

# COMPARISON OF THE EFFECTIVENESS OF SHIATSU MASSAGE THERAPY AND ABDOMINAL STRETCHING EXERCISE ON REDUCING THE LEVEL OF PRIMARY MENSTRUAL PAIN (DYSMENORRHEA) IN ADOLESCENT GIRLS

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**Abstract**

**Background:** Menstruation in adolescents is often accompanied by dysmenorrhea, affecting 40–80% and causing discomfort and absenteeism. Non-pharmacological methods like Shiatsu massage and abdominal stretching are effective, safe alternatives to medication. **Objective:** This study aimed to evaluate the effectiveness of shiatsu massage and abdominal stretching exercises in reducing primary dysmenorrhea among adolescent girls. **Methods :** A quasi-experimental design with a pre-post test two-group comparison was employed. Sixty-six adolescent girls with primary dysmenorrhea were purposively selected and divided into two groups: one received shiatsu massage therapy, and the other performed abdominal stretching exercises. Data were analyzed using the Wilcoxon and Mann-Whitney tests with a significance level set at  $p < 0.05$ . **Results :** Showed that both interventions significantly reduced menstrual pain ( $p = 0.000$ ). However, the shiatsu group experienced a greater average pain reduction (2.36 points) compared to the stretching group (1.55 points). **Conclusion :** The results of this study indicate that shiatsu massage therapy demonstrates a greater effectiveness in alleviating primary menstrual pain, commonly referred to as dysmenorrhea, when compared to abdominal stretching exercises, exhibiting a notable difference of 0.8 points in pain reduction between the two interventions. **Suggestion:** This intervention can be used in midwifery and healthcare settings, with Shiatsu materials serving as educational tools for adolescents on dysmenorrhea and reproductive health.

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## 1. Introduction

Reproductive health constitutes a critical area of concern that warrants significant attention, particularly among adolescents, as they represent the forthcoming generation of our society. The adolescent phase is characterized by a multifaceted transition from childhood to adulthood, encompassing not only significant biological transformations but also profound psychological and social changes that can impact their overall well-being and future development.<sup>1</sup> Numerous typical biological transformations transpire during adolescence for both boys and girls. Among these developmental changes, one of the most significant biological markers of maturity in females is the onset of menstruation, which not only signifies physical growth but also heralds the commencement of reproductive capability.

Menstruation, often referred to as the menstrual cycle, represents a complex physiological transformation in the female body that occurs at regular intervals and is intricately regulated by various reproductive hormones, reflecting the body's preparation for potential pregnancy and the overarching intricacies of the female reproductive system.<sup>2</sup> The phenomenon of menstruation often engenders numerous questions in the minds of adolescent girls, primarily because they frequently find themselves unprepared to navigate the complexities of these changes. Moreover, the onset of menstruation is accompanied by various challenges, one of which is the experience of menstrual pain, commonly known as dysmenorrhea, which can significantly affect their physical well-being and overall quality of life during this critical developmental phase.<sup>3</sup>

Dysmenorrhea is characterized by discomfort or cramping pain localized in the lower abdomen, which arises from uterine muscle spasms and can significantly hinder normal daily activities, thereby necessitating appropriate treatment. This condition is classified into two distinct categories: primary dysmenorrhea, which refers to menstrual pain that occurs in the absence of any identifiable organic pathology, and secondary dysmenorrhea, which is specifically associated with menstrual pain resulting from underlying gynecological disorders or conditions.<sup>4</sup>

Primary dysmenorrhea typically manifests in women of reproductive age approximately three to five years following the onset of menarche, particularly among those who have never experienced pregnancy. Nationally, data indicates that the average age of menarche among Indonesian children is between 13 and 14 years, affecting around 37.5% of this population. Consequently, it can be inferred that the incidence of dysmenorrhea is likely to arise in adolescents aged 16 to 17 years, a developmental stage during which these individuals are usually engaged in high school education or its equivalent.<sup>5</sup>

Dysmenorrhea represents a significant gynecological concern frequently reported by a substantial proportion of young women, with estimates indicating that between 40% to 80% of this demographic experiences its symptoms. Moreover, the global prevalence of dysmenorrhea exhibits considerable variation, ranging from 1.7% to as high as 97%, a discrepancy that can largely be attributed to differences in research methodologies and population demographics, including ethnic backgrounds and sociocultural factors, as well as variations in the definitions employed to characterize dysmenorrhea. For instance, studies conducted in Turkey reveal a notably high prevalence of dysmenorrhea, with figures ranging from 50% to 90%; similarly, research from Georgia reports a prevalence rate of 55.5%, while in India, the prevalence stands at approximately 71.4%, with 20% of those affected suffering from severe dysmenorrhea that significantly impairs their ability to carry out daily activities.<sup>6</sup>

The precise incidence of dysmenorrhea across Indonesia remains largely undocumented; however, it is estimated that approximately 64.25% of the female population experiences this condition, with a breakdown indicating that 54.89% suffer from primary dysmenorrhea and 9.36% from secondary dysmenorrhea. Nonetheless, it is essential to note that this statistic may not accurately represent the true prevalence of the condition, as not all individuals experiencing menstrual pain seek medical treatment. In Indonesia, it is primarily primary dysmenorrhea that is encountered most frequently among women suffering from menstrual discomfort.<sup>7</sup>

Preliminary studies were conducted at SMA 5 Karawang, the results of interviews with 15

female students who experienced dysmenorrhea during menstruation found that 4 students reduced the pain by lying down in the UKS and smeared with eucalyptus oil, 3 students reduced the pain by drinking warm water, 5 students reduced the pain by taking analgesics, and 3 students reduced the pain by not making any effort, just left it alone. Meanwhile, shiatsu therapy and physical exercise, especially abdominal stretching exercise, have never been done. They said this condition disturbed their concentration in class and made them lazy to do activities. According to the head of PMR (Palang Merah Remaja), the average student who experiences dysmenorrhea complains of abdominal pain accompanied by dizziness, weakness and there are even some students who faint when they really can't bear the pain, some are forced to miss school and permission to go home due to dysmenorrhea.

Several opinions have been proposed by researchers regarding the cause of primary dysmenorrhea. The first opinion states that the cause of primary dysmenorrhea is still unknown,<sup>8</sup> while the second opinion states that menstrual pain is caused by an increase in prostaglandins (PG) and leukotrienes in the endometrium shortly before menstruation occurs. The elevation of uterine prostaglandins, which are synthesized as a result of cyclooxygenase (COX)-2 activity that is induced by proinflammatory cytokines, contributes to the mediation of the inflammatory response; this process ultimately results in increased myometrial contractility, uterine ischemia, heightened sensitivity of pain fibers, and, consequently, the experience of pain during menstruation. Moreover, the study's findings demonstrated that women experiencing primary dysmenorrhea exhibit significantly higher concentrations of both prostaglandins and leukotrienes within the endometrial tissue compared to those who do not suffer from menstrual pain, thereby suggesting a potential biochemical basis for the severity of symptoms associated with this condition.<sup>9</sup>

The symptoms associated with dysmenorrhea encompass a range of discomforts, including cramping and pain in the lower abdomen, lower back pain, as well as gastrointestinal disturbances such as nausea, diarrhea, and vomiting; additionally, individuals may experience fatigue, faintness, weakness, and headaches. Notably, certain demographic factors increase the likelihood of developing dysmenorrhea, particularly in women who are overweight, those who smoke, and those who began menstruating before the age of eleven. Furthermore, research indicates that women who consume alcohol during their menstrual periods are prone to experiencing an exacerbation of dysmenorrhea, resulting in prolonged episodes of pain and discomfort.<sup>10</sup>

Dysmenorrhea can cause activity limitations, decreased efficiency and absenteeism at work.<sup>10</sup> The repercussions of dysmenorrhea among adolescent girls can manifest in the short term through school absenteeism, as those who experience menstrual pain often find themselves compelled to curtail their daily activities, particularly those related to academic engagement. In instances where students are afflicted by dysmenorrhea during their menstrual cycles, their ability to participate fully in educational activities becomes significantly hindered, leading to disruptions in their learning process and, in some cases, resulting in their absence from school altogether.<sup>11</sup>

In a study at a University in Italy, of the 84.1% prevalence of adolescents experiencing dysmenorrhea, there were 55.2% of adolescents with dysmenorrhea who needed treatment, 31.9% of adolescents with dysmenorrhea absent from school and 25.3% of adolescents with dysmenorrhea who needed treatment and absent from school.<sup>12</sup> Research conducted in Indonesia by Wagito et al. stated that adolescent girls in Medan City showed that 10.4% of adolescent girls did not go to school because of dysmenorrhea. Based on these adverse effects, dysmenorrhea must be treated immediately.<sup>12</sup>

Some efforts have been made by women to reduce the symptoms of menstrual pain by taking pain relieving drugs (analgesics) of the Non Steroid Anti Inflammatory Drug (NSAID) class such as mefenamic acid, ibuprofen, metamizole and other pain relievers. Most adolescent girls who experience menstrual pain do not consult health workers or go to the doctor, they treat the pain with over-the-counter drugs without a doctor's prescription. It has been studied that 30-70% of adolescent girls treat their menstrual pain with over-the-counter pain medications, which can

be harmful due to the adverse drug effects associated with the use of NSAIDs, including abdominal pain, diarrhea, nausea, and liver or kidney damage after stopping treatment. Therefore, non-pharmacological methods are a safer alternative with no side effects.<sup>13</sup>

Management of dysmenorrhea in general can be done through pharmacological and nonpharmacological methods.<sup>13</sup> Pharmacological therapy is a therapy that can help reduce dysmenorrhea by taking nonsteroidal anti-inflammatory drugs (NSAIDs) which are able to block the synthesis of prostaglandins through inhibition of the cyclooxygenase enzyme so that the conversion of arachidonic acid into prostaglandins is disrupted. Some research results support the effectiveness of using pharmacological agents such as NSAIDs or the use of oral contraceptives to reduce menstrual pain, but side effects in some women such as nausea, indigestion, diarrhea, and fatigue. It is estimated that 25% of patients using NSAIDs experience some side effects and 5% of them experience serious health developments such as gastric bleeding, acute renal failure and others. Therefore, many patients with primary dysmenorrhea seek nonpharmacological treatment such as the use of complementary/alternative medicine which is becoming widespread in medical practice.<sup>13</sup>

Nonpharmacological therapy is a therapy that can help reduce dysmenorrhea consisting of hot compresses, distraction, relaxation, skin stimulation techniques such as massages and physical exercise or exercise. Nonpharmacological methods are the method of choice for patients who do not respond well to medication or experience problems due to side effects and patients who do not want to take drugs. Nonpharmacological treatments are safer to use because they do not cause side effects of drugs. So massage with shiatsu and exercise with abdominal stretching exercise can be used to reduce menstrual pain.<sup>14,15</sup>

Shiatsu is a complementary and alternative medicine therapy developed in Japan over thousands of years. The massage technique uses finger pressure to harmonize Qi or life energy along pathways known as meridians. In eastern medicine, dysmenorrhea is a disorder of Qi circulation, so the therapy aims to improve Qi circulation. Shiatsu aims to improve blood circulation, calm the nervous system, relieve muscle stiffness, relieve stress and promote physical and mental relaxation. Shiatsu also helps the body release endorphin (the love hormone or happy hormone), one of the hormones that acts as the body's natural analgesic (painkiller).<sup>3</sup> Shiatsu massage therapy and abdominal stretching exercises alleviate primary menstrual pain through physiological and neurological mechanisms. Shiatsu applies targeted pressure to acupuncture points (e.g., thumb-webbing, between toes, and ankle areas) to stimulate energy flow, relax uterine muscles, and reduce prostaglandin-induced contractions. This pressure also triggers endorphin release, the body's natural painkillers, while activating the gate control mechanism to block pain signals.<sup>16</sup> Concurrently, abdominal stretching enhances pelvic oxygenation and lymphatic drainage, reducing muscle spasms and ischemia caused by uterine hyperactivity. Both methods improve blood circulation to the pelvic region, mitigating cramping severity, while stretching further elongates tense abdominal muscles for mechanical relief. Combined, these interventions address pain through biochemical modulation, neuromuscular relaxation, and enhanced hemodynamics.<sup>17</sup>

In Indonesia, the regulation of complementary therapies has been established under PERMENKES No. 1109/Menkes/Per/IX/2007, which delineates various manual healing methods that encompass chiropractic care, healing touch, tuina, shiatsu, osteopathy, and massage. Additionally, research conducted by Nurul indicated a significant effect of Shiatsu massage on alleviating menstrual pain among adolescents, demonstrating that those who undergo Shiatsu massage report a noticeable reduction in the intensity of their pain during menstruation. This suggests a potential therapeutic benefit of incorporating Shiatsu massage into the management of menstrual discomfort in this demographic.

One effective approach to alleviating the discomfort associated with dysmenorrhea, characterized by its minimal side effects, is the incorporation of regular physical exercise. Among various forms of exercise, abdominal stretching stands out as a beneficial physical activity that not only focuses on elongating the abdominal muscles but also serves as a relaxation technique, which has been shown to contribute significantly to pain reduction.<sup>3</sup> This

phenomenon can be attributed to the elevation of endorphin levels, which are synthesized by the brain as a direct result of engaging in physical exercise. The heightened presence of this hormone is known to mitigate or alleviate the perception of pain, resulting in a greater sense of comfort and happiness, while simultaneously enhancing the delivery of oxygen to the muscles. Furthermore, research conducted by Sorimin supports this assertion, indicating that exercise not only promotes increased blood flow within the pelvic region but also stimulates the production of endorphins in the body, ultimately leading to a significant reduction in the experience of pain.<sup>16</sup> Each of these nonpharmacological complementary therapies has demonstrated efficacy in alleviating primary dysmenorrhea among adolescents, thereby indicating the necessity for their implementation in community-based management strategies for this condition. Consequently, researchers have developed an interest in conducting a comparative analysis of the effectiveness of Shiatsu massage therapy versus abdominal stretching exercises in reducing the intensity of primary menstrual pain (dysmenorrhea) specifically in adolescent females, aiming to ascertain which approach yields superior outcomes in pain reduction.

## **2. Methods**

Methods should be structured as follows:

### **2.1 Research design**

This research design uses a *quasi-experimental* approach with a *two group comparison pre-post test design*. This research design uses two intervention groups, namely the first intervention group (the group given treatment, namely the group given shiatsu massage) and the second intervention group (the group given *abdominal stretching exercise* treatment). *Pre test and post test* were conducted on both intervention groups. The results before and after the intervention will be compared between the first and second intervention groups.

### **2.2 Setting and samples/participants**

The population studied in this research comprised female students from SMA 5 Karawang who were afflicted with primary dysmenorrhea characterized by mild to moderate levels of severity in the year 2024. The sample was specifically drawn from female students who not only experienced primary dysmenorrhea but also met the established inclusion criteria essential for the study. To select participants, the researchers employed a sampling technique whereby all research subjects who fulfilled the requisite criteria were incorporated into the study, ensuring a targeted and relevant population for analysis. The sampling technique employed in this study was purposive sampling, which involved selecting participants whose characteristics aligned with the established inclusion criteria and who satisfied the minimum requirements set for respondents. The distribution of the sample was categorized into two distinct groups: the Shiatsu intervention group and the abdominal stretching exercise intervention group. Furthermore, the determination of the research sample size was guided by a formula designed to assess the difference in averages between two populations. Following the calculations based on this formula, a total of 30 samples was obtained for each intervention group. However, accounting for a potential dropout rate of 10%, the requisite sample size was adjusted to 33 individuals per group to ensure the integrity and validity of the research findings.

#### **a. Inclusion Criteria**

The inclusion criteria in this study were as follows:

- 1) adolescent girls who experience primary dysmenorrhea at SMA 5 Karawang;
- 2) had primary dysmenorrhea with mild and moderate pain;
- 3) did not use pharmacological therapy during the study;
- 4) have regular menstrual cycles for the past 3 months (21-35 days).

#### **b. Exclusion Criteria**

Exclusion criteria in this study are:

- 1) suffering from certain gynecological diseases (secondary dysmenorrhea);
- 2) schoolgirls who experience menstrual pain and are using pharmacological therapy.

### c. Drop Out Criteria

Samples will be excluded from the study if they experience one or more of the following criteria during the study:

- 1) do not report and come when they first experience menstrual pain;
- 2) did not want to be a respondent during the study by resigning.

### 2.3 Intervention (applies to experimental studies)

This study was conducted at SMA 5 Karawang from February to March 2024, with the aim of evaluating the effectiveness of two nonpharmacological therapy methods in reducing primary menstrual pain (dysmenorrhea) in female students. The interventions provided in this study include shiatsu massage and abdominal stretching exercise. The intervention process is carried out through several systematic stages, starting with initial measurement, followed by treatment, and ending with evaluation after treatment. In the first stage, before the treatment was given, respondents were asked to immediately contact the researcher on the first day they experienced menstrual pain. The researcher then conducted an interview to ask about the degree of pain felt by the respondents and asked them to fill out a pain level measurement sheet using the Numerical Rating Scale (NRS). This measurement serves as important baseline data to compare the results after the intervention. After the initial measurement, the second stage was treatment. Respondents were randomly divided into two intervention groups.

The first group received shiatsu massage therapy, in which the researcher performed the massage technique according to predetermined procedures. Meanwhile, the second group followed the abdominal stretching exercise, where the researcher provided a structured movement guide to ensure all participants could carry out the exercise correctly. After the treatment was completed for each group, the third stage involved the re-measurement of menstrual pain levels using the NRS sheet. Respondents were asked to fill out the menstrual pain level measurement sheet again, and the researcher then evaluated the results of both intervention groups. The entire intervention process was carried out directly by the researcher, who ensured that each step was carried out consistently and in accordance with the established research protocol. The study did not include a no-treatment control group, as the main focus was to compare the effectiveness between the two types of interventions. With this approach, the study aims to provide scientific evidence regarding the effectiveness of shiatsu massage and abdominal stretching exercise in helping to reduce primary dysmenorrhea in adolescent girls.

### 2.4 Measurement and data collection

In this study, the type of data used was primary data collected directly from female students who experienced primary dysmenorrhea with mild to moderate pain levels. This study focuses on two intervention groups, namely shiatsu and abdominal stretching exercise, to evaluate the effectiveness of each method in reducing menstrual pain. To collect data regarding the variable of primary menstrual pain (dysmenorrhea), the instrument used was a pain measurement scale, namely the Numerical Rating Scale (NRS). Measurements were taken before and after shiatsu and abdominal stretching exercise interventions on female students who met the inclusion criteria. By using the NRS, researchers can accurately measure the level of pain experienced by respondents. The data collection process was carried out in two stages. In Phase I, case selection was carried out by gathering respondents in one place or classroom. The researcher then socialized the purpose of the study and selected samples that met the inclusion criteria. Questionnaires were distributed to students who were willing to participate, and they were asked to sign an informed consent letter. Next, the researcher explained how to fill out the questionnaire regarding dysmenorrhea and the NRS sheet, and provided information about the intervention to be carried out. A total

of 66 respondents who met the inclusion criteria were randomly divided into two groups, each consisting of 33 people, and all participants were included in the WhatsApp group or contacted via SMS. Phase II involved the allocation of treatment to each group. Before treatment, respondents were told to contact the researcher immediately when experiencing menstrual pain on the first day of menstruation. They were then asked to fill out a pain level measurement (NRS) sheet according to their group assignment. After that, the researcher gave the treatment: shiatsu massage for the shiatsu group and abdominal stretching exercise for the other groups. After the treatment was completed, menstrual pain assessment was carried out again using the NRS sheet, and respondents were asked to fill in the menstrual pain level measurement sheet. Finally, an evaluation phase was conducted to assess the results of both intervention groups.

## 2.5 Data analysis

In the context of this study, the data analysis was carried out utilizing two distinct methodologies: univariate analysis and bivariate analysis. The primary objective of the univariate analysis was to elucidate the characteristics of the respondents while concurrently identifying any potential influences within the two treatment groups. The presentation of the respondents' characteristics was rendered in a descriptive format, encompassing a range of variables, including age, the onset age of menarche, the duration of menstruation, relevant family medical history, and body mass index (BMI), thereby providing a comprehensive overview of the demographic and physiological factors under consideration. In order to ascertain the presence or absence of an effect between the paired groups, this study employed a paired t-test, contingent upon the assumption that the data obtained adhered to a normal distribution. Conversely, in instances where the data did not conform to the criteria of normality, the Wilcoxon signed-rank test was utilized as an alternative analytical method. Given that the data collected in this study failed to satisfy the normality assumption, the researcher opted to implement the Wilcoxon test accordingly. Additionally, bivariate analysis was performed to explore the nature of the relationship between the independent and dependent variables, thereby providing insights into any significant influences that may exist between them. The analytical method employed in this study predominantly utilized the independent t-test, applicable in scenarios where the data distribution is determined to be normal. In contrast, should the data distribution exhibit non-normal characteristics, the Mann-Whitney U test is employed as an alternative statistical approach. In this particular investigation, the researcher encountered unpaired data with an abnormal distribution; therefore, the decision was made to utilize the Mann-Whitney U test as the preferred method of analysis. Furthermore, the threshold for statistical significance was established at a p-value of less than 0.05, thus indicating a significant relationship exists between the variables under examination.

## 2.6 Ethical considerations

In this study, ethical considerations are a very important aspect, considering that the subjects used are humans. This consent includes various ethical aspects that must be considered to protect the rights and welfare of participants. One of the ethical principles applied is beneficence, where researchers are committed to maximizing the benefits of research and minimizing potential harm to respondents. In this context, research subjects are expected to experience a decrease in the scale of primary menstrual pain (dysmenorrhea) through the intervention of shiatsu techniques and abdominal stretching exercise as non-pharmacological therapy. The principle of non-maleficence is also applied to ensure that no action harms the respondents. Researchers always pay attention to the comfort of the environment and treatment of respondents. If there are side effects related to the treatment, the researcher will provide help according to the procedure, with the cost of help borne by the researcher. Furthermore, the principle of respect for persons emphasizes the right of respondents to make their own choices and the right to information disclosure. This research is voluntary, where respondents have the right to participate or not without coercion. They were given clear information regarding the background, purpose, procedure, benefits,

voluntariness, and possible risks. Upon completion of the study, respondents received a gift as an expression of gratitude for their participation. The principle of justice underscores the importance of treating all respondents fairly. The selection of respondents was done randomly based on inclusion criteria, ensuring a fair and non-discriminatory selection process. Researchers always discuss the risks and benefits of the study and provide equal treatment to each respondent without compromising the quality of the intervention provided. The study received ethical approval from the Dharma Husada Health College, with ethics permit number 010/KEPK/SDHB/B/I/2024. This approval ensures that all procedures involving human subjects were reviewed and deemed ethically appropriate, including informed consent, confidentiality, and the right of participants to withdraw from the study at any time.

### 3. Results

**Table 1 Characteristics of Subjects in Both Treatment Groups**

Characteristics	Shiatsu		ASE		P-value
	N	%	N	%	
<b>Age</b>					
15	3	9,1	9	27,3	0,281
16	20	60,6	15	45,5	
17 years old	10	30,3	9	27,3	
<b>Age at menarche</b>					
Mean (SD)	13,1 (1)		12,8 (0,8)		0,277
Median	13		13		
Rang	11-15		11-5		
<b>Duration of menstruation</b>					
Mean (SD)	6,1(1,1)		5,5 (1,5)		0,073
Median	6		5		
Rang	4-9		4-9		
<b>history</b>					
There is	25	75,8	24		0,195
	8	24,2	9		
<b>BMI</b>					
Mean (SD)	20,6 (2,7)	22,8 (3,8)			0,106
Median	20,4	22,4			
Rang	16,2-29,4	17,4-33,7			

Notes: \*) Maan-Whitney test results, \*\*) Chi-Square test results

Table 1 illustrates that there exists no statistically significant difference ( $p > 0.05$ ) between the characteristics of respondents in the Shiatsu and abdominal stretching exercise (ASE) groups across several variables, specifically including age, age at menarche, duration of menstruation, family history of dysmenorrhea, and body mass index (BMI).

**Table 2 Level of Primary Menstrual Pain (Dysmenorrhea) Before and After Shiatsu Massage Therapy**

Assessment	Before		After	
	N	%	N	%
<b>Pain level</b>				



level	0	0	4	12,1
Lightweigh	16	48,5	25	75,8
Medium	17	51,5	4	12,1

Table 2 reveals that prior to the administration of Shiatsu therapy, a total of 17 individuals (51.5%) exhibited a moderate level of pain. In contrast, following the completion of Shiatsu therapy, this number significantly shifted, with 25 individuals (75.8%) reporting a mild level of primary menstrual pain among adolescent girls.

**Table 3 Level of Primary Menstrual Pain (Dysmenorrhea) Before and After Given *Abdominal Stretching Exercise***

Assessment	<u>Before</u>		<u>After</u>	
	N	%	N	%
<b>Pain Level</b>				
No pain	0	0	1	3
Lightweight	20	60,6	26	78,8
Medium	13	39,4	6	18,2

Table 3 indicates that prior to engaging in abdominal stretching exercises, a total of 20 participants (60.6%) were categorized as experiencing a moderate level of pain. Conversely, following the implementation of the abdominal stretching exercises, this distribution shifted markedly, with 26 participants (78.8%) subsequently reporting a mild level of primary menstrual pain among adolescent girls.

**Table 4 Differences in Pre and Post Menstrual Pain Reduction in Shiatsu and *Abdominal Stretching Exercise* Groups**

Statistic	Shiatsu massage		Difference	P-value	Shiatsu massage		Difference	P-val
	<i>Pre test</i>	<i>Post test</i>			<i>Pre test</i>	<i>Post test</i>		
Min	2	0	2,36	0,000	2	0	1,55	0,000
Min	6	4			6	5		
Mean	4,18	1,82			3,73	2,18		
SD	1,51	1,21			1,44	1,21		

Table 4 shows that the level of pain before being given abdominal stretching exercise as many as 20 people (60.6%) in the moderate category. While after getting abdominal stretching exercise as many as 26 people (78.8%) the level of primary menstrual pain of adolescent girls is mild.

**Table 5 Differences in the Effectiveness of Shiatsu Massage Therapy and *Abdominal Stretching Exercise* on Reducing the Level of Primary Menstrual Pain (Dysmenorrhea)**

Group	Average	t <sub>count</sub>	p-value*
Shiatsu	2.36	-3.594	0.000
<i>Abdominal Stretching Exercise</i>	1.55		

Notes: \*) *Maan-Whitney* test results

Table 5 shows that the value of  $t_{\text{count}} = -3.594$  with  $p \text{ value} = 0.000$ , where  $p < 0.05$  ( $0.000 < 0.05$ ) means that there is a significant difference between shiatsu massage therapy and *abdominal stretching exercise* on reducing the level of primary menstrual pain (dysmenorrhea). The findings revealed that the average decrease in the level of primary menstrual pain among adolescent girls who received Shiatsu therapy was measured at 2.36, whereas those who participated in abdominal stretching exercises experienced an average reduction of only 1.55. This notable difference, amounting to 0.81 points, suggests that Shiatsu massage therapy is significantly more effective in alleviating primary menstrual pain (dysmenorrhea) in female students compared to the abdominal stretching exercise regimen.

#### 4. Discussion

##### a. The Effect of Shiatsu Massage Therapy on Reducing the Level of Primary Menstrual Pain (Dysmenorrhea) in Adolescent Girls

The results of the analysis presented in Table 1 indicate a p-value of 0.000, which is significantly lower than the threshold of 0.05; hence, it can be conclusively stated that there exists a statistically significant reduction in the level of primary menstrual pain experienced by adolescent girls at SMAN 2 Amlapura both prior to and following the administration of Shiatsu massage therapy. The data reveals that the average pain level before receiving Shiatsu therapy was recorded at 4.18, whereas the average pain level subsequent to the therapy decreased to 1.82. This indicates a noteworthy decline of 2.36 points in primary menstrual pain levels following the application of Shiatsu massage therapy.

According to Japanese medicine, menstrual pain is caused by the blockage of *Qi* energy in the body, which inhibits the circulation of *Qi* energy and blocks the flow of meridians in the body. Menstrual pain results from disharmony of *Qi*, energy flow throughout the body, blood and its functions. Therefore, massage manipulation at the *tsubo* point can smooth the flow of energy in the body (*Qi*), so that pain decreases.<sup>17</sup> The decrease in menstrual pain can occur due to muscle stimulation at the *tsubo* point during massage so that it can stimulate peripheral nerves and act as a "block" inhibiting pain signals forwarded to the brain to make blood circulation smooth. Muscle stimulation utilizing Shiatsu techniques generates signals that are transmitted through larger nerve fibers, specifically A Delta fibers. These A Delta fibers effectively close the "gate," thereby preventing the Cortex Cerebri from receiving pain signals, as these messages are obstructed by the phenomenon of counter-stimulation. As a result, the perception of pain undergoes a transformation, primarily due to the fact that the nerve fibers located on the surface of the skin (cutaneous fibers) predominantly consist of those with a larger diameter.<sup>9,10,13</sup>

Students who are given shiatsu massage experience changes in pain intensity because shiatsu massage has a positive effect through the mechanism of *distraction* to pain (*distraction*), where the focus of attention on pain or pain stimulus is diverted or reduced so that it has a relaxing effect on the muscles. As a distinctive form of relaxation technique, Shiatsu effectively alleviates muscle tension while simultaneously enhancing blood circulation to the affected area, thereby preventing the onset of hypoxia. This process, in turn, facilitates the body's natural ability to

release endorphins, contributing to an overall sense of well-being and pain relief.<sup>18</sup> This is in line with the research of Windiarsih et al (2020)<sup>19</sup>, The gate control theory posits that pain impulses can be modulated or inhibited through various defense mechanisms operating within the central nervous system, suggesting a complex interplay between sensory input and neural pathways in the perception of pain. This theory posits that pain impulses are transmitted when a defense mechanism is opened, while such impulses are inhibited when this defense is closed. The strategies designed to close these defenses constitute the foundational principles of pain relief theory. This defense mechanism becomes particularly evident in respondents experiencing dysmenorrhea who engage in Shiatsu massage; in this context, endorphins function as endogenous opiates, serving as natural analgesics produced by the body.

**b. The Effect of *Abdominal Stretching Exercise* on Reducing the Level of Primary Menstrual Pain (Dysmenorrhea) in Adolescent Girls**

The analysis results reveal a statistically significant p-value of 0.000, indicating that  $p < 0.05$ , thereby allowing for the conclusion that there exists a considerable reduction in the level of primary menstrual pain experienced by adolescent girls at SMA 5 Karawang before and after the implementation of abdominal stretching exercises. The data illustrates that the average pain level prior to engaging in abdominal stretching exercises was 3.73, while the post-exercise average decreased to 2.18. Consequently, this demonstrates a notable reduction of 1.55 points in the level of primary menstrual pain following the application of abdominal stretching exercises.

This decrease in menstrual pain can occur due to the physical exercise of stretching the abdominal muscles performed by female students so that it makes muscle strength, endurance, flexibility of the abdominal muscles and the production of endorphin hormones increase so that blood flow in the abdomen becomes smooth.<sup>20</sup> The endorphin hormone, synthesized during physical exercise, is subsequently distributed throughout the body, where it functions as a natural analgesic. This hormone plays a crucial role in regulating the condition of blood vessels, facilitating a return to normalcy and ensuring unobstructed blood flow. Moreover, the heightened metabolic blood circulation in the pelvic region that occurs as a result of exercise can have a significant impact on dysmenorrhea. This enhancement in blood flow serves to alleviate ischemic pain experienced during menstruation, thereby contributing to overall pain relief.<sup>4</sup>

The release of endorphins elicits a relaxing effect that enhances the parasympathetic nervous system response, subsequently leading to vasodilation of blood vessels both throughout the body and specifically within the uterus. This physiological response results in an increased uterine blood flow, effectively mitigating the intensity of menstrual pain experienced during the menstrual cycle.<sup>21</sup> Supported by Sormin's research, it is indicated that engaging in physical exercise significantly enhances blood flow within the pelvic region while simultaneously stimulating the release of endorphin hormones throughout the body, thereby contributing to a reduction in the pain scale experienced by individuals.<sup>16</sup>

**c. Differences in the Effectiveness of Shiatsu Massage Therapy and *Abdominal Stretching Exercise* on Reducing the Level of Primary Menstrual Pain (Dysmenorrhea) in Adolescent Girls**

The results of the comparison of the average decrease in menstrual pain showed that the decrease in the level of primary menstrual pain in adolescent girls who were given shiatsu therapy had an average of 2.36 and those given *abdominal stretching exercise* amounted to 1.55. This means that the difference in the decrease in the level of primary menstrual pain between female students given shiatsu massage and *abdominal stretching exercise*, which is a difference of 0.8 points, thus shiatsu massage therapy is more effective in reducing primary menstrual pain in adolescent girls compared to *abdominal stretching exercise*

Shiatsu works to improve blood circulation, calm the nervous system, relieve muscle stiffness, relieve stress and promote physical and mental relaxation and nourishment of body cells and tissues and the release of natural analgesics such as serotonin and endorphin.<sup>3,8</sup>

According to Japanese medicine, menstrual pain is caused by a blockage of *Qi* in the body, which inhibits the circulation of *Qi* energy and blocks the flow of meridians in the body.

Menstrual pain results from disharmony of *Qi*, energy flow throughout the body, blood and its functions. Therefore, massage manipulation of the *tsubo* point can smoothen the flow of energy in the body (*Qi*), so that pain is reduced.<sup>9</sup>

The mechanism of pain inhibition through shiatsu massage is fundamentally rooted in the principles of the Gate Control Theory. According to this theory, the stimulation of muscles at specific tsubo points activates peripheral nerves, effectively serving as a "block" that prevents pain signals from being transmitted to the brain, thereby promoting smoother blood circulation. The application of shiatsu techniques induces muscle stimulation, generating messages that are relayed through larger nerve fibers, specifically A Delta fibers. These fibers function to close the "gate," ensuring that the Cortex Cerebri does not receive pain messages, as they are intercepted by counter-stimulation. Consequently, this process alters the perception of pain, given that the cutaneous nerve fibers on the skin's surface predominantly consist of wide-diameter nerve fibers.<sup>22,23</sup>

Adolescent girls who are given shiatsu massage experience changes in pain intensity because shiatsu massage has a positive effect through the mechanism of *distraction*, where the focus of attention on pain or pain stimulus is diverted or reduced so that it has a relaxing effect on the muscles. As a relaxation technique, shiatsu effectively alleviates muscle tension and enhances blood circulation to the affected area, thereby preventing hypoxia and facilitating the body's release of endorphins. The production of endorphins is triggered by the application of pressure, which stimulates the hypothalamus to secrete these hormones, leading to an elevation in endorphin levels both in the bloodstream and systemically. Shiatsu stimulation facilitates a biochemical connection that promotes the release of substances capable of inhibiting pain signals transmitted to the brain. Endorphins, which function as the body's naturally occurring opiates, are synthesized by the pituitary gland and play a crucial role in pain reduction, memory modulation, and mood regulation, ultimately inducing a profound sense of relaxation.<sup>24</sup>

Massage has the effect of improving blood circulation. This means that the blood supply to the tissues becomes smooth, especially in ischemic tissues where during menstrual pain uterine contractions occur which can cause ischemia in the contraction area. This is in line with Field's research, stating massage can affect the hypothalamus and the pain gate. The hypothalamus stimulates the anterior hypophysis to produce endorphin which can cause feelings of comfort and pleasure.<sup>25</sup>

The shiatsu massage emphasis also works to improve the autonomic nervous system. With shiatsu suppression and therapy, the autonomic nervous system becomes better and returns to normal. Shiatsu is useful for calming the overactive parasympathetic nervous system, thus causing a relaxation response and increasing venous return. Increased parasympathetic activity leads to a decrease in heart rate, reduced blood pressure, and increases relaxation substances such as endorphins, increases blood circulation, relieves muscle stiffness and relieves stress.<sup>3</sup>

Research by Nurul W and et al, states that there is an effect of giving shiatsu massage on reducing menstrual pain in adolescents. Shiatsu massage has a positive effect through the mechanism of *distraction* to pain (*distraction*), so that the focus of attention on pain or pain stimulus is diverted or reduced.<sup>33</sup>

In this study, researchers provided interventions directly to subjects so that adolescent girls who experienced primary menstrual pain could effectively get nonpharmacological treatment in reducing menstrual pain. Compared to previous studies, the provision of shiatsu therapy involves more research subjects in providing treatment so that the workings of shiatsu can be less effective. It can also be seen from the larger sample used in this study, namely 33 people in the shiatsu group so that it has a greater chance of influencing the decrease in the level of primary menstrual pain in adolescents.

## 5. Conclusion

The findings of this study indicate that abdominal stretching exercise can reduce the level of menstrual pain, but shiatsu massage therapy is proven to be more effective with an average

decrease of 2.36 compared to 1.55 for abdominal stretching exercise, so that the difference in decrease of 0.8 points indicates shiatsu massage as a better choice to overcome primary dysmenorrhea. The contribution of this study provides new insights in the field of reproductive health, especially in the management of menstrual pain among adolescent girls and supports the application of nonpharmacological therapy as an alternative in nursing practice by health workers such as midwives in various health facilities. Therefore, this study deserves to be published in a scientific journal as it provides a strong scientific basis and highlights the potential application of the findings in clinical practice. Suggestions for future research include the need for further study of the interventions of both groups by increasing the length of the menstrual cycle to understand the long-term effects of each therapy, as well as knowing how long the effects of shiatsu massage can last and how the intensity and duration of therapy affect the outcome. In addition, this study can be used as one of the non-pharmacological complementary medicine therapies recommended by health workers, especially midwives, in independent practices (BPM) and other health facilities to treat primary dysmenorrhea. The creation of jobsheets, pocket books, and CDs on shiatsu techniques can also be utilized as learning materials to facilitate the provision of health education to adolescents, especially in managing primary dysmenorrhea and increasing their awareness of reproductive health.

## 6. Reference

1. Suganda AR, Septiani N T, Nuryuniarti R. Efektifitas Abdominal Stretching Exercise Terhadap Penurunan Intensitas Nyeri Dismenore Pada Remaja Putri. *J BIMTAS J Kebidanan Umtas*. 2021;5(2):62–71. Available from: <https://journal.umtas.ac.id/index.php/bimtas/article/view/1857>
2. Intiyaswati I, Primiastuti D. Pengaruh Abdominal Stretching Exercise Terhadap Intensitas Nyeri Menstruasi (Dismenorea) Pada Remaja Putri Di Sma Kartika Iv Surabaya. *J Kebidanan*. 2024;13(1):42–7. Available from: <https://jurnal.stikeswilliambooth.ac.id/index.php/Keb/article/view/598>
3. Robinson N, Donaldson J, Lorenc A. Shaitu A review of the evidence. 2016;(October):130 p.
4. Rejeki S, Pratama FY, Ernawati E, Yanto A, Soesanto E, Pranata S. Abdominal stretching as a therapy for dysmenorrhea. *Open Access Maced J Med Sci*. 2021;9:180–3. Available from: <https://oamjms.eu/index.php/mjms/article/view/6711>
5. Nursyamsiana N, Kusyairi A, Effleurage M. Efektivitas Abdominal Stretching Exercise Dan Massage Effleurage Terhadap Penurunan Nyeri. 2024;3(8):143–154. Available from: <https://journal.mandiracendikia.com/index.php/JIK-MC/article/view/1349>
6. Kumbhar SK, Reddy M, Sujana B, K RR, K DB, Balkrishna C, et al. Prevalence of Dysmenorrhea Among Adolescent Girls ( 14-19 Yrs ) of Kadapa District and Its Impact on Quality of Life : a Cross. *Natl J Community Med*. 2018;2(2):265–8. Available from: <https://njcmindia.com/index.php/file/article/view/1895>
7. Novia I, Nunik Puspitasari dan, Kabupaten Sidoarjo R, Biostatistika dan Kependudukan Fakultas Kesehatan Masyarakat Universitas Airlangga D. Faktor Risiko yang Mempengaruhi Kejadian Dismenore Primer. Available from: <https://www.neliti.com/id/publications/3893/faktor-risiko-yang-mempengaruhi-kejadian-dismenore-primer>
8. Silalahi UA, Prapahlawati IIK. The Effect of Giving Shiatsu Massage on Dysmenorrhea Pain in Tasikmalaya Health Polytechnic on 2018 [Internet]. Atlantis Press SARL; 2023. 1027–1034 p. Available from: [http://dx.doi.org/10.2991/978-2-38476-022-0\\_114](http://dx.doi.org/10.2991/978-2-38476-022-0_114)
9. Kopf A, Patel NB. Guide to Pain Management in Low-Resource Settings. IASP Press [Internet]. 2010;1–384. Available from: [papers2://publication/uuid/C6AF8061-CDFC-4664-92EE-549338C9A317](https://papers2://publication/uuid/C6AF8061-CDFC-4664-92EE-549338C9A317)
10. McKenna KA, Fogleman CD. Dysmenorrhea. *Am Fam Physician*. 2021;104(2):164–70.
11. Azima S, Bakhshayesh HR, Kaviani M, Abbasnia K, Sayadi M. Comparison of the Effect

- of Massage Therapy and Isometric Exercises on Primary Dysmenorrhea: A Randomized Controlled Clinical Trial. *J Pediatr Adolesc Gynecol* [Internet]. 2015;28(6):486–91. Available from: <http://dx.doi.org/10.1016/j.jpag.2015.02.003>
12. Grandi G, Ferrari S, Xholli A, Cannoletta M, Palma F, Romani C, et al. Prevalence of menstrual pain in young women: What is dysmenorrhea? *J Pain Res* [Internet]. 2020;5:169–74. Available from: <https://doi.org/10.2147/JPR.S30602>
  13. Salvo SG. *Massage Therapy: Principles and Practice*. Elsevier Health Sciences; 2015.
  14. Indrawati, Handoko G, Supriyadi B. Pengaruh Pemberian Abdominal Stretching Exercise Terhadap Intensitas Disminore Pada Remaja Putri. *J Penelit Perawat Prof*. 2023;5(4):1441–8. Available from: <https://jurnal.globalhealthsciencegroup.com/index.php/JPPP/article/view/1840>
  15. Faridah B, Handin HRS, Dita R. Pengaruh Abdominal Stretching Exercise Terhadap Penurunan Intensitas Nyeri Haid Pada Remaja Putri Effect of Abdominal Stretching Exercise For Reducing Menstrual Pain The Intensity of Adolescent Girl. *JIK (Jurnal Ilmu Kesehatan)*. 2019;3(2):68–73. Available from: <https://jik.stikesalifah.ac.id/index.php/jurnalkes/article/view/207>
  16. Marzouk TMF, El-Nemer AMR, Baraka HN. The effect of aromatherapy abdominal massage on alleviating menstrual pain in nursing students: A prospective randomized cross-over study. *Evidence-based Complement Altern Med*. 2022;3(3). <https://pubmed.ncbi.nlm.nih.gov/23662151/>
  17. Hur MH, Lee MS, Seong KY, Lee MK. Aromatherapy massage on the abdomen for alleviating menstrual pain in high school girls: A preliminary controlled clinical study. *Evidence-based Complement Altern Med*. 2018. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC3178179/>
  18. Sormin Nm. Efektivitas Senam Disminore Dalam Mengurangi Disminore Pada Remaja Putri Di Smp Negeri 2 Siantan Kabupaten Pontianak. 2023;1–203. Available from: <https://jurnal.untan.ac.id/index.php/jmkeperawatanFK/article/view/6480>
  19. Motahari-Tabari N, Shirvani MA, Alipour A. Comparison of the effect of stretching exercises and mefenamic acid on the reduction of pain and menstruation characteristics in primary dysmenorrhea: A randomized clinical trial. *Oman Med J*. 2017;32(1):47–53. Available from: <https://pubmed.ncbi.nlm.nih.gov/28042403/>
  20. Ummah W, Utami WT. Abdominal Stretching Exercise Berpengaruh Terhadap Intensitas Dysmenorrhea Pada Remaja Putri. *Care J Ilm Ilmu Kesehat*. 2023;11(3):587–96. Available from: [https://www.researchgate.net/publication/377088484\\_Abdominal\\_Stretching\\_Exercise\\_Berpengaruh\\_Terdapat\\_Intensitas\\_Dysmenorrhea\\_Pada\\_Remaja\\_Putri](https://www.researchgate.net/publication/377088484_Abdominal_Stretching_Exercise_Berpengaruh_Terdapat_Intensitas_Dysmenorrhea_Pada_Remaja_Putri)
  21. Windiarsih N, Yulifah R, Sutriningsih A. Perbedaan Pemberian Pemijatan Shiatsu oleh Peneliti dengan Responden terhadap Penurunan Disminore pada Remaja Putri di SMA Negeri 8 Malang. *Nurs News - J Ilm Mhs Keperawatan* [Internet]. 2020;2(1):199–208. Available from: <https://publikasi.unitri.ac.id/index.php/fikes/article/view/159>
  22. Urganlawar DS, Patil S, Dhage PP. Efficacy of Connective Tissue Therapy and Abdominal Stretching Exercises in Individuals With Primary Dysmenorrhea: A Review. *Cureus*. 2023;15(10):1–7. Available from: <https://pubmed.ncbi.nlm.nih.gov/37933353/>
  23. Patimah T, Sari SP, Mustari P, Simaremare SJ. The Effect Of Abdominal Stretching Exercise On Reducing Dysminorrhoea Pain At STIKes As Syifa Female Students. 2023;14(01):651–7. Available from: <https://ejournal.seaninstitute.or.id/index.php/health/article/view/5059>
  24. Ahmadi Barati A, Farhadi L, Khalily M. Comparison of the Effect of Stretching Exercises and Combination of Massage - Stretching Exercises on Primary Dysmenorrhea of Female Students of Razi University of Kermanshah. *J Clin Res Paramed Sci*. 2021;10(1). Available from: <https://brieflands.com/articles/jcrps-102312>
  25. Heitler B. Primary Afferent Depolarization and the Gate Control Theory of Pain: a tutorial

- simulation. *J Undergrad Neurosci Educ.* 2023;22(1):58–65. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10768827/>
26. Ginting Munthe NB, Sembiring IM, Lubis B, Safitri R. The Effect Of Abdominal Stretching Exercises On The Intensity Of Menstrual Pain (Dysmenorrhea) In Young Woman In Adolescent Women. *J Keperawatan Dan Fisioter.* 2023;5(2):405–10. Available from: <https://ejournal.medistra.ac.id/index.php/JKF/article/view/1664>
27. Field T, Hernandez-Reif M, Diego M, Schanberg S, Kuhn C. Cortisol decreases and serotonin and dopamine increase following massage therapy. *Int J Neurosci.* 2018;115(10):1397–413. Available from: <https://pubmed.ncbi.nlm.nih.gov/16162447/>