



THE EFFECTIVENESS OF SLOW STROKE BACK MASSAGE, COUNTERPRESSURE MASSAGE, CINNAMON AROMATHERAPY ON DYSMENORRHEA IN ADOLESCENTS

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ABSTRACT

Menstrual disorders are commonly experienced by adolescent girls and may occur due to various factors, including hormonal production, stress levels, nutritional status, daily activities, and early age at menarche. Dysmenorrhea, or menstrual pain, is classified as a type of menstrual disorder. Non-pharmacological or complementary therapies can be provided to help reduce dysmenorrhea. This research aims to determine the impact of providing interventions in the form of slow stroke back massage, counterpressure massage, and cinnamon aromatherapy for adolescent girls experiencing menstrual pain. The researcher employed a quasi-experimental method with a non-equivalent control group design, involving adolescent females divided into two groups. The researcher employed a quasi-experimental design with a non-equivalent control group, involving female adolescents as the study population and those experiencing dysmenorrhea as the sample. The participants were divided into two groups: an intervention group (n = 10), which received the treatment, and a control group (n = 10), which did not receive any intervention. A non-random sampling technique was used to recruit the participants. To measure pain intensity scores, a Numeric Rating Scale (NRS) was used. The collected data were analyzed using the Mann–Whitney test. The findings indicate that the intervention administered to the experimental group was effective in reducing pain, as demonstrated by the Mann–Whitney test comparing post-test pain scores between the experimental and control groups ($U = 7.0$, $Z = -3.539$, $p < 0.001$). The median pain score was lower in the experimental group (3; IQR 2–4) than in the control group (4; IQR 3–5). Interventions in the form of slow stroke back massage, counterpressure massage, and cinnamon aromatherapy were proven to be effective in reducing menstrual pain among adolescent girls.

Keywords: cinnamon aromatherapy; counterpressure massage; dysmenorrhea; slow stroke back massage

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INTRODUCTION

Adolescent reproductive health is an important aspect that requires attention, as this developmental stage involves significant physical, psychological, and social changes. Limited knowledge and inadequate access to information place adolescents at risk of various health problems, such as menstrual pain, anemia due to bleeding, and engagement in risky sexual behaviors. A comprehensive understanding of reproductive health, including knowledge of the menstrual cycle and appropriate management of menstrual pain, is essential for adolescents to maintain their health, remain optimally active, and reduce morbidity rates within this age group (Hayati et al., 2020; Meilani et al., 2025).

Adolescence represents a developmental stage characterized by significant physiological, social, and psychological transformations. One important phenomenon during this stage is the onset of menstruation, which is often accompanied by pain known as dysmenorrhea. Among adolescent girls, dysmenorrhea constitutes a frequently encountered gynecological issue, exhibiting a notably high prevalence in Indonesia. This condition can affect daily activities, academic concentration, and overall life functioning (Holmes et al., 2021; Juliana et al., 2019; Martínez-Fortuny et al., 2023).

Menstrual pain is typically caused by an increase in prostaglandin production, which induces excessive uterine contractions and results in pain in the lower abdomen, pelvis, and lower back. In addition to hormonal components, several determinants affect the severity of menstrual pain, including early menarche, a family history of dysmenorrhea, nutritional factors, stress, junk food consumption patterns, and inadequate physical activity. Psychological factors also play a role, as anxiety and stress can intensify pain perception among adolescent girls (Cholifah & Hadikasari, 2015; Horman et al., 2021; Solihah et al., 2023).

Many adolescent girls experience menstrual pain caused by cramping or muscle stiffness in the lower abdomen that radiates to the waist and lower back. This discomfort can interfere with their daily activities, making appropriate therapeutic management necessary. Non-pharmacological therapy can be provided as a complementary approach alongside pharmacological treatment, which typically involves the use of analgesics. Complementary non-pharmacological interventions may include slow stroke back massage, counterpressure massage, and cinnamon aromatherapy (Khotimah & Lintang, 2022; Nurul Abidah et al., 2024; Triningsih & Mas'udah, 2023).

To mitigate dysmenorrhea in adolescent girls, a combination of slow stroke back massage, counterpressure massage, and cinnamon aromatherapy can be administered. Slow stroke back massage is a massage technique performed using gentle, rhythmic strokes along the back to stimulate endorphin release, promote muscle relaxation, and enhance blood circulation, thereby reducing pain perception (Alfitri, 2021; Wahyuniar et al., 2023).

The counterpressure massage technique is performed by applying firm pressure to specific points in the lumbar area. This region is the central pathway for nerve fibers originating from the uterus. Following the application of counterpressure massage, the body releases endorphins, which serve as natural analgesics and help reduce menstrual pain (Henniwati & Dewita, 2021; Putri & Handayani, 2020). The use of aromatherapy in complementary therapy involves essential oils derived from plants, which can influence the brain's limbic system, promote relaxation, reduce stress, and help alleviate pain (Khotimah & Lintang, 2022; Sri Kusumawati, 2023).

Cinnamon extract contains anti-inflammatory compounds that are beneficial for reducing menstrual pain and bleeding. Cinnamon produces a warm, spicy, and sweet sensation, and contains active components such as cinnamaldehyde and eugenol, which promote relaxation, improve blood circulation, and provide analgesic effects. Cinnamon has been shown to significantly reduce pain, menstrual bleeding, and symptoms such as nausea and vomiting associated with primary dysmenorrhea, without causing adverse side effects (Husnah et al., 2024; Laksmi Puspa Sari et al., 2024). Cinnamon aromatherapy contains essential oils with antispasmodic and anti-inflammatory bioactive properties that help relieve muscle spasms, reduce joint pain, and enhance blood circulation, thereby decreasing the intensity of dysmenorrhea or menstrual pain (Laksmi Puspa Sari et al., 2024).

Due to their simplicity, proven efficacy, and low risk of side effects, slow stroke back massage, counterpressure massage, and cinnamon aromatherapy may function as practical non-pharmacological strategies for alleviating menstrual pain in adolescents. Based on these considerations, the present study aimed to investigate the effectiveness of integrating these three approaches in reducing menstrual pain in adolescent girls.

METHOD

The study adopted a quasi-experimental design employing a non-equivalent control group structure. Adolescent girls were chosen as respondents and subsequently divided into an experimental group, which was provided with the intervention, and a control group that received no intervention. This research obtained ethical approval from the Health Research Ethics Committee at Universitas

Muhammadiyah Purwokerto (Registration No. KEPK/UMP/172/VIII/2025). The selected respondents met the inclusion criteria of being female adolescents aged 13–18 years, having regular menstrual cycles, and experiencing monthly dysmenorrhea. The study involved 20 adolescent female participants, evenly distributed between the experimental group (n = 10) and the control group (n = 10). All participants were members of the adolescent health post (posyandu remaja).

Data were collected using a questionnaire that included pain intensity scores. Pain assessment was conducted using the Numeric Rating Scale (NRS). In the experimental group, pain intensity was measured twice—before the intervention and after receiving the intervention. In the control group, pain intensity was also measured twice (Indria, 2021). The intervention administered to the experimental group consisted of a combination of slow stroke back massage, counterpressure massage, and cinnamon aromatherapy during one menstrual cycle when the respondents experienced dysmenorrhea. Evaluations were conducted before and after the intervention by measuring pain intensity. In contrast, in the control group, pain intensity was measured without administering any intervention. The analysis included univariate analysis to outline respondent characteristics and bivariate analysis using the Wilcoxon test, given that the data were non-normally distributed. The Mann–Whitney test was then employed to assess differences between the experimental and control groups.

RESULT

Table 1.
Respondent Characteristics

Variables	f	%
Age		
13 – 18 years	20	100
Education		
Junior High School	11	55
Senior High School	9	45
Dysmenorrhea		
Yes	20	100

The characteristics of the respondents are summarized in Table 1. Every respondent (100%) fell within the 13–18-year age range, indicating that the entire sample consisted of adolescents. The majority of respondents had a junior high school education (55%), and all participants experienced dysmenorrhea.

Table 2.
Menstrual Pain Scale of Adolescent Girls Before the Administration of Slow Stroke Back Massage, Counterpressure Massage, and Cinnamon Aromatherapy

Variables	N	Mean	Min-Max	SD
Pre-test eksperimen	10	4.1	3 -5	0.737
Pre-test kontrol	10	4.2	3 -5	0.632

Table 2 illustrates the pre-intervention mean menstrual pain levels for both the experimental and control groups. The analysis reveals not notable difference between the groups, with mean scores of 4.1 and 4.2, respectively. These comparable values suggest that participants in both groups typically reported moderate pain intensity.

Table 3.
Menstrual Pain Scale of Adolescent Girls After the Intervention of Slow Stroke Back Massage, Counterpressure Massage, and Cinnamon Aromatherapy

Variables	N	Mean	Min-Max	SD
Post-test eksperimen	10	1.9	1 -3	0.567
Post-test kontrol	10	4	3 -5	0.667

As presented in Table 3, a substantial disparity is observed between the intervention and control groups. After the intervention, the experimental group had a mean pain score of 1.9 (mild pain), whereas the control group, assessed without intervention, reported a post-test mean score of 4, indicative of moderate pain.

Table 4.
Normality Test in the Experimental and Control Groups

Variabel		Shapiro-Wilk	
		df	Sig
Experimental Group	Pre-test	10	0.036
	Post-test	10	0.004
Control Group	Pre-test	10	0.012
	Post-test	10	0.036

Table 4, the normality assessment for each group, where Sig (p) values were found to be below the 0.05 threshold. Accordingly, the data violate the assumption of normality. The Shapiro–Wilk test corroborates this finding, showing that the distribution of changes in pain scores in both groups is non-normal ($p < 0.05$).

Table 5.
Analysis of Group Differences: Experimental vs. Control

Variabel		Wilcoxon	
		Z	Sig
Experimental Group	Pre-test	-2.877	0.004
	Post-test		
Control Group	Pre-test	-1.414	0.157
	Post-test		

Table 5, the outcomes of the Wilcoxon analysis comparing pre- and post-intervention scores in the experimental and control groups. The experimental group exhibited a significant decrease in pain intensity after receiving the intervention ($Z = -2.877$, $p = 0.004$). Meanwhile, the control group revealed no statistically significant change ($Z = -1.414$, $p = 0.157$), as reflected by a Sig (p) value above 0.05.

Table 6.
Comparison of Experimental and Control Groups Results

Group	n	Median (IQR)	Mean	U	Z	p-value
Experimental	10	3 (2 – 4)	6.20			
Control	10	4 (3 – 5)	14.80	7.0	-3.539	<0.001

As shown in Table 6, the comparative analysis between the experimental and control groups, indicating a significant post-test difference in pain scores ($U = 7.0$, $Z = -3.539$, $p < 0.001$). The lower median pain score observed in the experimental group (3; IQR 2–4), relative to the control group (4; IQR 3–5), supports the conclusion that the intervention was effective in alleviating menstrual pain among adolescent girls.

DISCUSSION

The respondents' characteristics based on age, as presented in Table 1, show that all participants were between 13 and 20 years old, which falls into the category of middle adolescence. During this stage, the reproductive system is still undergoing adjustment, and hormonal balance is often unstable, increasing the likelihood of stronger uterine contractions that may lead to menstrual pain. This is in line with the work of Aisyaroh et al., Rita et al., and Horman et al., which indicate that a younger age at menarche and earlier adolescence are associated with a higher risk of dysmenorrhea (Aprilia et al., 2022; Cholifah & Hadikasari, 2015).

Table 1 also shows that 55% of respondents were junior high school students. Educational level is believed to influence how adolescents manage menstrual pain. Junior high school girls, who are generally younger, are typically in the early stage of menstruation, during which hormonal and reproductive functions have not fully stabilized. This makes them more vulnerable to dysmenorrhea. Furthermore, their knowledge regarding menstrual pain management tends to be limited (Saputra et al., 2021).

In contrast, senior high school students tend to have longer experience with menstruation and greater knowledge of reproductive health. Age and educational maturity may influence pain

perception, pain management abilities, and attitudes toward menstrual discomfort (Meilani et al., 2025; H. Sari & Hayati, 2020)

The results in Table 3 show that pain scores decreased after the intervention was administered. The Wilcoxon test, as shown in Table 5, indicates a significant reduction in pain scores in the experimental group compared with the control group, which did not receive any intervention. On average, pain scores in the experimental group decreased by 2 points among all respondents ($Z = -2.877$, $p = 0.004$).

Slow stroke back massage is performed by applying gentle strokes along the back, with pressure directed from the 10th–12th thoracic vertebrae to the first lumbar vertebra for approximately five minutes. This technique stimulates the release of endorphins and improves blood circulation. Endorphins produce a relaxation effect that contributes to the reduction of pain (Alfitri, 2021; Mukhoirotin et al., 2020; Wahyuniar et al., 2023)

Based on the gate control theory, the mechanism underlying the slow stroke back massage involves mechanical stimulation that activates large nerve fibers to inhibit the transmission of pain signals from nociceptive fibers at the spinal cord level, thereby reducing the impulses that reach the thalamus and cortex. Gentle stroking in slow stroke back massage triggers the release of endorphins, serotonin, and dopamine, which function as natural analgesics in the body. Endorphins inhibit nociceptive signal transmission in the central nervous system, thus lowering pain intensity. Serotonin induces a sense of relaxation, while dopamine produces feelings of comfort and reduces anxiety, which can exacerbate pain perception during menstruation (Aisyaroh et al., 2022; Alfitri, 2021; Mukhoirotin et al., 2020; Triningsih & Mas'udah, 2023).

Repeated gentle touch during slow stroke back massage stimulates the parasympathetic nervous system, reducing excessive sympathetic activity and consequently lowering heart rate, blood pressure, and muscle tension. These physiological changes support deep relaxation, which contributes to reducing menstrual pain (Alfitri, 2021; Mukhoirotin et al., 2020; A. P. Sari & Usman, 2021). Counterpressure massage is performed by applying firm, small circular motions to the back. This technique targets the area near the seventh cervical vertebra and is directed outward toward the ribs, activating nerve fibers that help reduce the transmission of pain signals to the brain. This mechanism results in decreased menstrual pain (Indria et al., 2023; Putri & Henniati, 2023; Ulfa et al., 2019).

According to Melzack's Gate Control Theory of Pain, pain perception can be modulated at the spinal cord level through counterpressure massage, which activates large nerve fibers and inhibits pain signals transmitted by smaller fibers. This reduces the number of pain impulses reaching the brain, thereby alleviating menstrual pain (Ernawati & M. Askar, 2024; Khotimah & Lintang, 2022; Ulfa et al., 2019). Repeated pressure applied during counterpressure massage in the lumbosacral area stimulates the release of endorphins, which suppress pain transmission in the central nervous system. This technique also enhances blood circulation by reducing uterine hypoxia and relaxing tense back and pelvic muscles (Henniwati & Dewita, 2021; Putri & Handayani, 2020).

Cinnamon aromatherapy is derived from the essential oil of *Cinnamomum* plants, which contains active compounds such as cinnamaldehyde and eugenol. These constituents possess anti-inflammatory, antispasmodic, vasodilatory, and analgesic properties. Pharmacologically, cinnamaldehyde inhibits cyclooxygenase-2 (COX-2) and reduces prostaglandin production, thereby decreasing uterine contractions and pain intensity. Meanwhile, eugenol acts as a smooth muscle relaxant and analgesic through modulation of peripheral pain pathways (Husnah et al., 2024).

Inhalation of cinnamon aromatherapy influences the central nervous system through the stimulation of olfactory receptors connected to the limbic system. Limbic activation is strongly associated with the regulation of emotion, stress, and pain perception. Thus, cinnamon inhalation not only reduces physiological pain but also decreases anxiety and enhances relaxation. Consistent with the findings of Husnah et al., cinnamon aromatherapy has been shown to reduce menstrual pain in adolescents (Husnah et al., 2024; Laksmi Puspa Sari et al., 2024).

The psychological effects of slow stroke back massage, counterpressure massage, and cinnamon aromatherapy include feelings of being cared for, enhanced relaxation, and distraction from menstrual discomfort. These therapeutic touch techniques help reduce anxiety, which can intensify pain perception. These findings align with the results presented in Table 6, which show a significant difference in post-test pain scores between the experimental and control groups, with the experimental group experiencing an average reduction of 3 points (Sari Hrp et al., 2022; Triningsih & Mas'udah, 2023).

The reduction of menstrual pain through non-pharmacological interventions has broad implications for adolescent health, including physical, psychological, social, and reproductive domains. Physically, reducing menstrual pain can prevent dependence on analgesic medications, improve sleep quality, and allow adolescents to carry out daily activities normally (Aisyaroh et al., 2022; Nurul Abidah et al., 2024; Sari Dewi & Dwi Mardiyah Ningsih, 2023; H. Sari & Hayati, 2020). Psychologically, massage and aromatherapy help decrease anxiety, improve mood, and reduce stress during adolescence, a critical phase of emotional development. Socially and educationally, reduced menstrual pain can lower absenteeism and support better academic performance and social engagement (Rizqillah et al., 2025; Saputra et al., 2021; Triningsih & Mas'udah, 2023).

Education regarding non-pharmacological pain management increases reproductive health literacy and fosters adolescents' independence in self-care. Adolescents learn to understand their bodies, manage pain in healthy ways, and develop preventive behaviors that support future reproductive well-being. Thus, these interventions not only provide immediate pain relief but also contribute to long-term improvements in quality of life and overall health status among adolescent girls.

CONCLUSION

The complementary therapeutic intervention consisting of a combination of slow stroke back massage, counterpressure massage, and cinnamon aromatherapy was effective in reducing menstrual pain among adolescent girls. This combination stimulates the release of endorphins, enhances muscle relaxation, and improves blood circulation, thereby decreasing pain intensity. A limitation of this study is that pain measurement was conducted during only one menstrual cycle. Future research is recommended to assess pain intensity across multiple menstrual cycles.

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