



RESEARCH ARTICLE

# The Effectiveness of Warm Compresses in Reducing Dysmenorrhea Pain Among Adolescent Girls: A Pre-Experimental Study in Bengkulu, Indonesia

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## Abstract

This study examines the effectiveness of warm compresses in reducing dysmenorrhea pain among adolescent girls. A pre-experimental one-group pre-post test design was used. The study was conducted at the Youth Posyandu in Tanjung Sanai I Rejang Lebong Village, Bengkulu, Indonesia, from June 6 to June 30, 2023. A total of 24 participants were selected using convenience sampling. Data were collected through a structured questionnaire and a standardized pain scale, validated through a pilot test. Pain levels were measured before and after applying warm compresses to the lower abdomen for 15-20 minutes, three times daily. Before the intervention, 54.2% of participants reported moderate pain, and 33.3% reported severe pain. After applying warm compresses, 50% of participants reported no pain, 29.2% reported mild pain, 16.7% reported moderate pain, and only 4.2% reported severe pain. The reduction in pain levels was statistically significant ( $p=0.000$ ). Warm compresses significantly reduce dysmenorrhea pain in adolescent girls, shifting pain levels from moderate and severe to mild or none. This method is practical, accessible, and effective, offering a valuable non-pharmacological option for managing menstrual pain in young women.

Keywords: Dysmenorrhea, warm compress, adolescent girls, menstrual pain, non-pharmacological intervention, pain management.

**Abstrak:** Studi ini mengkaji efektivitas kompres hangat dalam mengurangi nyeri dismenore pada remaja putri. Penelitian ini menggunakan desain pra-eksperimental dengan pre-post test satu kelompok. Penelitian dilakukan di Posyandu Remaja Desa Tanjung Sanai I Rejang Lebong, Bengkulu, Indonesia, dari 6 hingga 30 Juni 2023. Sebanyak 24 partisipan dipilih menggunakan teknik sampling kemudahan. Data dikumpulkan melalui kuesioner terstruktur dan skala nyeri standar, divalidasi melalui uji coba. Tingkat nyeri diukur sebelum dan sesudah penerapan kompres hangat di perut bagian bawah selama 15-20 menit, tiga kali sehari. Sebelum intervensi, 54,2% partisipan melaporkan nyeri sedang, dan 33,3% melaporkan nyeri parah. Setelah penerapan kompres hangat, 50% partisipan melaporkan tidak ada nyeri, 29,2% melaporkan nyeri ringan, 16,7% melaporkan nyeri sedang, dan hanya 4,2% melaporkan nyeri parah. Penurunan tingkat nyeri ini signifikan secara statistik ( $p=0,000$ ). Kompres hangat secara signifikan mengurangi nyeri dismenore pada remaja putri, mengubah tingkat nyeri dari sedang dan parah menjadi ringan atau tidak ada. Metode ini praktis, mudah diakses, dan efektif, menawarkan pilihan non-farmakologis yang berharga untuk mengelola nyeri menstruasi pada wanita muda.

Kata kunci: Dismenore, kompres hangat, remaja putri, nyeri menstruasi, intervensi non-farmakologis, manajemen nyeri.

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## INTRODUCTION

Menstruation is a periodic process of blood loss or the endometrial cycle, which physiologically indicates the shedding of mature egg cells and marks the reproductive period in a woman's life (Bobak, 2014). Menstruation typically begins between the ages of 12-15 years and lasts until the age of 45-50 years. Common complaints during menstruation include irritability, restlessness, sleep disturbances, concentration problems, breast enlargement, and menstrual-related disorders such as dysmenorrhea (Halitopo, 2022). Dysmenorrhea is one of the most common complaints among adolescents during menstruation (Manuaba, 2015).

Dysmenorrhea, characterized by painful menstruation, is one of the most prevalent gynecological issues affecting women of various ages, causing significant disruption to daily activities and often requiring sufferers to rest and abstain from activities (Bobak, 2015). Dysmenorrhea is categorized into two types: (1) primary dysmenorrhea, which involves menstrual pain without any anatomical abnormalities of the genitals, and (2) secondary dysmenorrhea, which is associated with clear anatomical abnormalities or pathological problems in the pelvic cavity (Manuaba, 2014). Primary dysmenorrhea generally occurs 1-3 years after menarche (Ningsih, 2013). Nationally, the average age of menarche is 13-14 years among adolescents (Riskasdas, 2014). Dysmenorrhea tends to occur in adolescents aged 16-17 years, who are typically in junior high school or equivalent (Ningsih, 2013).

The prevalence of menstrual pain (dysmenorrhea) is significant worldwide, affecting more than 50% of women in most countries. In the United States, the prevalence is approximately 60%, while in Sweden it is around 72%. In Indonesia, it is estimated that 55% of women of reproductive age suffer from menstrual pain (Atikah, 2015). The prevalence of primary dysmenorrhea in Indonesia is around 54.89%, while the remainder are secondary dysmenorrhea cases (Atikah, 2015). In East Java, the prevalence is 64.25%, with 54.89% primary and 9.36% secondary dysmenorrhea (Handayani et al, 2023). Although generally not dangerous, dysmenorrhea can be significantly disruptive (Atikah, 2015). The degree of pain and its impact varies among women; some can continue their activities with mild discomfort, while others are unable to function due to severe pain (Proverawati & Misaroh, 2015).

The Gate Control Theory of Pain, proposed by Melzack and Wall in 1965, states that pain is not merely the result of direct signals from the injury site to the brain but is also influenced by control mechanisms in the spinal cord. Non-nociceptive stimulation, such as warm compresses, can close the 'gate' in the spinal cord, thereby reducing the transmission of pain signals to the brain. This explains how the application of heat from warm compresses can alleviate the sensation of dysmenorrhea pain.

Various studies have demonstrated the effectiveness of using warm compresses as a non-pharmacological method to reduce menstrual pain. A study by Akin et al. (2004) found that applying warm compresses to the lower abdomen significantly reduced the intensity of dysmenorrhea pain in adolescents. These results align with findings from another study conducted by Jones and Sutton (2016), which reported that warm compresses could provide significant and quicker pain relief compared to nonsteroidal anti-inflammatory drugs (NSAIDs) in some cases.

Non-pharmacological methods, such as warm compresses, can effectively reduce primary dysmenorrhea. Non-pharmacological pain management involves alleviating the pain response without the use of

pharmacological agents (Hendrawan, 2013). Warm compresses provide a sense of security by using heat, which helps to relax muscles, increase blood flow, and reduce pain (Lowdermilk et al., 2013). A study by Anugraheni and Wahyu Ningsih (2013) also supports the effectiveness of warm compresses, where they found that the application of warm compresses significantly reduced the intensity of dysmenorrhea pain in adolescent girls. This research emphasizes the importance of using accessible and low side-effect non-pharmacological methods for managing dysmenorrhea pain.

Furthermore, research conducted by Dawood (2006) confirms that heat therapy methods, including warm compresses, are effective in reducing dysmenorrhea pain through mechanisms of increased blood flow and reduced muscle tension. This study reinforces the idea that heat therapy is a valid and beneficial approach in managing menstrual pain. Thus, the use of warm compresses as a non-pharmacological method is supported by strong theoretical and empirical evidence, making it an effective intervention for reducing dysmenorrhea pain in adolescent girls.

Despite the high prevalence of dysmenorrhea and the known benefits of non-pharmacological interventions like warm compresses, there is a lack of comprehensive studies examining the specific effects of warm compresses on dysmenorrhea among adolescent girls, particularly in the Indonesian context. Previous studies have primarily focused on pharmacological treatments or have not adequately explored the cultural and social factors that might influence the effectiveness of non-pharmacological interventions (Anugraheni & Wahyu Ningsih, 2013; Nurafifah et al., 2020).

This study aims to fill this gap by providing empirical evidence on the effectiveness of warm compresses in reducing dysmenorrhea pain among adolescent girls in Indonesia. By focusing on a specific non-pharmacological intervention and considering the unique demographic and cultural context of the participants, this research seeks to contribute valuable insights that can inform better management practices for dysmenorrhea in adolescents.

## METHOD

### Research Design

This study employs a pre-experimental research design with a one-group pre-post test design. This design was chosen to reveal causal relationships by observing one group of subjects before and after treatment. This method allows for a direct comparison of menstrual pain (dysmenorrhea) levels before and after the application of warm compresses. The independent variable in this study was the application of warm compresses. The dependent variable was the level of menstrual pain (dysmenorrhea), which was measured using a pain scale before and after the treatment.

### Location and Time of Study

The study was conducted at the Youth Posyandu in Tanjung Sanai I Rejang Lebong Village, Bengkulu, Indonesia. The data collection period spanned from June 6 to June 30, 2023. This location was selected due to its accessibility and the presence of a target population suitable for the study.

### Population and Sample

The target population for this study comprised all young women attending the Youth Posyandu in Tanjung Sanai I

Rejang Lebong Village during the study period, totaling 40 individuals. The inclusion criteria for the study were young women who experience dysmenorrhea and are willing to participate. Exclusion criteria included young women with medical conditions requiring special treatment unrelated to dysmenorrhea or those unwilling to participate. The sample size was determined using the Lemeshow formula (1990), as cited in Murti (2016), resulting in 24 participants. Due to time and resource constraints, convenience sampling was employed to select participants who were readily available and met the inclusion criteria.

### Instruments and Data Collection Techniques

Data were collected using a structured questionnaire and a standardized pain scale. The questionnaire gathered demographic information, while the pain scale assessed the intensity of dysmenorrhea before and after the intervention. The validity and reliability of the questionnaire and pain scale were established through a pilot test on a similar population, ensuring their accuracy and relevance. The reliability of the pain scale was confirmed using Cronbach's alpha, resulting in a score of 0.82, which indicates good reliability.

Participants were recruited based on the inclusion criteria and provided informed consent. Initially, they were asked to rate their menstrual pain using the pain scale before the application of the warm compress. Warm compresses were then applied to the lower abdomen for 15-20 minutes, three times a day, with each session lasting 10-15 minutes. After the intervention, participants rated their pain again using the same scale.

### Data Analysis

Data analysis in this study involved both descriptive and inferential statistical techniques. Descriptive statistics were used to summarize the demographic characteristics of the participants and the distribution of pain levels before and after the intervention. Inferential statistics, specifically the Wilcoxon Signed Rank Test, were employed to assess the significance of differences in pain levels before and after the application of warm compresses. This non-parametric test was chosen due to its suitability for small sample sizes and its ability to handle ordinal data. All statistical analyses were conducted using SPSS version 25, a comprehensive software package for data management and analysis.

Raw data underwent rigorous processing to ensure completeness and accuracy. Initially, the data were cleaned to remove any inconsistencies or errors. Missing data were managed by excluding cases with incomplete information from the analysis on a case-by-case basis. This approach helped maintain the integrity of the dataset while minimizing the loss of valuable information. Outliers, which could potentially skew the results, were carefully identified and examined. Their impact on the overall analysis was assessed to determine whether they should be retained or excluded. This thorough data processing ensured that the analysis was based on reliable and valid data, leading to robust and credible findings.

### Research Ethics

The study obtained ethical approval from the ethics committee at Dehasen University, ensuring that all procedures adhered to ethical guidelines designed to protect the safety and well-being of the participants. Informed consent was obtained from all participants after they were fully informed about the study's objectives, procedures, benefits, and potential risks. This process included assuring participants of the confidentiality and anonymity of their data. Ethical considerations were strictly observed throughout the study. The confidentiality and anonymity of participant data were rigorously maintained, and all collected information was used solely for research purposes. No data were published in a manner that could identify individual participants, thereby upholding the ethical standards of privacy and data protection.

### RESULTS OF STUDY

This study investigates the demographic characteristics and incidence of dysmenorrhea among 24 adolescent girls, focusing on their age and the specific days of their menstrual cycle when they experience pain. The analysis reveals that a majority of the respondents are 14 years old (58.3%), while the remaining participants are 13 years old (41.7%). This relatively balanced age distribution ensures that the findings will be broadly representative of early adolescent girls within this age range. The distribution of their characteristics is summarized in Table 1.

Dysmenorrhea, a common issue among the study participants, predominantly occurs on the first day of the menstrual cycle, with 79.2% of the girls reporting pain on Day-1. In contrast, only 20.8% experience dysmenorrhea on the second day. This significant prevalence of Day-1 dysmenorrhea highlights the critical need for effective pain management strategies during the initial day of menstruation, which is often the most painful for many women.

The data underscores the importance of interventions such as warm compresses, particularly for managing pain on the first day of menstruation. The high occurrence of Day-1 dysmenorrhea among the participants suggests that any observed benefits from the use of warm compresses will be most relevant for alleviating pain at the onset of menstruation. This could guide future research and clinical practices to prioritize early intervention methods for menstrual pain relief.

Overall, the study aims to provide valuable insights into non-pharmacological interventions for managing dysmenorrhea, potentially improving the quality of life for young girls experiencing menstrual pain. The findings indicate that warm compresses could play a significant role in reducing dysmenorrhea pain, especially on the first day of menstruation, and highlight the need for targeted pain management strategies in early adolescence. Further research will be necessary to evaluate the effectiveness of warm compresses and to establish them as a recommended practice for alleviating dysmenorrhea in adolescent girls.

**Table 1. Characteristics of Young Female Respondents Based on Age and Dysmenorrhea (N=24)**

	Characteristics	Frequency (f)	Percentage (%)
Age (years)	13	10	41,7
	14	14	58,3
Dysmenorrhea	Day-1	19	79,2
	Day-2	5	20,8

The effectiveness of warm compresses in alleviating menstrual pain was examined through a comparison of pain levels before and after the intervention. The pain was measured using a standard pain scale and the results are presented in Table 2, which details the frequency and percentage distribution of pain levels among the 24 adolescent girls who participated in the study. Before the application of warm compresses, none of the participants reported experiencing no pain. The majority of the girls, 54.2%, suffered from moderate pain (pain scale 4-6), while 33.3% experienced severe pain (pain scale 7-9). Only 12.5% of the respondents reported mild pain (pain scale 1-3). These initial findings indicate that dysmenorrhea pain among the participants was predominantly moderate to severe, highlighting the need for effective pain relief interventions.

After the intervention with warm compresses, a significant reduction in pain levels was observed. Remarkably, 50.0% of the participants reported no pain at all, indicating that the warm compresses effectively alleviated dysmenorrhea pain for half of the respondents. Additionally, the proportion of girls experiencing mild pain increased to 29.2%, suggesting that the intervention also successfully reduced the intensity of pain for another significant portion of the group. The number of participants experiencing moderate pain dropped to 16.7%, and those reporting severe pain fell dramatically to just 4.2%.

These results clearly demonstrate the efficacy of warm compresses in reducing menstrual pain among adolescent girls. The intervention not only alleviated pain entirely for a substantial number of participants but also lessened the severity of pain for others. The shift from moderate and severe pain levels to no or mild pain post-intervention underscores the potential of warm compresses as a simple, non-pharmacological method for managing dysmenorrhea.

In conclusion, the study provides strong evidence supporting the use of warm compresses as an effective means of reducing dysmenorrhea pain in adolescent girls. The significant reduction in pain levels following the intervention suggests that warm compresses could be recommended as a practical and accessible pain

management strategy for young women experiencing menstrual pain. Further research could explore the long-term benefits and any potential side effects of regular use of warm compresses during menstruation.

In this study, the effectiveness of warm compresses was assessed by comparing pain levels before and after the intervention. Table 3 provides a detailed analysis of the changes in pain levels, measured in terms of frequency and percentage, for the adolescent girls who participated in the study. Before the intervention, none of the participants reported experiencing no pain. A majority, 54.2%, experienced moderate pain, while 33.3% suffered from severe pain. Only 12.5% of the girls reported mild pain, indicating that dysmenorrhea pain was predominantly moderate to severe among the participants before applying the warm compresses.

After the application of warm compresses, the results showed a significant reduction in pain levels. Notably, 50.0% of the participants reported experiencing no pain at all, a substantial improvement from the pre-test condition. Additionally, the proportion of girls experiencing mild pain increased to 29.2%, while the number experiencing moderate pain dropped to 16.7%. The frequency of severe pain also decreased dramatically to just 4.2%.

The p-value of 0.000 indicates that these changes are statistically significant, confirming the effectiveness of warm compresses in reducing dysmenorrhea pain among the participants. The shift from moderate and severe pain to no or mild pain demonstrates the potential of warm compresses as a simple, non-pharmacological intervention for managing menstrual pain in adolescent girls.

Overall, the findings from this study provide strong evidence that warm compresses significantly alleviate dysmenorrhea pain, making it a viable option for pain management in young women. This method could be recommended as an accessible and effective treatment to improve the quality of life for adolescent girls suffering from menstrual pain. Further research could explore the long-term benefits and broader applications of warm compresses in various settings.

**Table 2. comparison of menstrual pain scale (dysmenorrhea) before and after giving warm compress**

Pain Scale	Before		After	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
No pain (0)	0	0,0	12	50,0
Mild pain (1-3)	3	12,5	7	29,2
Moderate pain (4-6)	13	54,2	4	16,7
Severe pain (7-9)	8	33,3	1	4,2
<b>Total</b>	<b>24</b>	<b>100</b>	<b>24</b>	<b>100</b>

**Table 3. Analysis of the Effect of Giving Warm Compresses on Reducing Dysmenorrhea Pain in Adolescent Girls**

Pain Level	No pain		Medium		Severe		Severe		p value
	f	%	f	%	f	%	f	%	
Pre - Test	0	0	3	12,5	13	54,2	8	33,3	0,000
Post - Test	12	50,0	5	29,2	4	16,7	1	4,2	
Total	12	50,0	8	4,17	17	70,9	9	37,5	

## DISCUSSION

The findings of this study reveal significant insights into the effectiveness of warm compresses in managing dysmenorrhea among adolescent girls. Dysmenorrhea, or painful menstruation, is a prevalent issue that can severely

disrupt daily activities, particularly in young women. This study aimed to evaluate whether warm compresses could serve as an effective non-pharmacological intervention for this condition.

The application of the Gate Control Theory of Pain, proposed by Melzack and Wall (1965), supports the study's

hypothesis. According to this theory, pain signals are not merely direct messages from the site of injury to the brain but are modulated by a gating mechanism in the spinal cord. Non-nociceptive stimuli, such as heat from warm compresses, can close this gate, thereby reducing the perception of pain. This theoretical framework provides a robust explanation for the observed pain relief in participants who used warm compresses.

Various empirical studies corroborate the effectiveness of warm compresses in alleviating menstrual pain. For instance, Akin et al. (2004) demonstrated that warm compresses significantly reduce dysmenorrhea intensity in adolescents. Similarly, Jones and Sutton (2016) found that heat therapy provided faster and more significant pain relief compared to nonsteroidal anti-inflammatory drugs (NSAIDs). Additionally, a study by Proctor and Farquhar (2006) supports the use of heat therapy, indicating it as an effective intervention for primary dysmenorrhea.

The results indicate that before the application of warm compresses, the majority of participants experienced moderate to severe pain. Specifically, 54.2% of the girls reported moderate pain, and 33.3% reported severe pain. This distribution underscores the high level of discomfort associated with dysmenorrhea in the studied population. However, after the intervention, there was a notable shift in pain levels. Half of the participants (50.0%) reported no pain post-intervention, while the proportion of those experiencing mild pain increased to 29.2%. Only a small fraction continued to experience moderate or severe pain (16.7% and 4.2%, respectively). This significant reduction in pain levels was statistically confirmed with a p-value of 0.000, highlighting the efficacy of warm compresses.

The use of non-pharmacological methods such as warm compresses is particularly advantageous due to their accessibility, ease of use, and minimal side effects. Warm compresses help relax muscles, increase blood flow, and reduce muscle tension, all of which contribute to pain relief (Lowdermilk et al., 2013). Additionally, studies by Anugraheni and Wahyu Ningsih (2013) support the effectiveness of warm compresses in reducing dysmenorrhea pain among adolescent girls, further emphasizing the importance of non-pharmacological interventions. A systematic review by Armour et al. (2019) also indicates that heat therapy can effectively alleviate menstrual pain and improve the quality of life for women with dysmenorrhea.

Despite these promising results, there are some limitations to this study. The use of convenience sampling and the relatively small sample size may limit the generalizability of the findings. Future research should consider larger, more diverse populations and explore the long-term benefits and any potential side effects of regular use of warm compresses during menstruation.

This study provides compelling evidence that warm compresses significantly alleviate dysmenorrhea pain in adolescent girls. Given the substantial reduction in pain levels observed, warm compresses can be recommended as a practical and effective pain management strategy for young women experiencing menstrual pain. These findings contribute valuable insights into non-pharmacological pain management practices and highlight the need for targeted interventions to improve the quality of life for those affected by dysmenorrhea.

## CONCLUSIONS

This study provides compelling evidence on the effectiveness of warm compresses in reducing

dysmenorrhea pain among adolescent girls. The findings demonstrate a significant reduction in pain levels following the application of warm compresses, with a marked shift from moderate and severe pain to mild or no pain. Specifically, 50% of the participants reported no pain after the intervention, while the number of those experiencing severe pain dropped dramatically to 4.2%.

The results align with the Gate Control Theory of Pain, which posits that non-nociceptive stimuli, such as heat, can modulate pain perception by closing neural gates in the spinal cord. This theoretical framework explains the mechanism through which warm compresses alleviate menstrual pain. Empirical studies, including those by Akin et al. (2004) and Jones and Sutton (2016), corroborate these findings, highlighting the rapid and significant pain relief provided by heat therapy compared to NSAIDs.

The study underscores the benefits of non-pharmacological methods like warm compresses, which are accessible, easy to use, and have minimal side effects. This is particularly advantageous in adolescent populations, where the preference may be for non-drug interventions. Anugraheni and Wahyu Ningsih (2013) and Armour et al. (2019) support these findings, emphasizing the efficacy of heat therapy in managing dysmenorrhea and improving the quality of life for affected individuals.

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## Conflict of Interest Statement

The authors report no potential conflict of interest.

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