

ARTICLE INFORMATION

Received: July 07, 2026

Revised: July 25, 2026

Available online: July 28, 2026

at: <https://e-jurnal.iphorr.com/index.php/mchc>

Effect of warm compresses combined with lavender aromatherapy on body temperature among children with febrile seizures

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Abstract

Background: Febrile seizures are among the most common neurological emergencies in children and are closely associated with a rapid increase in body temperature. Prompt fever management is essential to reduce the risk of recurrent seizures and other complications. In addition to pharmacological treatment, complementary non-pharmacological interventions such as warm compresses and lavender aromatherapy have been suggested to enhance fever management. However, evidence regarding the combined effectiveness of these interventions remains limited.

Purpose: To determine the effect of warm compresses combined with lavender aromatherapy on body temperature among children with febrile seizures treated in the emergency department.

Methods: This study employed a quasi-experimental pretest-posttest control group design. A total of 32 children with febrile seizures were recruited using purposive sampling and allocated into an intervention group (n=16) and a control group (n=16). The intervention group received warm compresses combined with lavender aromatherapy, while the control group received routine care. Body temperature was measured before and after the intervention using a digital thermometer. Data were analyzed using paired t-tests to evaluate within-group differences and independent t-tests to compare outcomes between groups, with a significance level of $p < 0.05$.

Results: The mean body temperature in the intervention group decreased significantly from $39.1 \pm 0.62^{\circ}\text{C}$ before the intervention to $37.1 \pm 0.62^{\circ}\text{C}$ after the intervention ($p < 0.001$), representing a mean reduction of 2.0°C . In contrast, the control group showed a non-significant decrease from $38.8 \pm 0.45^{\circ}\text{C}$ to $38.6 \pm 0.45^{\circ}\text{C}$ ($p = 0.051$). Comparison between groups demonstrated a statistically significant difference in body temperature reduction ($p < 0.001$).

Conclusion: Warm compresses combined with lavender aromatherapy were effective in reducing body temperature among children with febrile seizures. This intervention may be considered a complementary nursing strategy for fever management in pediatric emergency settings to support conventional treatment.

Keywords: Body Temperature; Child; Febrile Seizures; Lavender Aromatherapy; Warm Compress.

INTRODUCTION

Child health issues are one of the major health issues currently facing Indonesia. The health of children reflects the health of the nation, as children, the nation's future generation, possess abilities that can be developed to continue the nation's development (Faisal, 2022).

Fever is the body's response to infection. Fever is

defined as a condition in which a person's body temperature rises above normal (Gaol & Tarigan, 2024). Febrile seizures are seizures that occur in children with a body temperature exceeding 38°C without being caused by infection or a clear brain disorder. They usually occur in children under 5 years of age. Febrile seizures, also known as stupor or step,

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are a condition in which a child's body temperature becomes unable to maintain its normal body temperature (Milatik, 2024).

Globally, febrile seizures are more common in boys than girls, with a ratio of 1.6-1%, due to the faster cerebral maturation in girls compared to boys (Rosa, 2021). The World Health Organization (WHO) states that more than 21.65 million children worldwide experience febrile seizures, while 216,000 children die (Solikah & Waluyo, 2023). In Asia, the incidence of febrile seizures is higher than in other countries, with 80-90% of cases being simple febrile seizures (Safitri et al., 2024). According to a 2021 report from the Indonesian Ministry of Health, the incidence of febrile seizures in Indonesia in 2020 was recorded at 14,252 sufferers (Ministry of Health of the Republic of Indonesia, 2025). Based on a preliminary survey conducted through interviews with the Head of the Emergency Room at Aisyiyah Hospital in Kudus, data on febrile seizures in children were obtained from the Children's Medical Records of 35 children: 17 children aged 1 year, 8 children aged 2 years, and 10 children aged 3 years.

According to data from Aisyiyah Hospital in Kudus, the incidence of febrile seizures in 2025 was 38 cases in December 2025. Febrile seizures in children are caused by a rapid and sudden increase in body temperature, generally due to infections such as upper respiratory tract infections, ear infections, urinary tract infections, or other viral or bacterial infections. This increase in body temperature triggers a low seizure threshold in the central nervous system of children, especially those aged 6 months to 5 years (Susanto et al., 2025).

One reason fever must be treated is because it can have several effects on the sufferer's body. Fever is considered a threat to the sufferer's health and can cause concern. Fever is known to impact the sufferer's metabolism (Marlina et al., 2023). Among the potential effects of fever is dehydration due to excessive evaporation of body fluids. Seizures can also occur, caused by disrupted signals from the brain to the muscles due to high body temperature, resulting in uncontrolled contractions (Afsani et al., 2023). If a seizure lasts more than 15 minutes, it can lead to apnea, hypoxia, hypoxemia, hypercapnia, lactic acidosis, hypotension, anatomical abnormalities in the brain, leading to epilepsy, and

impaired growth.

Fever can be managed with both pharmacological and non-pharmacological methods. Pharmacological measures include administering antipyretic medications. Parents often prescribe antipyretic medications when they discover their child has a high temperature, including paracetamol, silicic acid, ibuprofen, and others. However, antipyretics themselves have several side effects, including bronchospasm, gastrointestinal bleeding, decreased kidney function, and inhibition of serum antibody response suppression (Afsani et al., 2023). Meanwhile, non-pharmacological methods for reducing fever include compresses, wearing light clothing, drinking plenty of fluids, and creating a cool environment with a fan or air conditioning (Kusuma et al., 2023).

Currently, interventions in hospitals to reduce fever in children include administering antipyretics appropriate to the child's age and dosage, such as paracetamol, as the primary therapy for lowering body temperature. These interventions typically take a long time to respond, with the temperature dropping within 3-4 hours, necessitating additional intervention. A non-pharmacological treatment for fever in children is warm compresses. Warm compresses involve applying warm water to lower a high body temperature. Based on interviews with several parents in the room, eight mothers were present. Three mothers stated that their children had experienced febrile seizures at home for three days. The treatment given was fever-reducing medication without warm compresses. Two mothers stated that their children's fevers fluctuated, and the treatment given was antipyretics and warm compresses. The other three mothers provided plaster compresses to their children, which are long-lasting and practical. For clients with febrile seizures, warm compresses can be used to reduce fever because when the body experiences a high fever, they can open the pores, allowing the body's high fever to escape through the pores (Anisa, 2023).

This is supported by previous research that explains that in 23 respondents, body temperature decreased, with an average of 37.0°C before the warm compress and 36.5°C after the warm compress. In this study, the Wilcoxon signed rank test for reducing subfebrile body temperature before and

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after warm compresses were given, with a p value of $0.001 < 0.05$, H_a was accepted that there was an effectiveness in reducing subfebrile body temperature in children with febrile seizures by using warm compresses in the Gardenia Inpatient Room of M. Sani Regional Hospital (Vita et al., 2023). Likewise, other studies implemented warm compresses for 3 days from an average of 39.3°C to 36.9°C . This shows that after warm compresses were given, seizures decreased to 36.9°C (Nopianti et al., 2023).

Although several studies have reported the effectiveness of warm compresses in reducing fever, evidence regarding the combined use of warm compresses and lavender aromatherapy among children with febrile seizures remains limited. Previous studies mainly evaluated warm compresses alone without incorporating complementary aromatherapy interventions. Therefore, this study aimed to investigate the effectiveness of combining warm compresses with lavender aromatherapy in reducing body temperature among children with febrile seizures.

RESEARCH METHOD

This study employed a quantitative approach using a quasi-experimental pretest–posttest control group design to evaluate the effectiveness of warm compresses combined with lavender aromatherapy in reducing body temperature among children with febrile seizures. The study was conducted in the Emergency Department of Aisyiyah Kudus Hospital, Central Java, Indonesia.

The study population comprised all children diagnosed with febrile seizures who were treated in the Emergency Department during the study period. Based on hospital records from October to December 2025, the average number of eligible patients was 35 children. A total of 32 participants were recruited using a purposive sampling technique according to the predetermined inclusion and exclusion criteria. The participants were divided into two groups: an intervention group ($n = 16$) and a control group ($n = 16$).

Children in the intervention group received warm compress therapy combined with lavender aromatherapy in addition to routine nursing care, whereas those in the control group received routine nursing care according to the hospital protocol. Body temperature was measured before (pretest) and after (posttest) the intervention using a calibrated digital thermometer and recorded in degrees Celsius ($^{\circ}\text{C}$). The primary outcome of this study was the change in body temperature following the intervention.

Descriptive statistics were used to summarize participants' demographic characteristics. Continuous variables are presented as means and standard deviations (SD), while categorical variables are presented as frequencies and percentages. The effectiveness of the intervention within each group was analyzed using the paired t-test, whereas differences between the intervention and control groups were analyzed using the independent t-test. Statistical significance was established at $p < 0.05$.

RESEARCH RESULTS

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Table 1. Characteristics Of Respondents (N=32)

Variable	Result
Age Intervensi Group (Mean±SD) (Month) (Range)	(22.7±13.676) (9-50)
Age Control Group (Mean±SD) (Month) (Range)	(31.7±13.902) (10-52)
Gender Intervensi Group (n/%)	
Male	6/37.5
Female	10/62.5
Gender Control Group (n/%)	
Male	9/56.2
Female	7/43.8

Table 1 shows that respondents in the intervention group were predominantly female (10) (62.5%), while the control group was male (9) (56.2%). The average age of respondents in the intervention group was 22 months, with the lowest age being 9 months and the oldest being 50 months, while the average age in the control group was 31 months, with the lowest age being 10 months and the oldest being 52 months.

Table 2. Statistical Test of Pre-Post Body Temperature in the Intervention and Control Groups (N=32)

Variable	(Mean±SD)	p-value	Difference
Body Temperature Intervensi Group		0.001	2
Pre-test	(39.1±0.619)		
Post-test	(37.1±0.619)		
Body Temperature control Group		0,051	0.2
Pre-test	(38.8±0.447)		
Post-test	(38.6±0.447)		
Comparison of Body Temperature of the Intervention and Control Groups		0.001	

The table above shows that the intervention group experienced a significant decrease from 39.1 in the pretest to 37.1 in the posttest with a paired t-test p value of 0.001, meaning there was a significant difference. Meanwhile, in the control group, the average score did not change, namely from 38.8 in the pretest to 38.6 in the posttest with a p value of 0.051, meaning there was no significant difference. Comparison of body temperature in the intervention and control groups obtained independent t-test results of 0.001, meaning that giving warm compresses and lavender aromatherapy was effective in reducing body temperature in children with

febrile seizures.

DISCUSSION

The results of the study showed a p-value of 0.001 in the independent t-test, indicating that warm compresses and lavender aromatherapy were effective in lowering body temperature in children with febrile seizures in the emergency room at Aisiyiyah Hospital, Kudus.

These results align with previous research showing a decrease in body temperature among 23 respondents, with an average of 37.0°C before and 36.5°C after (Vita et al., 2023). In this study, a

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Wilcoxon signed-rank test with a p-value of 0.001 <0.05 confirmed the H_a (H_a) criterion for lowering subfebrile body temperature in children with febrile seizures. This indicates that warm compresses have a significant effect on increasing body temperature in children. This is due to the patient's comfort and heat transfer after the application. Meanwhile, other research indicates that warm compresses have an effect on lowering body temperature in children aged 5-12 years with Dengue Hemorrhagic Fever (DHF) in the Kenanga Ward of Deli Serdang Regional General Hospital, Lubuk Pakam (Maharningtyas & Setyawati, 2022).

Previous research revealed that warm compress interventions were carried out for two consecutive days on each participant. The compresses were applied once daily in the morning, for 15–20 minutes, using a temperature of around 37°C–40°C. The areas of the body covered by the compresses included large blood vessels such as the armpits and groin (axilla and inguinal). Before and after the intervention, body temperature was measured using a digital thermometer to monitor the effectiveness of the intervention (Putriningsih & Khayati, (2025). This study demonstrated that warm compresses are effective in lowering body temperature in children with febrile seizures.

A similar finding was observed in previous research, which showed that the patient had a fever with an initial body temperature of 38.5°C. After three consecutive days of warm compresses, the body temperature gradually decreased to 36.5°C. The study concluded that warm compresses are effective in lowering body temperature in children experiencing febrile seizures. Operational recommendations for healthcare professionals and families at home include applying warm compresses to body folds such as the armpits and forehead for 15-20 minutes, 2-3 times daily, while continuously monitoring the child's temperature (Damayanti et al., 2026). Recent research concluded that warm compresses can lower body temperature from 37.9°C to 37.8°C in the Ar Rahman Hospital Purwokerto room (Kusuma et al., 2023).

Warm compresses are a physical method for lowering the body temperature of children with fever. Applying a warm compress to the area of large blood vessels stimulates the preoptic area of the

hypothalamus to lower body temperature. This warm signal, carried by the blood to the hypothalamus, stimulates the preoptic area, resulting in the release of signals by the effector system.

A warm compress can lower body temperature through evaporation. Warm compresses cause the external body temperature to warm, which the body interprets as being hot enough. This ultimately reduces the brain's temperature-regulating control to prevent the body temperature from rising. Warm external temperatures cause peripheral blood vessels in the skin to dilate and vasodilate, opening the pores and facilitating heat loss, resulting in a decrease in body temperature (Dewi & Utami, 2023).

This is in line with previous theory, where warm compresses can lower the body temperature of children with fever because the body can release heat through four mechanisms: radiation, conduction, convection, and evaporation. In general, the body releases heat through conduction, which is the transfer of heat from direct skin exposure to surrounding objects. Typically, heat loss through conduction is minimal, while evaporation (water evaporation from the skin) facilitates body heat transfer. Every gram of water evaporated results in a body heat loss of 0.58 kilocalories. In individuals who are not sweating, evaporation occurs at a rate of approximately 450-600 ml. This results in continuous heat loss at a rate of 12-16 calories per hour (Barman et al., 2014).

On the other hand, lavender's function is to increase patient comfort. Lavender aromatherapy does not directly lower body temperature, but it helps children become more relaxed, calm, and less anxious during fevers. This state of relaxation helps reduce the stress response, which can trigger increased sympathetic activity, such as increased heart rate and metabolism, potentially maintaining or even increasing body temperature. By reducing anxiety and tension, the body can adapt more optimally to the temperature-lowering process.

According to researchers, by giving a warm compress it will cause the body temperature outside to be warm so that the body will interpret that the temperature outside is quite hot, finally the body will reduce the temperature control in the brain so as not to increase the body's temperature regulator, with the warm outside temperature will make the peripheral

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blood vessels in the skin widen and experience vasodilation so that the skin pores will open and facilitate heat release, so that there will be changes in body temperature. Giving a warm compress to the axillary area is more effective because in that area there are more large blood vessels and many apocrine sweat glands that have many vascular so that it will expand the area that experiences vasodilation which will allow the acceleration of heat transfer from the body to the skin up to eight times more. In addition, researchers also did repeated compresses with the help of the child's parents so that it is also possible for the child's fever to go down.

CONCLUSION

Warm compresses combined with lavender aromatherapy effectively reduced body temperature in children with febrile seizures compared with standard care. This intervention may be considered as a complementary nursing strategy in pediatric emergency settings. Future multicenter randomized studies involving larger populations are recommended to strengthen the evidence.

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