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EFFECTS OF SANYINJIAO ACUPRESSURE AND CINNAMON DECOCTION DYSMENORRHEA ADOLESCENTS' MEAN PLATELET VOLUME

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ABSTRACT

Introduction: *Dysmenorrhea is a common menstrual pain complaint among adolescent girls affecting physical, psychological, and social activities. According to the World Health Organization (WHO) in 2021, 90% of women worldwide experience dysmenorrhea, and approximately 10–15% suffer from severe cases. One of the biological indicators related to menstrual pain is Mean Platelet Volume (MPV), the average size of platelets in the blood and reflects platelet activity and inflammation. The normal range of MPV is 150.000–400.000 µL, and elevated values may indicate an inflammatory process or acute pain, such as in dysmenorrhea.*
Objective: *To determine the effect of the combination of Sanyinjiao (SP6) acupressure and cinnamon decoction on Mean Platelet Volume (MPV) levels before and after treatment in adolescent girls with dysmenorrhea.*
Methods: *This study used a Pre-Experimental design with a One Group Pre-test and Post-test approach. The sample consisted of 32 adolescent girls with dysmenorrhea, selected using total sampling. The intervention of Sanyinjiao (SP6) acupressure and cinnamon decoction was administered twice daily for five days during menstruation.*
Results*: The mean value of MPV showed a decrease after the intervention, with a p-value of 0.000 (<0.05), indicating a significant effect of the combination of Sanyinjiao (SP6) acupressure and cinnamon decoction on reducing MPV levels in adolescents with dysmenorrhea.*
Conclusions: *The combination of SP6 acupressure and cinnamon decoction was proven to be effective in significantly reducing MPV levels in adolescent girls with dysmenorrhea. This therapy may serve as a practical and safe non-pharmacological alternative to alleviate menstrual pain associated with inflammation.*

Introduction

Puberty, also known as adolescence, is a period in which individuals experience significant physical, emotional, and social changes as preparation for adulthood. During puberty, individuals begin to understand their gender roles within society and undergo important social transitions. This stage occurs between childhood and adolescence, when sexual maturity is marked by signs such as menstruation in females and nocturnal emissions in males (Oti Aprillia et al., 2024). Adolescents aged 14–16 years are categorized as middle adolescents, while those aged 17–20 years are classified as late adolescents. This developmental stage follows a consistent pattern for each individual. Although each stage has distinctive characteristics, there are no strict boundaries, as growth and development occur continuously (Hanriyani & Suazini, 2022).

Menstruation in adolescent girls is one of the main characteristics of puberty. It is a natural and inevitable part of the life cycle of women. Menstruation occurs when an ovum is not

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fertilized by sperm, leading to a decrease in estrogen and progesterone levels, which in turn causes the shedding of the endometrium. The length of the menstrual cycle varies from 21 to 35 days. Factors that may influence changes in the menstrual cycle include age, diet, activity, anxiety, depression, physical fatigue, and pathological conditions (Puspa et al., 2024).

Dysmenorrhea is pain that occurs during or before menstruation. It is a common problem in gynecology, and changes in the menstrual cycle can be influenced by various factors such as age, diet, activity, anxiety, depression, physical fatigue, and pathological conditions, which may affect the quality of life of women of all ages. Dysmenorrhea is classified into two types: primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea generally occurs 6 to 12 months after menarche. Several factors influence primary dysmenorrhea, including family history, exercise, age at menarche, duration of menstruation, stress levels, and consumption of fast food. The cause is the high level of prostaglandins released from endometrial secretions, leading to painful uterine contractions (Pratiwi et al., 2024). Secondary dysmenorrhea usually begins around the age of 20 years and occurs in about 25% of women with dysmenorrhea (Panjaitan & Khairiah, 2024). Pain caused by dysmenorrhea, if not promptly managed, can affect an individual's mental and physical functions; therefore, it should be addressed immediately through pharmacological or non-pharmacological interventions (Andera, 2023).

Symptoms of dysmenorrhea include pelvic pain in the lower abdomen that may radiate to the lower back and thighs. The pain may be experienced as intermittent cramps or continuous dull aches. It typically appears before or during menstruation, peaks within 24 hours, and subsides after about two days. Other symptoms include headache, diarrhea, nausea, frequent urination, and vomiting (Fadliyah & Sudiamin, 2022).

According to the Indonesian Ministry of Health (Kemenkes RI, 2021), the prevalence of dysmenorrhea was 107,673 cases (72.89%), with 59,671 (54%) occurring among adolescent girls. A study in collaboration with the Burnett Institute reported that 93.2% of adolescents experienced dysmenorrhea. The prevalence of dysmenorrhea among women of reproductive age ranges from 45% to 95%, while the prevalence of primary dysmenorrhea among adolescents is 60%-75% (Djailani et al., 2023).

In East Java, approximately 4,653 adolescents were reported to suffer from dysmenorrhea, with 4,297 cases (90.25%) classified as primary and 365 cases (9.75%) as secondary dysmenorrhea (Christiana et al., 2023).

Based on a field survey or preliminary study conducted at the adolescent Posyandu in Karang Asem Village, Klampis District, Bangkalan Regency in November 2024, the results of a pre-test questionnaire using the Numeric Rating Scale (NRS) for pain showed that a total of 32 female adolescent respondents experienced dysmenorrhea with mild, moderate, and severe pain levels.

Dysmenorrhea is not life-threatening, but it can interfere with daily activities and have physical, psychological, and social impacts on women. Dysmenorrhea should not be ignored, as it can lead to serious consequences due to increased secretion of prostaglandin hormones, which cause irregular uterine contractions. This occurs as a result of elevated secretion of prostaglandin F2α (PGF2α) and prostaglandin E2 (PGE2) during endometrial shedding. Prostaglandins are involved in enhancing uterine contractions and constricting blood vessels, which reduce oxygen supply to the uterus and stimulate the production of anaerobic metabolites. This process causes hypersensitization of pain fibers, ultimately leading to pelvic pain. Women with regular menstrual cycles experience elevated endometrial prostaglandin levels during the late luteal phase. The higher the prostaglandin levels, the stronger and more painful the contractions or cramps that are experienced (Kurniawan, F.T., Chairuna., Effendi, 2024). Evidence-Based Practice (EBP) emphasizes that a combination of complementary interventions, such as acupressure and herbal remedies, can serve as a safe and effective non-pharmacological therapy alternative.

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Mean Platelet Volume (MPV) is a routine hematological test that measures the average size of platelets circulating in the peripheral blood and helps evaluate thrombopoiesis activity. MPV values above >400 µL indicate an inflammatory process associated with menstrual pain. The normal range of MPV is 150.000-400.000 µL. During menstruation, increased prostaglandin levels stimulate uterine contractions, triggering pain and involving platelets in the inflammatory process. Platelets become active when blood vessels are damaged. Once activated, they aggregate to form a clot to stop menstrual bleeding. This activity leads to an increase in platelet levels, contributing to dysmenorrhea. However, platelet counts generally decrease or return to normal between the third and seventh days of menstruation (Putro Ragil Santoso et al., 2022).

Dysmenorrhea can be managed through therapies such as Sanyinjiao (SP6) acupressure and cinnamon decoction. Acupressure at the Sanyinjiao (SP6) point is performed by applying circular pressure with the thumb on a meridian point located three fingers above the medial malleolus. This point strengthens the spleen, restores Yin-Yang balance, improves kidney and liver function, regulates blood circulation, and helps reduce primary dysmenorrhea pain (Apriyelva et al., 2021).

Stimulation at SP6 activates the nervous system, prompting the endocrine system to release endorphins, natural analgesics that block pain receptors in the brain and induce relaxation. Therefore, Sanyinjiao (SP6) acupressure is effective in relieving dysmenorrhea pain (Ningrum et al., 2023). Preventive practice involves clockwise massage at this point, performed 30 rotations for 10 minutes, twice daily during dysmenorrhea episodes (Jatnika et al., 2022).

Cinnamon decoction has been traditionally used as a remedy, particularly for soothing the stomach. Cinnamon possesses antioxidant, antibacterial, antifungal, analgesic, and anti-inflammatory properties. With its analgesic components, cinnamon is effective in alleviating menstrual pain, while other compounds help inhibit prostaglandin biosynthesis. The main benefit of cinnamon decoction is its ability to relieve menstrual symptoms. In women, prior to menstruation, various symptoms may arise as indicators of endometrial shedding. These symptoms vary among individuals and may include lower abdominal pain, back pain, nausea, vomiting, and in some cases, fainting (Laksmi Puspa Sari et al., 2024). A study conducted by P. Ranasinghe in 2012 reported that cinnamon does not have significant side effects or toxic effects when consumed at doses of 1–6 grams per day.

Based on the explanation above, the researcher is interested in conducting a study on the effects of Sanyinjiao (SP6) acupressure and cinnamon decoction on mean platelet volume levels. The objectives of this study are: first, to identify mean platelet volume levels before the administration of the combination of Sanyinjiao (SP6) acupressure and cinnamon decoction in adolescents with dysmenorrhea; second, to identify mean platelet volume levels after the administration of the combination of Sanyinjiao (SP6) acupressure and cinnamon decoction in adolescents with dysmenorrhea; and third, to analyze the effect of administering the combination of Sanyinjiao (SP6) acupressure and cinnamon decoction on mean platelet volume levels in adolescents with dysmenorrhea.

Methods

This study employed a pre-experimental one group pre-test and post-test design to evaluate the effect of Sanyinjiao (SP6) acupressure combined with cinnamon decoction on Mean Platelet Volume (MPV) levels in adolescent girls with dysmenorrhea. The research was conducted at Posyandu Remaja Karang Asem, Klampis Sub-district, Bangkalan Regency, East Java, from January to April 2025. The study population comprised all adolescent girls in Karang Asem village experiencing dysmenorrhea. A total of 32 respondents were selected using total sampling based on inclusion criteria: female adolescents aged 13-20 years, experiencing dysmenorrhea in the last three menstrual cycles, not using analgesics during the study, and

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willing to participate. Exclusion criteria included a history of gynecological pathology, irregular menstrual cycles unrelated to dysmenorrhea, and allergy to cinnamon.

The intervention was provided for five consecutive days during menstruation. Acupressure was applied bilaterally at the SP6 point for five minutes twice daily with moderate pressure until a slight soreness or numbness was felt. Cinnamon decoction was prepared by boiling 5 grams of Cinnamomum burmannii bark in 100 ml of water for 5 minutes, then cooling and filtering before consumption, and was administered twice daily after meals. MPV levels were measured in femtoliters (fL) using an automated hematology analyzer before and after the intervention.

Data were collected through a questionnaire sheet by measuring dysmenorrhea pain levels before the intervention using the Numeric Rating Scale (NRS) method, in which respondents checked their pain intensity from 0 to 10. Observation sheets or laboratory results were also used to examine platelet levels before and after the intervention with the aid of an automated hematology analyzer. The data were then analyzed using a paired t-test after conducting a normality test with the Shapiro–Wilk test. A p-value <0.05 was considered statistically significant.

Results

The respondent's in this study were 32 adolescents at the intergrated health post (Posyandu) in Karang Asem Village, Klampis District, Bangkalan Regency. The distrubution of respondent's is as follows:

Table 1. Frequency Distribution of General Characteristic data

Variables	Category	n=32	%
Age	11-13 year	0	0
	14-16 year	10	31.3
	17-20 year	22	68.8
Education	Tidak sekolah	0	0
	SD	17	53.1
	SMP	11	34.4
	SMA	4	12.5
	PT	0	0
Age of menarche	<12 year	13	40.6
	12-14 year	14	43.8
	>14 year	5	15.6
Menstrual period	<4 days	0	0
	4-7 days	19	59.4
	>7 days	13	40.6
Frequency of pain duration	<1-2 days before menstruation	0	0
	1-2 days of menstruation	25	78.1
	>2 days of menstruation	7	21.9
Dismenore	0 no pain	0	0
	1-3 mild pain	19	59.4
	4-6 moderate pain	12	37.5
	7-9 severe pain	1	3.1
Nutritional status	underwight	14	43.8
	normal	18	56.3
	overwight	0	0

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	obesity	0	0
Physical activity	<1-2 times a week (never)	23	71.9
	1-2 times a week	9	28.1
	3-4 times a week	0	0

Table 1 presents the characteristics of respondents for each variable. The majority were aged 17–20 years, totaling 22 respondents (68.8%). In this age range, the hormonal activation of estrogen and progesterone tends to fluctuate, influencing prostaglandin release during menstruation. As women grow older, they are more likely to experience longer menstrual periods, with a wider cervical opening that increases uterine contractions, leading to dysmenorrheic pain and higher prostaglandin secretion (Edward et al., 2025). Regarding education level, 17 respondents (53.1%) had an elementary school education. Lower educational attainment can lead to a lack of knowledge and skills in effectively managing dysmenorrhea, both pharmacologically and non-pharmacologically.

The most common age of menarche was between 12–14 years, reported by 14 respondents (43.8%). Physiologically, menarche is the final outcome of reproductive system maturation controlled by hormonal activity, primarily estrogen and progesterone. Most respondents reported a menstrual duration of 4-7 days (19 respondents, 59.4%). The most common pain duration during menstruation was 1-2 days, experienced by 25 respondents (78.1%), during which the body undergoes an extended inflammatory process that can trigger increased prostaglandin release, intensifying uterine contractions and worsening symptoms of dysmenorrhea, as well as endocrine, emotional, and inflammatory disturbances. The longer the inflammatory process lasts, the greater the likelihood of platelet activation (Fadliyah & Sudiamin, 2022). Mild dysmenorrhea was reported by 19 respondents (59.4%). The severity of dysmenorrhea varies among individuals and is influenced by the intensity of pain, which reflects dominant prostaglandin activity. Most respondents had a normal nutritional status (18 respondents, 56.3%). A normal nutritional status indicates adequate daily nutrient intake to support the body's physiological functions one of the key aspects influencing the menstrual cycle and menstrual pain (W. B. Anika et al, 2024). Furthermore, 23 respondents (71.9%) reported engaging in physical activity less than 1–2 times per week. Insufficient physical activity can hinder the release of endorphins, which act as the body's natural analgesics. Low physical activity also reduces optimal blood circulation, slows uterine inflammation recovery, and promotes increased systemic inflammation (Fadliyah & Sudiamin, 2022). According to (Duttaroy, 2024), regular physical activity can reduce platelet activity by improving blood circulation and decreasing the body's oxidative stress.

Table 2. Tabulation of the Effect of a Combination of Sanyinjiao (SP6) Acupressure and Cinnamon Decoction on Mean Platelet Volume Levels

The Effect of a Combination of Sanyinjiao (SP6) Acupressure and Cinnamon Decoction on Mean Platelet Volume Levels	Mean Platelet Volume Levels					
	Low <150.000 µL		Normal 150.000-400.000 µL		High >400.000 µL	
	n	%	n	%	n	%
Not routine <2x a day	0	0	3	9.4	0	0
Routine 2x a day	0	0	29	90.6	0	0

Table 2, which presents the tabulation of the combination of Sanyinjiao (SP6) acupressure and cinnamon decoction administration on mean platelet volume levels, shows that after the intervention (post-test), all respondents who routinely performed the intervention twice daily

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29 respondents (90.6%) experienced a significant decrease, reaching the normal range (150.000–400.000/µL). This decrease indicates the stabilization of the body's inflammatory and hemostatic systems, as well as the effectiveness of the intervention in suppressing the biological processes that trigger increased mean platelet volume during menstruation. Meanwhile, 3 respondents (9.4%) who did not perform the intervention routinely (<2 times daily) still showed a decrease in laboratory results. This may be due to the body's natural ability to maintain platelet levels within balance, as well as the anti-inflammatory properties of cinnamon and the relaxation effects of SP6 acupressure, which still contributed to reducing platelet levels and keeping them within the normal range.

Table 3. Mean Platelet Volume Levels Before and After Intervention of a Combination of Sanyinjiao (SP6) and Cinnamon Decoction

Levels	*n*	*Mean±SD*	*p-value*	*p-value*
Pre-test				
Rendah <150.000 µL	0			
Normal 150.000-400.000 µL	0	410.56 ± 5.769	0.169 [a]	
Tinggi >400.000 µL	32			
Post-test				0.000 [b]
Rendah <150.000 µL	0			
Normal 150.000-400.000 µL	32	389.06 ± 5.193	0.083 [a]	
Tinggi >400.000 µL	0			

[a] *Shapiro-Wilk* [b] Paired *Sample T-test*

Table 3 shows that before the intervention (pre-test), in the category of high mean platelet volume levels (>400,000 µL), there were 32 respondents (100.0%), with a mean value of 410.56 and a standard deviation of 5.769, and a p-value of 0.169. Meanwhile, after the administration of the Sanyinjiao (SP6) acupressure and cinnamon decoction intervention, the post-test results indicated that platelet levels were within the normal category (150.000–400.000 µL) in 32 respondents (100.0%), with a mean value of 389.06, a standard deviation of 5.193, and a p-value of 0.083.

Discussion

Mean Platelet Volume (MPV) Levels Before the Administration of the Combination of Sanyinjiao (SP6) Acupressure and Cinnamon Decoction

Before the intervention, all respondents in this study had Mean Platelet Volume (MPV) levels categorized as high (>400,000/µL), with a mean value of 410.56 fL. This condition reflects an inflammatory process associated with dysmenorrhea. Epidemiological data also indicate that dysmenorrhea has a very high prevalence among adolescents in Indonesia. According to the Ministry of Health (2021), 72.89% of adolescent girls experience dysmenorrhea, while in East Java the prevalence reaches 93.2%. A preliminary survey conducted in Karang Asem Village in 2024 showed that all 32 respondents experienced dysmenorrhea with varying levels of intensity, thereby emphasizing the importance of addressing this issue in the study location.

Mean Platelet Volume (MPV) Levels After the Administration of the Combination of Sanyinjiao (SP6) Acupressure and Cinnamon Decoction

After receiving Sanyinjiao (SP6) acupressure therapy combined with cinnamon decoction for five consecutive days, consumed twice daily, the Mean Platelet Volume (MPV) levels of all respondents returned to the normal range (150,000–400,000/µL), with a mean value of 389.06

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fL. This finding indicates that the combination therapy was effective in modulating platelet activity and reducing menstrual pain.

In line with the study by (A. Nur Khasanah, 2023), Sanyinjiao (SP6) acupressure is recognized as a traditional therapeutic technique targeting specific pressure points that are highly effective in strengthening the spleen, restoring Yin balance in the liver and kidneys, thereby improving blood circulation, reducing menstrual pain, and lowering prostaglandin levels.

Similarly, cinnamon decoction, consistent with the findings of (Maloto et al., 2022), contains active compounds such as cinnamaldehyde, eugenol, flavonoids, and anticoagulants that possess anti-inflammatory and antioxidant properties. The analgesic content in cinnamon can alleviate menstrual pain, while its anticoagulant properties help prevent blood clotting, which means these compounds act by reducing pro-inflammatory cytokine expression and inhibiting platelet aggregation.

The results of this study demonstrate a correlation between acupressure and cinnamon decoction in reducing mean platelet volume levels, suggesting that this combination is proven to lower MPV levels and stabilize the hematological system of adolescent girls experiencing dysmenorrhea.

The Effectiveness of the Combination of Sanyinjiao (SP6) Acupressure and Cinnamon Decoction on Mean Platelet Volume Levels

The combination of SP6 acupressure and cinnamon decoction was proven to significantly reduce Mean Platelet Volume (MPV) levels, with an average decrease of 21.5 fL. Statistical testing of pre- and post-intervention values showed a significance level of $p = 0.000$, indicating a highly significant difference between laboratory results before and after the intervention. This reduction reflects the stabilization of inflammatory processes and the normalization of platelet activity during menstruation. Practically, this intervention not only alleviates pain but also improves hematological balance, which may enhance both the physical and psychological well-being of adolescents. Although this study employed a one-group design, the measurable outcomes obtained provide strong support for the potential of this complementary approach. Further studies with comparison groups, such as warm compresses or pharmacological therapy, are recommended to confirm the superiority of this intervention.

These findings are consistent with the theory proposed by (Putro Ragil Santoso et al., 2022), which states that MPV levels may increase during menstruation as a physiological response to bleeding through activation of the primary hemostasis system to stop blood flow. However, excessive platelet activation may indicate an imbalance in inflammatory processes, as platelets adhere and aggregate to form clots that close damaged areas (Handayani & Haribowo, 2021). Platelets have a lifespan of only about 5–10 days in circulation. Aged or damaged platelets are cleared by the spleen and replaced with new ones (Putri, 2023). Therefore, interventions that suppress inflammation, such as acupressure and herbal intake with anti-inflammatory effects, may help maintain platelet levels within the normal range.

Sanyinjiao (SP6) acupressure works by stimulating the body's energy meridians, particularly those associated with the spleen, liver, and kidneys, which in traditional Chinese medicine are believed to regulate blood circulation, hormonal balance, and Yin-Yang equilibrium. Stimulation of this point helps relax uterine muscle tension, improve blood flow, and reduce prostaglandin levels, which are responsible for pain and inflammation (A. Nur Khasanah, 2023). The body also releases endorphins, which act as natural pain relievers. In addition, SP6 acupressure therapy has been reported to reduce dysmenorrhea pain for up to three months (Wajo & Rahmawati Sholihah, 2023).

Cinnamon decoction contains bioactive compounds such as cinnamaldehyde, eugenol, and flavonoids that possess anti-inflammatory, anticoagulant, and analgesic properties. These

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compounds work by inhibiting pro-inflammatory cytokine expression and reducing platelet aggregation. The mineral composition of cinnamon includes iron (7.0 mg/g), calcium (83.8 mg/g), chromium (0.4 mg/g), manganese (20.1 mg/g), magnesium (85.5 mg/g), sodium (0.0 mg/g), potassium (134.7 mg/g), and phosphorus (42.2 mg/g). The high potassium content in cinnamon bark helps regulate blood pressure (Sari et al., 2021). In this study, cinnamon decoction contributed to reducing excessive platelet activity and improving blood circulation efficiency, thereby lowering the risk of hypercoagulation and severe menstrual pain (Maloto et al., 2022). Both SP6 acupressure and cinnamon decoction were administered routinely twice a day during the five days of menstruation.

These findings are consistent with the study of (A. Nur Khasanah, 2023), which reported that SP6 acupressure effectively reduces prostaglandin levels, balances the hormonal system, and alleviates menstrual disorders such as primary dysmenorrhea. Similarly, (Maloto et al., 2022) found that cinnamon can reduce menstrual pain and stabilize blood circulation through its anticoagulant and anti-inflammatory effects.

However, this study has several limitations that must be considered in interpreting the results. The study employed a one-group pretest-posttest design without a control group, making it difficult to confirm that the decrease in MPV was solely due to the intervention. Moreover, the short duration of the intervention and uncontrolled external factors such as sleep patterns, physical activity, and daily nutritional intake of respondents may also have influenced the findings.

Conclusion

The results of this study demonstrate that the combination of Sanyinjiao (SP6) acupressure and cinnamon decoction significantly reduces Mean Platelet Volume (MPV) levels in adolescent girls with dysmenorrhea. Administered twice daily for five consecutive days during menstruation, this intervention proved effective in lowering MPV values, indicating a potential reduction in inflammatory processes associated with menstrual pain. These findings suggest that SP6 acupressure combined with cinnamon decoction can serve as a practical, safe, and non-pharmacological approach for managing dysmenorrhea. Future research with larger samples and control groups is recommended to strengthen the evidence and explore its long-term benefits.

Ethics approval and consent to participate

This research has passed the Feasibility test of the Health Research Ethics Commission, Faculty of Health Sciences, PGRI Adi Buana University Surabaya, with number: 146-KEPK dated December 23, 2024.

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