Proceedings
The International Conference of Advancements in Nursing Care (ADNURS)
Volume 1 (2024)
E-ISSN: *On process*

Section: Paediatric Nursing

The effectiveness of water tepid sponge in children with hyperthermia

Iqbal Fahmi Rizzal, Muhammad Khoirul Amin, Retna Tri Astuti

Authors information
Department of Nursing, Universitas Muhammadiyah Magelang, Indonesia

Contactable email: iqbalalfahmi@gmail.com / Article DOI: *On process*

Abstract
Fever is a condition in which body temperature exceeds the normal set point. Fever in children is generally caused by identifiable microbiological agents and usually resolves in a short period. Hyperthermia can be managed both pharmacologically and non-pharmacologically. There are various non-pharmacological therapies, one of which is Water Tepid Sponge Therapy. This study aims to determine the effect of Water Tepid Sponge Therapy on reducing body temperature in children. The study was designed as a case study conducted on children with fever over three consecutive days, with each session lasting approximately 10-15 minutes. The results of the study show that Water Tepid Sponge Therapy has an effect on reducing body temperature in children with fever. Based on the findings, it is recommended that hyperthermia can be managed using the non-pharmacological Water Tepid Sponge Therapy, allowing patients to avoid dependence on antipyretic drugs.

Keywords: Complementary therapy; water tepid sponge; paediatric nursing; children care; nursing intervention

Introduction
Fever is an increase in body temperature above the normal range. The normal body temperature in children is 37.5°C; if the body reaches this temperature or higher, it indicates the presence of fever (Barbi et al., 2017). Fever is a clinical indicator of a disease, commonly occurring in response to infection, inflammation, or trauma (Rose, 2021). The World Health Organization (WHO) estimates that worldwide cases of fever reach between 16-33 million annually, with 500.000-600.000 deaths each year, and children are the most vulnerable to fever, although their symptoms are often milder than those in adults. In nearly all endemic areas, fever incidence is high among children aged 3-12 (Bakalli, Klironomi, Kola, & Celaj, 2022). In Indonesia, there are approximately 1.100 cases of fever per 100.000 people per year, with a relatively high mortality rate of 3.11% - 10.4% (Harapan, Michie, Mudatsir, Sasmono, & Imrie, 2019). This disease ranks second as a cause of death in Indonesia, especially among children aged 5-12. If a child's fever is not properly managed, it can lead to dehydration due to increased fluid evaporation, resulting in fluid deficiency in the body. Untreated fever can become dangerous and may lead to complications such as seizures and reduced consciousness. Further complications from untreated fever can include dehydration, oxygen deficiency, a fever above 42°C, febrile seizures, and even death. Thus, fever must be promptly and properly managed to prevent fatal complications (Walter, Hanna-Jumma, Carraretto, & Forni, 2016).

Managing a child's fever largely depends on the role of parents, particularly the mother. As a central figure in the home, a mother plays a crucial role in maintaining and nurturing the family. A mother must be sensitive and able to assess a child's fever to understand the best approach for treatment (Alsofyani & Hassanien, 2022). When a child has a fever, parents should observe the child's activity patterns, hydration status, circulation, breathing patterns, and changes in skin, lip, and tongue color (Çelik & Güzel, 2024). This enables parents to accurately assess the fever in the child. Mothers also play a role in providing care according to good health practices, such as caring for a sick child. This caregiving role requires maternal knowledge to ensure effective illness management without disrupting the child's growth and development. Fever management can be conducted using pharmacological (antipyretic) and non-pharmacological therapies (Young & Saxena, 2014). Common pharmacological therapies include antipyretics like paracetamol, ibuprofen, or aspirin (El-Radhi, 2012). The use of recommended doses of antipyretics, combined with warm compresses, has been shown to be more effective in reducing fever in children, particularly within the first 30 minutes. The main principle is to reduce fever as quickly as possible to prevent side effects like seizures or loss of consciousness (Chiappini et al., 2022). Non-pharmacological therapy involves physical methods, such as ensuring the child rests, providing fluids, good airflow, removing heavy clothing or blankets, and administering warm compresses like warm compresses, Water Tepid Sponge (sponging technique), fluid therapy by increasing fluid intake, avoiding thick clothing, and staying in a room with normal temperature. These measures are quite effective in lowering body temperature.

One non-pharmacological therapy is Water Tepid Sponge (WTS). Water Tepid Sponge is a combination of block and sponge techniques, which uses block compresses in multiple locations with large blood vessels. Additionally, it involves sponging in several body areas, making this technique more complex and comprehensive compared to others. However, applying block compresses directly in various areas enhances the signal transmission to the hypothalamus . The sponging also accelerates peripheral blood vessel dilation, facilitating heat transfer from the body to the surrounding environment, thus speeding up temperature reduction. The Water Tepid Sponge method is a nursing intervention that is often overlooked and even delegated to the patient's family. However, this technique is relatively easy to perform and does not incur significant costs. Furthermore, this intervention allows the patient or family to rely less on antipyretic drugs. WTS can be used as an alternative for managing fever in children. The general public is often unaware of WTS and usually relies on warm compresses as a complementary therapy to reduce fever in children with hyperthermia. A preliminary study through interviews conducted by the author in Bentingan Village, Paremono Village, Mungkid District, Magelang Regency, revealed that mothers of toddlers and school-aged children reported using cooling patches to treat their children's fever at home. Some mothers had used warm compresses and sponging techniques to reduce their children's fever. Based on this preliminary study, the Water Tepid Sponge technique is rarely applied. Therefore, the author is interested in implementing this non-pharmacological therapy to reduce fever in children using the Water Tepid Sponge method.

Case Description

On July 22, 2024, an assessment of the family revealed that they reported An. I's body had felt hot for the past three days. Objective findings included a body temperature of 39°C, a flushed appearance with warm skin, and a pulse rate of 113 beats per minute. The assessment also indicated that the family lacked knowledge on how to care for a sick child, as they frequently asked questions about proper caregiving techniques. Based on this information, the nursing diagnosis identified was hyperthermia related to the family's inability to care for a sick family member (D.01300). Supporting data included the complaint of fever from Mrs. N., who noted that An. I had been feverish for the past three days, along with objective findings of warmth, flushed skin, a temperature of 39°C, and a pulse rate of 113 beats per minute. The nursing care plan aimed to improve thermoregulation (L.09091), with expected improvements following three 10-minute visits. The criteria for success included a reduction in skin redness, improvement in tachycardia, and a decrease in body temperature, each measured by a score improvement from 2 to 5. The interventions implemented for hyperthermia management (I.15560) included monitoring An. I's body temperature and identifying the cause of the hyperthermia. Therapeutic actions involved loosening An. I's clothing and performing external cooling through a Water Tepid Sponge. Additionally, the family was educated on providing extra fluids, and a collaborative plan was made with healthcare professionals to administer antipyretics if necessary.

Discussion

Fever can be identified through body temperature measurement showing above-normal readings, body warmth or heat upon palpation, red skin, increased respiration, and elevated heart rate (Sherman & Sood, 2012). Similarly, fever can be identified through three criteria: the person's claim of experiencing fever, palpation, and body temperature measurement. The complaint of heat in children is often due to a raised set point (due to infection) or an imbalance between heat production and loss, leading to symptoms like body warmth and elevated temperature (Chiappini et al., 2009). A child's ability to respond to infection with fever symptoms largely depends on age. The younger the infant, the lesser the ability to adjust the set point and produce heat. Very young infants often experience severe infections without the symptom of fever. Theoretically, the rise in temperature due to infection is beneficial as it increases blood flow, facilitating the distribution of nutrients and oxygen. However, if the temperature becomes too high (above 38.5°C), patients may feel discomfort; the increased blood flow causes more blood to be directed to vital organs such as the brain, heart, and lungs, reducing the volume available to extremities, causing the feet and hands to feel cold. High fever accelerates metabolism, causing the heart to pump more forcefully and quickly, and breathing frequency to increase (Hamilton, Evans, & Bakshi, 2020). Dehydration may occur due to skin and lung evaporation, which disrupts electrolyte balance and can cause further temperature elevation. Tissue damage, particularly to the brain and muscles, may occur if body temperature exceeds 41°C, leading to potentially permanent damage, such as brainstem injury, seizures, coma, and paralysis. Muscle damage may result in rhabdomyolysis and myoglobinemia (Dalal & Zhukovsky, 2006).

Fever in children also causes discomfort that disrupts their daily activities, including eating and drinking. This is often seen in children who become irritable and lose appetite when they have a fever. If a child refuses food and drink over time, it can adversely impact their nutritional status. To diagnose hyperthermia, specific characteristics must be present, such as above-normal body temperature, reddish skin, seizures, tachycardia, tachypnea, and warm skin (Pusic, 2007). Clinical conditions associated with hyperthermia include infection, hyperthyroidism, stroke, dehydration, trauma, and prematurity. Data showing hyperthermia in An. A include family reports of the child having a fever for approximately three days and objective data showing an above-normal body temperature of 39°C and warm

skin. Hyperthermia is a condition where body temperature exceeds the normal range, with a continuous body temperature reaching around 37.6ºC (Meremikwu & Oyo-Ita, 2003). Hyperthermia in An. I occurred because body temperature is regulated by the thermoregulatory center in the hypothalamus, maintaining body temperature near a set point of 37ºC. The thermostat mechanism in the hypothalamus receives input from central and peripheral receptors. If temperature changes occur, these receptors send information to the thermostat, which then increases or decreases heat production to maintain a constant set point (Klein & Cunha, 1996). However, during an infection, pyrogenic substances raise the body's normal set point, a process mediated by prostaglandins, prompting the hypothalamus to increase heat production until the core temperature reaches the new set point.

This study focuses on a nursing care plan to address the issue of hyperthermia, which has been prioritized based on scoring, as it may lead to other issues such as dehydration if not addressed. Independent nursing actions to address hyperthermia include administering a Water Tepid Sponge (WTS), which involves applying warm compresses to the body for approximately 10 minutes. Another study indicated that warm compresses were more effective than compress patches, with a temperature reduction difference of about 0.42ºC (Bakalli, Klironomi, Kola, & Celaj, 2022). Warm water compresses affect body temperature by causing vasodilation in the area, which dilates skin pores, facilitating heat release and consequently lowering body temperature. The tepid water sponge method is a non-pharmacological approach to lowering body temperature by wiping the entire body and compressing specific areas with warm water for a certain period. Warm water is used because, during tepid water sponging (warm water compresses), the brain perceives external body temperature as warm, prompting it to respond by generating a cooling effect that lowers body temperature (Walter, Hanna-Jumma, Carraretto, & Forni, 2016). When applied to vascular areas, warm compresses cause vasodilation. This strong vasodilation accelerates heat transfer from the body to the skin up to eight times faster. Tepid sponging combines techniques of blocking superficial blood vessels with a wiping method, aiming to reduce the body temperature of febrile children (Young & Saxena, 2014). Benefits of tepid water sponging include reducing the child's body temperature, providing comfort, relieving pain, and reducing fever-related anxiety.

Tepid water sponging is done when a child's body temperature reaches 38ºC or higher, and after administering an antipyretic 30 minutes beforehand. The warm water temperature should range from 30°-35°C, with the process taking approximately 5-10 minutes. For An. I, after receiving WTS for 10 minutes, the child's body temperature dropped from 39ºC to 37.8ºC. At the second visit, the temperature decreased from 38.2ºC to 37.6ºC, and at the third visit, it dropped to 37.2ºC. The tepid water sponge technique causes the skin to feel warm, dilating peripheral blood vessels, leading to vasodilation, which opens skin pores to facilitate heat release, ultimately lowering body temperature. Tepid water sponge therapy is essential when a child has a fever, and parents should be informed about the procedure. It is also easy to perform with simple tools, making it suitable for managing elevated body temperature in children at home.

Conclusion

The application of water tepid sponge therapy has proven to be an effective non-pharmacological intervention for reducing hyperthermia in children. This method works by facilitating vasodilation in peripheral blood vessels, which enhances heat dissipation through the skin, thereby lowering body temperature. Studies show that using warm water sponges on specific vascular areas enables efficient and safe temperature reduction, often achieving significant drops within a short timeframe. The water tepid sponge technique also provides added benefits by promoting comfort, alleviating pain, and reducing anxiety in febrile children, making it a valuable tool in pediatric fever management. Additionally, its simplicity and ease of use allow parents or caregivers to perform it at home, which can be particularly beneficial when combined with antipyretic medications. Regular education on this technique for parents can empower them to respond effectively to febrile episodes in children, reducing the risk of complications associated with hyperthermia.

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