

## Combating Dysmenorrhea: the Effectiveness of Exercise and Effleurage Massage Among Adolescent Girls

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### ABSTRACT

Dysmenorrhea is a condition characterized by menstrual pain, commonly presenting as lower abdominal cramps that may radiate to the back. The primary cause is often linked to hormonal imbalances. Non-pharmacological approaches, such as physical exercise and massage therapy, have been shown to help alleviate the symptoms. This study aimed to evaluate the effectiveness of exercise for dysmenorrhea and effleurage massage in reducing menstrual pain among adolescent girls at the Melak Health Vocational School. A quasi-experimental design with a two-group pre-test and post-test approach was used. The study population included all female students from classes X, XI, and XII, with a total of 48 participants selected through total sampling. Pain intensity was measured using the Numeric Rating Scale (NRS), and the data were analyzed using the Wilcoxon and Mann-Whitney tests. The results indicated that both interventions significantly reduced menstrual pain, with a p-value of 0.000 ( $p < 0.05$ ) for each group. Furthermore, the Mann-Whitney test revealed a significant difference between the two interventions, with a p-value of 0.001 ( $p < 0.05$ ). Exercise for dysmenorrhea demonstrated a greater average effect than effleurage massage, with a mean difference of 11.25. Based on these findings, it is recommended that adolescent girls consider both exercise and effleurage massage as non-pharmacological options for managing menstrual pain, with exercise for dysmenorrhea proving to be the more effective therapy.

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### INTRODUCTION

Dysmenorrhea refers to menstrual pain characterized by lower abdominal cramps that may radiate to the back. (Putri, Wilson and Putri, 2020). Dysmenorrhea is a condition characterized by menstrual pain, particularly cramping in the lower abdomen that may radiate to the back. It is commonly accompanied by

symptoms such as nausea, headaches, dizziness, and fatigue, significantly disrupting daily activities and quality of life, especially among adolescents (Hermaniati and Nofa Anggraini, 2023). Globally, the prevalence of dysmenorrhea in adolescent girls reaches 71.1%, (Armour *et al.*, 2019), while in Indonesia, the prevalence is 64.25%, consisting of 54.89% primary



and 9.36% secondary dysmenorrhea (Arisani and Wahyuni, 2022). A preliminary study conducted on March 15, 2023, at Melak Senior High School revealed that 15 out of 20 students (75%) experienced dysmenorrhea, with most of them relying on medication for pain relief (Februanti *et al.*, 2020).

Primary dysmenorrhea is linked to excessive prostaglandin production, which triggers strong uterine contractions, and is influenced by factors such as family history, high stress, and unhealthy habits like smoking and alcohol consumption (Petraglia *et al.*, 2017; Macgregor *et al.*, 2023). In contrast, secondary dysmenorrhea results from underlying medical conditions such as endometriosis, pelvic inflammatory disease, or uterine abnormalities like fibroids or polyps (Ryan *et al.*, 2023). Dysmenorrhea has a high prevalence among young women and significantly impact on academic performance, with 20.1% reporting absenteeism from school or university and 40.9% reporting decreased concentration and performance in class (Molla *et al.*, 2022). Other impacts of dysmenorrhea in adolescents that are often

experienced physically include nausea-vomiting, dizziness, diarrhea, back pain, fatigue. Psychologically, such as decreased activity levels due to feeling unwell, decreased student achievement scores, increased number of adolescent girls who do not attend school, feelings of anxiety and restlessness (Rahmawati, Dwiningsih and Herawati, 2021). The pain is caused by increased prostaglandin levels during menstruation, leading to strong, uncoordinated uterine contractions, reduced blood flow, and resulting uterine ischemia or hypoxia (Thiyagarajan, Basit and Jeanmonod, 2022).

Management of dysmenorrhea includes both pharmacological and non-pharmacological approaches. NSAIDs are the first-line drugs for pain relief (Barassi *et al.*, 2018). While non-pharmacological methods such as physical therapy, massage, yoga, and relaxation exercises have also been shown to effectively reduce menstrual pain (López-Liria *et al.*, 2021). One of the physical therapies that can reduce dysmenorrhea pain is by doing efflurage massage. This technique plays a role in reducing tissue hypoxia by increasing



oxygen levels, thereby helping to reduce pain. Effleurage massage is done by rubbing the skin on the abdomen using the fingertips. The rubbing is done by making a pattern that resembles butterfly wings on the surface of the skin and is adjusted to the rhythm of breathing. This massage technique can improve blood circulation, provide a warm effect on the abdominal muscles, and help the body to relax more (Lailatun, 2023). In addition to massage, desminor exercise activities can help reduce pain during uterine muscle contractions by training the pelvic floor muscles to stretch and widen blood vessels, so that oxygen can be distributed to the reproductive organs that are experiencing spasms (Brown and Brown, 2017). Both interventions are non-invasive, low-risk, and accessible options, making them suitable alternatives to pharmacological treatments for adolescent girls.

Based on the background described, this study aims to explore the effectiveness of exercise and effleurage massage in reducing dysmenorrhea among female adolescents at Melak Vocational School, West Kutai, East Kalimantan. Specifically, this research is

conducted to determine and compare the effectiveness of exercise and effleurage massage in reducing the intensity of menstrual pain experienced by adolescent girls.

## **RESEARCH METHODS**

This study is a quantitative study with a quasi-experimental method using a two-group pre-test and post-test design approach consisting of 2 groups, each of which was given a different intervention. The first group was given an exercise or menstrual gymnastics intervention and the second group was given an effleurage massage intervention by being given measurements before and after the intervention.

This study was conducted on female adolescents at the Melak Vocational School, West Kutai, East Kalimantan in June-November 2023. The sampling technique was total sampling was chosen due to the relatively small and manageable number of the target population, totaling 48 female students with dysmenorrhea. This approach allowed for the inclusion of the entire accessible population to



enhance data representation and reduce sampling bias.

The instruments used were the Numeric Rating Scale (NRS) observation sheet and standard operational procedure for both effleurage massage and dysmenorrhea-targeted exercise to ensure standardized and safe interventions. Trained facilitators provided instruction and demonstrations, enabling participants to perform the techniques independently during the intervention period.

The exercise group, group followed an standard operational procedure consisting of dysmenorrhea-focused physical movements such as pelvic tilts, knee-to-chest stretches, deep breathing exercises, and gentle abdominal stretches. That aimed to relax the pelvic muscles, improve blood circulation, and reduce uterine muscle spasms. The sessions were conducted 3 times a week for 10 minutes each, regardless of menstrual cycle phase, to build flexibility and reduce pain anticipation (before the menstruation). While In the efflurage massage group, the massage was applied for 3–5 minutes once daily, starting on the first day of menstruation and repeated on the

second day if dysmenorrhea symptoms persisted. Only participants who were confirmed to be menstruating and experiencing dysmenorrhea received the intervention. After receiving prior training from a facilitator, participants performed the massage independently; however, the implementation was still monitored to ensure proper technique and safety.

Data analysis to assess the difference in dysmenorrhea pain before and after the intervention was carried out using the Wilcoxon test. While the analysis test carried out to assess the effectiveness between exercise or gymnastics intervention and effleurage massage intervention was carried out using the Mann Whitney test.

This study has passed ethical review by the Health Research Ethics Commission of Universitas Muhammadiyah Lamongan and has obtained ethical clearance with certificate number : No 262 / EC / KEPK – S1 / 05 / 2023



## RESULTS AND DISCUSSION

Based on research conducted on 48 respondents, the following results were obtained:

**Table 1. Respondents' Characteristics**

Characteristics	Exercise		Effleurage	
	<i>n</i>	%	<i>n</i>	%
Age at Menarche				
<10 years	3	12.5	2	8.3
11–13 years	16	66.7	19	79.2
>14 years	5	20.8	3	12.5
Total	24	100.0	24	100.0
Menstrual Cycle				
<21 days	3	12.5	3	12.5
21–35 days	13	54.2	16	66.7
>35 days	8	33.3	5	20.8
Total	24	100.0	24	100.0
Duration of Menstruation				
<2 days	0	0.0	0	0.0
3–7 days	21	87.5	20	83.3
>8 days	3	12.5	4	16.7
Total	24	100.0	24	100.0

In the characteristics of the respondents' menarche age, the majority of respondents in both groups experienced menarche at the age of 11-13 years. Research on the relationship between age of menarche and the incidence of dysmenorrhea has been conducted in various countries with fairly consistent results. Dysmenorrhea, or menstrual pain, research shows that an earlier age of menarche is associated with an increased risk of dysmenorrhea. Adolescents who experience menarche earlier are more likely to experience

primary dysmenorrhea (Matchock, 2023).

In the characteristics of the respondents' menstrual cycle, the majority of respondents in both groups had a cycle of 21-35 days. The results of previous studies showed that respondents with irregular menstrual cycles were at greater risk of experiencing primary dysmenorrhea. Irregular menstrual cycles can be caused by several factors, one of which is psychological factors, namely stress. Women who experience stress will cause an increase in the production of prostaglandins which are mediators of pain in primary dysmenorrhea (Zairina and Utomo, 2023)

In the characteristics of the respondents' menstrual period, the majority of respondents in both groups experienced menstruation for 3-7 days. Previous studies have shown that the duration or length of menstruation does not have a significant relationship with the incidence of dysmenorrhea. (Hendianti *et al.*, 2022)



**Table 2. Level of Menstrual Pain Before and After Exercise for Dysmenorrhea Exercise for Dysmenorrhea Group**

Pain Level	Pre-test		Post-test		Wilcoxon
	n	%	n	%	
No pain	0	0.0	0	0.0	p-Value 0.000
Mild pain	0	0.0	12	50.0	
Moderate pain	11	45.8	10	41.7	
Severe pain	13	54.2	2	8.3	
Total	24	100.0	24	100.0	

Based on Table 2, it can be concluded that, of the 24 respondents in the group given the exercise for dysmenorrhea intervention, the majority of adolescents experienced severe pain, as many as 13 respondents (54.2%) before the exercise was carried out and after the exercise, the majority of respondents experienced mild pain, as many as 12 respondents (50.0%).

The results of this study are in line with previous research in Yogyakarta, which found that before dysmenorrhea exercises were carried out in the treatment group, the majority of respondents experienced moderate pain of 46.7%. Meanwhile, after dysmenorrhea exercises were carried out in the treatment group, most respondents experienced mild pain of 80% (Trisnawati and Mulyandari, 2020).

During exercise, the body experiences increased physical activity

and metabolism. This makes the muscles work more intensely, so the body requires more energy and oxygen. In response to physical activity, the brain, especially the pituitary gland and hypothalamus, produces endorphins. Increased endorphins function to help the body reduce pain and discomfort (Preeti and Jagga, 2024).

These endorphins bind to opioid receptors in the brain, which can reduce the perception of pain. The way it works is similar to painkillers, but endorphins are natural substances produced by the body (Kusuma, Hikmanti and Yanti, 2023).

**Table 3. Level of Menstrual Pain Before and After Effleurage Massage Effleurage Massage Group**

Pain Level	Pre-test		Post-test		Wilcoxon
	n	%	n	%	
No pain	0	0.0	4	16.7	p-Value 0.000
Mild pain	2	8.3	17	70.8	
Moderate pain	19	79.2	3	12.5	
Severe pain	3	12.5	0	0.0	
Total	24	100.0	24	100.0	

Based on Table 3, it can be concluded that, of the 24 respondents in the group given efflurage massage intervention, the majority of adolescents experienced moderate pain, as many as 19 respondents (79.2%) before efflurage massage was performed and after efflurage massage, the majority of



respondents experienced mild pain, as many as 17 respondents (70.8%).

The results of this study are in line with previous research conducted by Devi on the effect of effleurage massage therapy on reducing menstrual pain in adolescent girls in Klaten. The results of the study explained that the pain scale of respondents in the experimental group after effleurage massage was a minimum pain scale of 1, a maximum value of 4, with an average pain scale of  $2.24 \pm 0.970$ , while the second measurement of the minimum pain scale was 2, a maximum value of 5, with an average pain scale of  $3.71 \pm 1.047$ . The results of data analysis using the Mann Whitney test obtained  $P_v = 0.00 < \alpha = 0.05$ . from this explanation it can be concluded that effleurage massage therapy has an effect on reducing menstrual pain (Sari, Sat and Hamranani, 2019).

Through effleurage massage, hypoxia that occurs in the tissue will be reduced because the oxygen levels in

the tissue increase, so that the pain felt will be reduced. This increase in oxygenation promotes better blood circulation, facilitates the removal of metabolic waste products, and enhances the delivery of nutrients to the affected area, all of which contribute to muscle relaxation and a decrease in pain perception, ultimately leading to improved comfort and overall well-being (Retni, Harismayanti and Umani, 2023).

In addition, this massage can also increase blood circulation, reduce stress, and relieve stiff muscles. After being massaged, endorphins will be released which can increase the pain threshold so that the pain will feel lighter (Hidayati *et al.*, 2024). Effluorage massage can reduce pain by deactivating the defense mechanism in the nervous system, known as the gate control theory. This theory states that stimulation of nerve fibers that transmit painless sensations can inhibit or reduce the transmission of pain impulses (Argaheni, 2021).

**Table 4. Effectiveness of Exercise for Dysmenorrhea and Effleurage Massage**

Intervention Group	<i>n</i>	Mean	Sum of Ranks	Asymp. Sig. (2-tailed)
Exercise for Dysmenorrhea	24	30.13	732.00	
Effleurage Massage	24	18.88	453.00	p-value = 0.001
Total	48			



Based on Table 4, the results of the Mann Whitney test analysis above show that the P-value is 0.001 ( $P < 0.005$ ), this indicates that  $H_1$  is accepted, meaning there is a significant difference between the 2 groups in reducing menstrual pain. From the table above, it can also be seen that the average menstrual pain in exercise for dysmenorrhea is 30.13 and efflurage massage is 18.88, so it can be concluded that exercise therapy for dysmenorrhea is more effective for reducing menstrual pain.

The results of this study are in line with the research conducted by Nandini which stated that the average value of the pain scale before being given Abdominal Stretching Exercise was 4.67, and after being given it decreased to 3.78. Meanwhile, the average value of the pain scale before being given Effleurage Massage was 4.94, and after it became 4.83. Based on the results of the analysis test, the p Value  $\alpha$  (asympt. Sign. 2-tailed) value was obtained at 0.000, so it can be concluded that Abdominal Stretching Exercise is more effective in reducing dysmenorrhea pain in adolescents at Pondok Putri

Hafshawaty Pesantren Zainul Hasan (Nursyamsiana and Kusyairi, 2024)

Menstrual pain or dysmenorrhea, arises from a complex interaction between physiological and neurobiological mechanisms. Prostaglandins produced by the endometrium will stimulate contractions in the uterus, this will cause ischemia in the tissue and cause pain. This condition affects 50% to 90% of women during menstruation. Fluctuations in sex hormones throughout the menstrual cycle can modulate pain perception, with increased sensitivity to pain noted during the menstrual phase (Obuchowska *et al.*, 2022)

Exercise has been shown to reduce menstrual pain through a variety of physiological mechanisms, primarily involving hormonal and inflammatory responses. Exercise can increase progesterone levels, which inversely correlates with prostaglandin production, thereby reducing uterine contractions and pain. High-intensity exercise has been associated with decreased levels of inflammatory cytokines such as  $TNF-\alpha$ , which further contribute to pain relief (Kannan, Cheung and Lau, 2019). Physical



activity triggers the release of endorphins, natural pain relievers that improve mood and reduce discomfort (Tyas *et al.*, 2023).

Efflurance massage reduces menstrual pain by stimulating tactile fibers in the skin, inhibiting pain signals, and activating the gate control theory to regulate pain impulses in the central nervous system (Pramesti and Sudaryanto, 2024). In addition, efflurance massage can stimulate the release of endorphins, reduce menstrual pain by reducing cramps due to uterine hypoxia in primary dysmenorrhea through gentle muscle stroking (Ariani, Septiani and Solama, 2023). Gentle stroking during massage can increase blood circulation so that it can reduce tissue ischemia. This will reduce pain and increase relaxation (Emelya *et al.*, 2023).

Based on the results of the explanation in the discussion, the researcher evaluated that the intervention of exercise gave more effective results in reducing menstrual pain because when someone does exercise, there will be an increase in metabolism, cardiac output and an increase in body oxygen levels. This is

what is able to provide a more significant effect in reducing menstrual pain. On the other hand, although the provision of effleurage massage provides a more instant pain reduction effect, which is caused by the provision of tactile stimulation which will block the pain impulse so that the respondent will immediately feel comfortable. However, this condition will not last for a long time.

This study use two non-pharmacological interventions (exercise and effleurage massage). Which are a low-cost, safe, and easy to implement by adolescents. The study also applied a structured SOP and provided training, allowing participants to perform the interventions independently while maintaining standardization. In addition, the comparison of two interventions provides valuable insights into their relative effectiveness in managing dysmenorrhea. However, the study also has some limitations. The pain-reducing effect of effleurage massage, although immediate, tends to be short-term and may not offer lasting relief compared to exercise. Another limitation is the reliance on self-reported pain levels, which are



subjective and may vary among individuals. Furthermore, the study was conducted within a single school setting with a limited number of participants, which may limit the generalizability of the findings to broader populations.

## CONCLUSIONS

The results of this study indicate that both exercise and effleurage massage significantly reduced dysmenorrhea pain among female adolescents, with exercise showing a more consistent and lasting effect. Although the study was conducted in a single school with a limited sample, the interventions used are simple, low-cost, and can be applied widely without requiring advanced equipment or medical supervision. Therefore, the findings have the potential to be generalized to other adolescent populations in similar educational or community settings, particularly where access to pharmacological treatments is limited.

This study contributes to the growing evidence supporting non-pharmacological approaches to menstrual pain management and can serve as a reference for health

promotion programs targeting adolescent girls. Further studies involving larger and more diverse populations are recommended to strengthen the external validity and applicability of these findings across different cultural and regional contexts.

Suggestions for the community, especially adolescents, this study can be used as one of the information in the health sector to handle menstrual pain non-pharmacologically. Meanwhile, for institutions and further researchers, this study can be used as a source of reference and also as one of the media for scientific development.

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