat. Infection is the entry of microorganisms (microorganisms or very small living things that are generally not visible to the eye) into the body. The entry of microorganisms does not necessarily cause us to fall sick, depending on many things. Among others, it depends on how strong our immune system is. If our immune system is strong, then we may not get sick. Even if we are sick, our body then forms immune substances (antibodies). Microorganisms can include germicidal bacteria, viruses and fungi. In children who have an infection, the signs of an elevated body heat often appear. It has been proven that a fever is deliberately made by our body as an effort to help the body get rid of infection. When attacked by an infection, the body must eradicate it. The trick is by deploying the immune system.

Commanding the forces to fight infection are the white blood cells. In carrying out their duties to be effective and on target, white blood cells cannot be alone. Support is needed by many parties including pyrogens. Pyrogens have a complex role in the regulatory mechanism that exists in the human body.

Pyrogens have 2 missions: 1. Deploy the white blood cells or leukocytes to the site of infection and 2. cause a fever that will kill the virus. This is because viruses do not deal well with high temperatures. The typhoid virus thrives at low temperatures (Djuwariyah, 2011).

The occurrence of fever when someone has an infection in one of his organs, for example, is not a negative sign like it is in typhoid. Typhoid fever has the typical symptom of a continuous fever. This is a fever that persists with a maximum fluctuation of 0,40C over a 24 hour period (Kemenkes, 2006). Typhoid fever is more common in school-aged children (Nasution, 2015). In typhoid fever patients, there is a fever that is not too high and that lasts for 3 weeks. The first week is where there is an increase in fluctuating body temperature. Usually the body temperature increases at night and decreases in the morning (NurrochmadC & Williams, 2014). The first step in managing the fever is to make the diagnosis as precise as possible before establishing treatment modalities that are not necessarily drugs (Pujiarto, 2008).

One effort to reduce fever is warm compresses that cause the body temperature to warm up. The body will interpret that the temperature is quite hot and eventually the body will reduce the temperature control in the brain so as not to increase the body's temperature further. Warmer temperatures make the vessels carrying the peripheral blood widen and vasodilate, so the skin pores will open and facilitate heat dissipation. Changes in body temperature will therefore occur (Djuwariyah, 2011). A warm compress on the skin can inhibit shivering and the resulting metabolic effects. In addition, a warm compress also induce peripheral vasodilation, thereby increasing the amount of body heat coming out (Purba & Wandra, 2016). A warm compress can be made by coating the surface of the skin with a towel soaked in warm water. The results of the research conducted proved that a compress of wet warmth is effective at lowering the body temperature in fever patients diagnosed with typhoid fever (Purwanti & Ambarwati, 2008). The non-pharmacological treatment of fever that can be done includes compressing. The compress techniques that can be used come in the form of a conventional warm compress or the tepid sponge technique. Warm water compresses are more effective by 74.6% at reducing the body temperature of pediatric patients with a fever than compress plasters (Yuliani, 2006). The tepid sponge is one of the warm compress techniques that combines a block technique related to the superficial large vessels with the seka technique throughout the body. The results of the research conducted shows there to be a significant comparison of effectiveness between a tepid sponge compress and warm water compress toward the body temperature reduction in typhoid fever children with hyperthermia. The tepid sponge compress show a greater reduction in numbers compared to the warm water compress (Susanti, 2012). Child nursing uses

the principle of a family care center that there is a family partner in contact related to child care. The associated nurse provides appropriate information for them to make decisions, assesses the family needs and gathers the families to help them learn of appropriate resources in their environment (Suyanto, 2011).

This research was carried out for 3 weeks by compressing 1 respondent for 15 - 20 minutes (to avoid the rebound phenomenon). The respondents were children who had typhoid fever in the inpatient ward of the Kampili health center, totaling 20 respondents.

The respondents in this study each received parenteral fluid therapy in the form of IVFD Ringer Lactat and antiperetic therapy. None of the respondents had any secondary diseases. This was based on the medical diagnoses concluded from the clinical examinations and laboratory examinations (widal test). The researchers also first examined for the existence of a wound,; if no wound was found, then compressing could be done. The average value of the respondent's body temperature before being compressed (pre test) was 37.80C for the conventional warm compresses whereas for the tepid sponge technique, it was 38.040C.

From the Differential Univariate-General Linear Model and the General Linear Model-Repeated Measure test, it is known that conventional warm compresses and the tepid sponge technique significantly influence body temperature changes. Based on the results of the testing using the Univariate-General Linear Model, it showed a value of $p < \alpha$ ($0,03 < 0,05$) which concluded that there was a difference between conventional warm compresses and the tepid sponge technique (H_0 rejected).

Based on the General Linear Model-Repeated Measure test, the p value for conventional warm compresses was obtained after compressing: after 5 minutes ($0.07 > 0.05$), the average effect given was a decrease in body temperature of 0,150C, in 5 minutes and up to 15 ($0.01 < 0.05$), the average effect given was a decrease in body temperature of 0.280C, at 30 minutes ($0.78 > 0.05$), the average effect given was a decrease in body temperature of 0.010 C and at 60 minutes ($0.21 > 0.05$), the average effect given was an increase in body temperature of 0.690C from the initial temperature of the compress.

Based on the results of the statistical tests on the changes in body temperature after being compressed, the decrease was only found in the 5 to 15 minute period for the conventional warm compresses while the tepid sponge technique decreased the temperature for between 5 to 30 minutes; 60 minutes after both types of compress were used, there was an increase in temperature again. Because this research was only empirical, the researchers assume that it is influenced by the placement of the compression cloth. Conventional warm-sensitive neurons are less sensitized because the compress is only placed at 1 point. Impulses from afferent nerve fibers received by the hypothalamus to control body temperature are

determined by the receptors. Unlike what is the case with warm compresses, the tepid sponge technique and the placement of the compress cloth at 3 points of afferent nerve fibers allows for the stimulus to the receptor to be stronger which allows for decrease in temperature for longer, up to 30 minutes after compressing.

CONCLUSION

Based on the results of the study, it was obtained that the average for the conventional warm compress pre-test body temperature was 37.830C while the average tepid sponge technique warm compress pre-test body temperature was 38.040C. Changes in the body temperature fluctuated in both the conventional warm compresses and tepid sponge technique. From the Different Univariate-General Linear Model test, it is known that both the conventional warm compresses and tepid sponge technique significantly influence changes in body temperature $p = 0.03$. The tepid sponge technique is better used for fever management in children with typhoid fever than conventional warm compresses because the decrease in body temperature occurs from 5 minutes through 30 minutes while the conventional warm compresses' decrease in body temperature only lasts for 15 minutes after compressing.

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