

Section: General Nursing

Warm compress to reduce fever in children with typhoid fever

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Abstract

Fever is a physiological defense mechanism utilized by the body to combat infectious agents or hazardous substances. In the management of pediatric hyperthermia, non-pharmacological interventions such as warm compress therapy serve as a critical adjunct to standard care. This method involves applying a cloth soaked in warm water (37°C-40°C) to specific vascular areas, such as the forehead or the inguinal folds (thighs), to facilitate heat loss through conduction and evaporation. This case study aimed to evaluate the clinical implementation of warm compresses for managing fever in children diagnosed with typhoid fever. The methodology employed was a descriptive case study design, illustrating the comprehensive nursing care process for a pediatric patient presenting with typhoid-related hyperthermia. The primary nursing diagnosis identified was Hyperthermia, for which warm compress therapy was selected as the core intervention. Implementation was carried out over three consecutive days, resulting in a significant reduction in core body temperature from 39.8°C to a stable 36.5°C. These findings demonstrate that warm compresses are a highly effective and accessible nursing intervention for reducing fever in children suffering from hyperthermia due to typhoid infection.

Keywords: Complementary therapy, nursing care, symptom management, thyroid, warm compress

Introduction

Typhoid fever remains a critical global health challenge, particularly within developing nations (Buzilă et al., 2025). Data from the World Health Organization (2019) estimates approximately 21 million cases worldwide, resulting in 128,000 to 161,000 deaths annually. In Indonesia, infection-related mortality among children under five years of age ranges from 1% to 20%. Typhoid fever, also known as typhus abdominalis, is an acute febrile illness caused by the bacterium *Salmonella typhi* (Bhutta, 2006). The transmission of this disease is closely linked to poor personal hygiene and environmental sanitation, often occurring through the ingestion of food or water contaminated by fecal-oral pathogens (Yushananta & Putri, 2024). These conditions are most prevalent in densely populated areas with inadequate implementation of Clean and Healthy Living Behaviors (PHBS). Symptoms of typhoid fever in children are often non-specific, though persistent high-grade fever is the most common clinical manifestation (Rauniyar et al., 2021). Symptoms typically emerge one to three weeks post-exposure and include malaise, headache, nausea, anorexia (loss of appetite), and gastrointestinal disturbances such as constipation or diarrhea. In advanced stages, clinical examination may reveal hepatosplenomegaly (enlargement of the liver and spleen).

Fever is defined as a rise in core body temperature above the normal baseline of 37°C, often triggered by infectious or non-infectious factors (Afsar et al., 2025). To manage hyperthermia in pediatric patients, nurses frequently implement non-pharmacological interventions, with warm compress therapy being a primary independent nursing action. This method involves applying a cloth soaked in warm water (37-40°C) to highly vascularized areas such as the axilla, neck, and inguinal folds (groin). Warm compresses stimulate peripheral vasodilation, which enhances blood flow to the skin and facilitates heat loss through evaporation and conduction (Souza et al., 2022; Krafft et al., 2022). This approach is generally considered more comfortable and effective for children than cold applications, as it avoids triggering the shivering reflex. In Indonesia, the Ministry of Health reports a typhoid prevalence ranging from 300 to 800 per 100,000 population. Regional data from East Java shows a sharp increase in cases, rising from 99,906 in 2018 to 187,235 in 2019, with a high concentration among school-aged children. Locally, at Harapan Magelang Hospital, interviews with the head of the Mawar Ward revealed that 26 children were treated for typhoid fever between November and December alone. Driven by these high prevalence rates and the clinical need for effective fever management, the author is motivated to conduct this case study focused on the implementation of warm compress therapy to reduce fever in patients with typhoid fever.

The importance of this study lies in its focus on a high-priority physiological need—thermoregulation—within a vulnerable pediatric population. Typhoid fever, a systemic infection caused by *Salmonella typhi*, is characterized by prolonged and fluctuating hyperthermia (Okyere et al., 2025; Kuehn et al., 2025). If left unmanaged, high-grade fever in

children can lead to severe complications, including dehydration, febrile seizures, and metabolic stress, which can significantly delay the recovery process. While pharmacological antipyretics are standard, they often have a limited duration of effect and carry risks of side effects. This study is critical because it evaluates warm compress therapy as a safe, non-invasive, and cost-effective nursing intervention. By applying warmth to highly vascularized areas, the nurse can stimulate the hypothalamus to lower the body's temperature set-point and promote peripheral vasodilation, facilitating heat loss without triggering the shivering reflex associated with cold applications. Furthermore, this case study is significant for the advancement of Evidence-Based Nursing Practice in Indonesia, where typhoid fever remains endemic. Highlighting the success of independent nursing interventions in a clinical setting like Harapan Hospital Magelang provides a practical model for other healthcare providers to follow. It empowers nurses to take a lead role in symptom management, potentially reducing the patient's length of hospital stay and decreasing the family's dependency on intensive medical interventions. By documenting the transition from a critical temperature of 39.8°C to a stable 36.5°C, this study provides empirical support for integrating warm compresses into standardized pediatric nursing care protocols, ultimately improving patient comfort and clinical outcomes.

Case Description

The researcher employed a descriptive case study design to provide an intensive, in-depth analysis of a single unit of study. Specifically, this case study illustrates the comprehensive nursing care process for a pediatric patient with typhoid fever receiving warm compress interventions. The subject was a 9-year-old child, an age group identified as having a significantly high risk (45.3%) of contracting typhoid fever. Participant selection was guided by specific inclusion and exclusion criteria. The inclusion criteria required that the respondent be a pediatric patient undergoing treatment for typhoid fever at Harapan Hospital Magelang, who experienced fluctuating fever over a 14-day period with a positive Widal laboratory result. Additionally, the participant and their legal guardians were required to provide informed consent and demonstrate the ability to communicate effectively throughout the study period. Conversely, the exclusion criteria included patients with decreased levels of consciousness, those scheduled for discharge, or patients unable to follow the researchers' instructions. Data were gathered using a multi-method approach to ensure a thorough clinical assessment. This included in-depth interviews with the family, direct clinical observations, and comprehensive physical examinations. Furthermore, the researcher conducted a documentation study of the patient's medical records and utilized standardized case study instruments to ensure the systematic collection and analysis of all clinical data.

The patient, identified as An. G, is a 9-year-old female admitted to Harapan Hospital Magelang on December 17, 2024, with a medical diagnosis of typhoid fever. Upon admission to the Emergency Department, the primary complaint was a high-grade fever persisting for five days. The patient's mother reported that the fever followed a fluctuating pattern, characterized by significant nocturnal spikes accompanied by shivering. Additionally, the patient complained of epigastric heat, nausea, and an urge to vomit. Systemic symptoms included anorexia (loss of appetite), an acidic taste in the mouth, and alternating sensations of heat and chills. At the time of the nursing assessment, the patient continued to experience fluctuating fever, generalized malaise (weakness), and dizziness. Physical examination revealed the following vital signs: blood pressure of 98/70 mmHg, a tachycardic pulse of 135 beats/minute, a high-grade temperature of 39.8°C, oxygen saturation (SpO₂) at 97%, and an increased respiratory rate of 28 breaths/minute. Regarding treatment history, the patient had previously been administered paracetamol with limited effect. A Widal test was performed, yielding a positive result, which confirmed the presence of a *Salmonella typhi* infection.

Discussion

Based on the nursing assessment conducted through clinical observation and family interviews, the patient presented with a high-grade fever persisting for five days, accompanied by generalized malaise and anorexia (loss of appetite). Objective clinical signs included warm acral surfaces, dry oral mucosa, pallor, and cutaneous flushing (redness of the skin). The patient was receiving intravenous fluid therapy (Asering) at a rate of 15 drops per minute. Vital signs recorded during the assessment showed significant physiological distress: a high-grade temperature of 39.8°C, tachycardia with a pulse of 130 beats/minute, a respiratory rate of 28 breaths/minute, and a blood pressure of 98/70 mmHg. Laboratory investigations further confirmed the severity of the infection. Results indicated mild anemia with a Hemoglobin level of 10.6 g/dL and a Hematocrit of 32.4%. Leukocytosis was present at 14,000/μL, while the platelet count was recorded at 117,000/μL. Most significantly, the Widal test returned a positive result with titers for *Salmonella typhi* O at 1/320 and *Salmonella typhi* H at 1/80, providing definitive evidence of an active typhoid infection. Typhoid fever is a systemic infectious disease caused by the bacterium *Salmonella enterica* serotype typhi. This Gram-negative, flagellated, and facultative anaerobic bacterium is transmitted primarily through the fecal-oral route via contaminated food or water. Upon ingestion, the bacteria invade the intestinal mucosa and multiply within the mononuclear phagocyte cells of the liver, spleen, lymph nodes, and Peyer's patches. This process leads to prolonged bacteremia without initial endocardial involvement. The clinical manifestation typically appears 1–3 weeks post-infection, characterized by a progressive "stepladder" fever, nausea, headache, and gastrointestinal disturbances such as diarrhea or constipation. In severe cases, patients may exhibit "rose spots" on the chest or hepatosplenomegaly (enlargement of the liver and

spleen). The systemic nature of this infection causes comprehensive physiological impacts, primarily marked by the persistent hyperthermia observed in this case.

Based on the clinical assessment, the prioritized nursing diagnosis is Hyperthermia related to the bacterial infection process of *Salmonella typhi* (D.0130). This diagnosis was prioritized due to the severe systemic risks associated with unmanaged hyperthermia. Failure to resolve elevated body temperature can lead to acute neurological damage, including delirium, seizures, and coma, as well as permanent cerebellar lesions resulting from the destruction of Purkinje cells. Furthermore, hyperthermia triggers systemic inflammation, oxidative stress, and coagulopathy, which may escalate into acute kidney injury, hepatic injury, heart failure, pulmonary oedema, or acute respiratory distress syndrome (ARDS). This critical state, often referred to as heatstroke, carries a mortality rate of 60–80% if not addressed immediately. Additionally, the drastic metabolic increase of approximately 10% per 1°C rise in temperature severely strains cardiac function, while the resulting fluid and electrolyte loss can cause hypotension and further multi-organ failure.

In developing the care plan, the researcher adhered to the Indonesian Nursing Intervention Standards (SIKI), which categorizes nursing actions into four stages: observation, therapeutic action, education, and collaboration. The core therapeutic intervention selected for this study was warm compress therapy. This non-pharmacological method was chosen due to its safety profile, minimal side effects, and proven efficacy in reducing body temperature. Following the principles of Evidence-Based Nursing Practice, the warm compresses were applied specifically to highly vascularized areas, such as the neck and axilla. This placement facilitates peripheral vasodilation and opens skin pores, allowing internal body heat to dissipate through conduction and evaporation. The effectiveness of the intervention was evaluated by comparing pre- and post-intervention temperatures using a standardized thermometer and following strict Standard Operating Procedures (SOP). Following the consistent application of warm compresses and adequate fluid management, the patient experienced a significant physiological recovery. The body temperature, which was initially recorded at 39.8°C, successfully decreased to 36.5°C. Combining warm compresses with proper hydration optimizes thermoregulation. When fluid requirements are met, the body's ability to dissipate heat is enhanced, leading to a stable and normalized body temperature.

The findings of this case study demonstrate a significant reduction in the respondent's body temperature following the consistent application of warm compress therapy over a three-day period. Regarding the nursing diagnosis of Hyperthermia related to the *Salmonella typhi* infection process (D.0130), the problem was partially resolved by the first day, as the patient began to tolerate the intervention with guidance. By the third day, the clinical objective was fully achieved; the patient reported feeling significantly improved ("delicious" or comfortable), with a stabilized body temperature of 36.5°C and a normalized pulse rate of 105 beats/minute. These results indicate that warm compress therapy provides a positive physiological effect by lowering core temperature and enhancing patient comfort. Physiologically, warm compresses lower body temperature through the process of evaporation and conduction. By applying the compress to areas with large superficial blood vessels—such as the neck, axillae (underarms), inguinal folds (groin), and popliteal folds (behind the knees)—a signal is rapidly transmitted to the hypothalamus. This triggers the thermoregulatory centre to initiate peripheral vasodilation and sweating, which facilitates the release of internal heat.

Conclusion

The clinical application of warm compress therapy over three consecutive days demonstrated a significant and consistent reduction in body temperature for the pediatric patient diagnosed with typhoid fever. Initial assessment revealed a high-grade fever of 39.8°C, accompanied by systemic symptoms such as shivering and tachycardia. Following the systematic implementation of the warm compress protocol—applied to highly vascular areas for 15 minutes per session—the patient's core temperature exhibited a gradual and stable decline, eventually reaching a normal range of 36.5°C. This substantial reduction of 3.3°C indicates that the intervention successfully facilitated heat loss through peripheral vasodilation and evaporation, effectively lowering the hypothalamic set-point without triggering the shivering reflex often associated with cold applications. Based on these outcomes, it can be concluded that warm compress therapy is a highly influential and effective non-pharmacological intervention for managing hyperthermia in children with typhoid fever. The success of this case study underscores the importance of integrating simple, evidence-based nursing actions into standard pediatric care plans. This therapy not only provides rapid physiological stabilization but also enhances the patient's overall comfort and reduces the risk of fever-related complications such as dehydration or febrile seizures. Therefore, warm compresses are recommended as a primary nursing independent intervention that is safe, low-cost, and easily replicable by both healthcare professionals and family caregivers in a clinical setting.

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