ORIGINAL RESEARCH

THE EFFECTIVENESS OF ABDOMINAL STRETCHING EXERCISES ON THE INTENSITY OF PRIMARY DYSMENORRHEA IN ADOLESCENT GIRLS IN EAST JAKARTA

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Abstract

Background: The transition by childhood to adulthood is called adolescence, typically beginning at the age of 12–24 years. Female adolescence is marked by several changes, particularly in the development of the hormone's estrogen and progesterone. One of the characteristics of women entering adolescence is menstruation. in the process of menstruation, women may endure unpleasant symptoms, such as dysmenorrhea or menstrual pain caused by excessive uterine contractions that can interfere by daily operations.
Purpose: This study aimed to explore how effective abdominal stretching exercises are in decreasing the degree of menstrual pain endured by adolescent girls in East Jakarta.
Methods: This study conducted a pre-experimental method utilizing a one-cohort pretest–posttest design approach.
Outcomes: The outcomes implied that before doing the abdominal stretching exercises, most participants endured moderate menstrual pain (scale 2–6), by 33 respondents (55.0%) reporting this stage. After the exercise, the pain degree decreased to a mild stage (scale 1–4) in 50 respondents (83.3%). A total of 60 adolescents took a part in the study. Utilizing the Wilcoxon Signed Ranks Test, the analysis yielded a p-value of 0.000 that is lower than the significance stage of 0.05. This implies that abdominal stretching exercises were effective in decreasing dysmenorrhea degree among adolescent girls in East Jakarta.
Conclusion: Abdominal stretching can boost blood flow, ease muscle tension in the abdominal area, and promote relaxation. These effects help lessen the degree of menstrual pain endured by individuals by dysmenorrhea.

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1. **Introduction**

Adolescence typically begins among the ages of 12 and 24. Several hormones, particularly estrogen and progesterone, become active in the process of this period, causing changes in the female body. These changes include breast enlargement, widening of the pelvis, and the growth of fine hair in the armpits and pubic area. In addition, one of the characteristics of entering adolescence is the onset of menstruation [1].

Dysmenorrhea is a widespread status that affects the majority of women globally. Research [2] implies that its prevalence is very high, by more than 50% of women in most countries experiencing menstrual pain. In Sweden alone, about 72% of women are affected by dysmenorrhea. In the United States, it is forecasted that around 90% of women endure menstrual pain, and about 10–15% suffer by severe dysmenorrhea, that can be so intense that it prevents them by carrying out daily operations.

A study conducted in Kuwait [3] reported that the one-year prevalence of dysmenorrhea reached 85.6% among participants. Of these, 26% sought treatment at private clinics for their pain, and 41% required hospitalization due to the degree of their menstrual discomfort. Furthermore, 58.2% of students by dysmenorrhea missed at least one day of school, and 13.9% were absent in the process of an exam due to menstrual pain. A study conducted at SMPN 2 Denpasar by Dewi & Runiari [420] involving 119 female students found that 47 students (39.5%) endured mild dysmenorrhea, 48 students (40.3%) endured moderate pain, and 24 students (20.2%) endured severe pain.

Pharmacological methods to decrease menstrual pain involve the use of analgesic medications to suppress dysmenorrhea. However, continuous use of these medications can have side effects on the digestive system, kidney function, and liver function. Non-pharmacological therapies include massage, warm compresses, hot baths, and distraction. Physical exercises such as yoga, calisthenics, and abdominal stretching exercises are designed to relax the body and decrease the risk of severe menstrual pain [5]. Abdominal stretching exercises have been shown to effectively decrease the degree of dysmenorrhea by strengthening the muscles, increasing abdominal flexibility, and enhancing overall physical endurance. These exercises also incorporate relaxed breathing, that helps improve lung ventilation and release tension, contributing to better pain relief [6].

Abdominal stretching exercise is a 10-minute routine focused on stretching the abdominal muscles. It aims to improve muscle strength, endurance, and flexibility, that in turn helps ease menstrual pain. in the process of physical behavior, the body releases endorphins—natural chemicals yielded by the brain and spinal cord—that act as pain relievers and promote a sense of comfort and well-being [7]. Research shows that physical behavior stimulates the release of natural opioid endorphins in the body, that help decrease pain and promote a sense of well-being. Abdominal stretching exercises, in particular, can serve as a non-pharmacological treatment to ease menstrual pain. These exercises not only strengthen and improve muscle flexibility but also improve appetite and memory, relieve cramps, enhance blood circulation, decrease anxiety and emotional stress, and help stabilize mood [8].

Abdominal Stretching Exercise is a combination of six movements: cat stretch, lower trunk rotation, buttock/hip stretch, abdominal strengthening, and the bridge position [9]. The objective of this study was to examine the effectiveness of abdominal stretching exercises on the degree of primary dysmenorrhea in adolescent girls in East Jakarta.

2. Methods

Methods should be structured as follow:

2.1 Research design

This study conducted a quantitative approach utilizing a pre-experimental design to examine the cause-and-effect connection among the intervention and the outcomeing outcomes. The study applied a one-cohort pretest–posttest design, beginning by an initial observation (pretest) before the intervention, followed by the intervention itself, and concluding by a final observation (posttest) to assess the outcomes.

2.2 Setting and samples/participants

The population of this study consisted of 150 young women by churches in East Jakarta. A non-probability sampling method by a total sampling technique was used, meaning that every member of the population was included as part of the sample. utilizing Slovin's formula, a sample of 60 female adolescents was obtained, by inclusion criteria being female adolescents in churches in East Jakarta, experiencing menstrual pain or dysmenorrhea, willing to participate in abdominal stretching exercises, and aged 14-20 years.

2.3 Intervention (applies to experimental studies)

In this study, the researcher used an interview technique based on pre-determined questions. Respondents were given paint stretching technique training by certified instructors. Subsequently, this technique was performed continuously by the respondents by the beginning and in the process of menstrual pain, about 3 times a week, and monitored for 6 weeks. The outcomes obtained were reported on observation sheets.

2.4 Measurement and data collection

The interviewer asked questions according to a prepared list to determine the scale of primary menstrual pain (dysmenorrhea) endured by the subjects, utilizing the pain stage measurement sheet (Numeric Pain Rating Scale) created by the researcher as a guide.

Bivariate analysis was conducted to examine the connection among two variables, specifically to determine the difference in menstrual pain degree before and after the abdominal stretching exercise. Since the study used a one-cohort pretest–posttest design by numerical data, a normality test was conducted as part of the statistical analysis.

2.5 Data analysis

Bivariate analysis in this study was conducted utilizing the Wilcoxon Signed Rank Test, as the data did not match the assumption of normality.

3. Results

Table 1. Frequency Distribution of Respondents Based on Age, Menarche, Menstrual Cycle, Duration of Menstrual Pain, Methods of decreasing Menstrual Pain, Exercise Habits, and endure by Abdominal Stretching Techniques

Characteristics	N	Percentage (%)
Age		
14 – 16 years old	48	80
17 –19 years old	12	20
Total	**60**	**100**
Menarche		
1 0 – 12 years old	41	68.
13–15 years old	19	31
Total	**60**	**100**

Duration of dysmenorrhea		
1–2 days	44	73.3
3–4 days	16	26.7
Total	**60**	**100**
Menstrual cycle		
26-30 days	**35**	**58.6**
21-25 days	19	31.7
>30 days	6	9.7
Total	**60**	**100.0**
How to Manage Dysmenorrhea		
Sleep	**40**	**66.7**
Apply white oil	9	15
Apply a warm compress	4	6
Others	7	11.7
Total	**60**	**100**
Frequent operations		
Exercise	**59**	**98**
No exercise	1	1.7
Total	**60**	**10**
Abdominal Stretching Exercise		
Never	**58**	**96.7**
Ever	2	3.3
Total	**60**	**1**

Based on Table 1, the most common age cohort among respondents was 14–16 years old, by 48 female adolescents (80%). The majority of respondents endured menarche among the ages of 10 and 12, totaling 41 respondents (68.3%). The most common duration of menstrual pain was 1–2 days, by 44 respondents (73.3%). The most common menstrual cycle length was 26–30 days, by 35 respondents (58.6%). The most common method of managing menstrual pain was sleeping, by 40 respondents (66.7%). Aside by resting or sleeping, regular physical behavior is another effective way to help ease menstrual pain. The outcomes of this study implied that most female adolescents (59 respondents, 98.3%) were physically active. However, nearly all of them (58 respondents, 96.7%) had never tried abdominal stretching exercises as a method to relieve menstrual discomfort.

Table 2. Distribution of Respondents Based on Menstrual Pain Before and After Performing Abdominal Stretching Exercises in East Jakarta

Pain stage	**n**	**Pre-test**	**Post-test**	
			n	**(%)**
Mild Pain	3	5	**5**	**83.3**
Moderate pain	**33**	**55**	10	16.7
Severe pain	24	40	**-**	**-**
Total	**60**	**100**	**60**	**1**

Table 2 reveals the outcomes of abdominal stretching exercises among adolescent girls, by the following outcomes: moderate menstrual pain (scale 4–6) in 33 respondents (55.0%), severe pain (scale 7–9) in 24 respondents (40.0%), and mild pain (scale 1–3) by 3 respondents (5.0%). The outcomes after the respondents performed abdominal stretching exercises implied a noticeable

decrease in pain degree. Most participants (50 respondents or 83.3%) endured mild menstrual pain (scale 1–3), while the remaining 10 respondents (16.7%) reported moderate pain (scale 4–6).

Table 3. Distribution of the number of respondents according to compliance by abdominal stretching exercises in East Jakarta

Abdominal Stretching Exercise	n	%
	57	**95**
Non-Compliant	3	5
	60	**1**

Based on Table 3, the outcomes reveal that 57 respondents (95.0%) were compliant when performing abdominal stretching exercises by an intervention conducted three times a week, two weeks before the forecasted date of monthly menstruation, over a six-week period. Meanwhile, non-compliant respondents were defined as those who did not match the criteria, where abdominal stretching exercises were performed for less than 6 weeks, involving 3 respondents (5.0%). The success of the abdominal stretching exercise was highly associated by compliance in performing the exercise, by a duration of 10–15 minutes [15].

Table 4. outcomes of Pain Scale Analysis Before and After Abdominal Stretching Exercise in Adolescent Girls in East Jakarta

Data Type		N	Mean Rank	Sum of Ranks	P
Pre-Training	Negative Ranks	58[a]	29.5	1711.00	0,000
Post-Training	Positive Ranks	0[b]	,00	,00	
	Ties	2[c]			
	Total	6			

Bivariate analysis was conducted to illustrate changes in the dysmenorrhea pain scale among adolescent girls before and after performing abdominal stretching exercises. The outcomes implied that 58 respondents endured a reduction in pain degree, while 2 respondents reported no change in their pain stages.

4. Discussion

The stage of pain endured by the respondents differed, as did the extent of its reduction. Prior to performing the abdominal stretching exercises, three respondents reported experiencing mild menstrual pain. After the exercise, there was a small reduction in pain compared to the reduction endured by other respondents. It was noted that the three respondents did not perform the abdominal stretching exercises properly, skipping some movements and not following the prescribed number of repetitions. This outcome is supported by Rika's research [16], that states that movements performed consecutively be able to relax the uterine muscles and improve blood perfusion to the uterus, thereby preventing anaerobic metabolism that produces lactic acid. According to the Gate Control Theory, this causes the pain impulses accepted by C-pain fibers to be inadequate. As a outcome, the release of substance P is inhibited, causing the Substance Gelatinosa Gate (SG Gate) to close, and either no or decreased information about pain degree is transmitted to the cerebral cortex [16]. Additionally, in the process of aerobic exercise, the body releases endogenous opioids such as endorphins and enkephalins, that are yielded in the brain and spinal cord. These substances have morphine-like properties by analgesic effects, forming a pain-inhibiting system [17].

Two respondents revealed inconsistent reductions in pain scale scores or no changes at all after the intervention. One respondent maintained a mild pain scale score (2=2), and one respondent maintained a moderate pain scale score (5=5). This is related to the stress stages of respondents

who were experiencing menstruation for the first time, where understanding, endure, and knowledge are important factors in the success of decreasing pain degree. Adolescents experiencing menstrual pain (dysmenorrhea) are caused by uterine muscle spasms, that can be influenced by physical and psychological factors such as stress and the effects of prostaglandin hormones. in the process of dysmenorrhea, uterine muscle contractions occur due to improved prostaglandin stages, leading to vasospasm of the uterine arteries, causing ischemia, endometrial disintegration, bleeding, and cramps in the lower abdomen, that trigger pain in the process of menstruation [18]. Therefore, personal endure can serve as a valuable source of knowledge. When individuals go through an event themselves, it shapes their understanding and actions. endure and habitual practices are key factors that influence how adolescent girls manage personal hygiene in the process of menstruation [19].

A decrease in pain degree or pain scale after performing abdominal stretching exercises on 11 respondents revealed a significant reduction in pain scale, by one respondent experiencing a decrease by a pain scale of 9 to 4. This is related to compliance by the intervention by repeating several movements that the respondents found comfortable to perform and felt a significant reduction in pain scale. This is similar to the study conducted by Dana [20], one of the movements being Cat stretching, that is a stretching movement that can improve blood circulation and relax the uterine muscles. This movement can stimulate the body to produce endorphins, that help blood flow smoothly devoid of any obstacles. Additionally, the Lower Trunk movements help improve muscle flexibility, return muscles to their normal length, maintain proper function, improve tissue elasticity, and decrease the occurrence of muscle cramps [21]. The abdominal stretching exercises primarily target the abdominal muscle cohort, including the rectus abdominis, internal oblique, and external oblique muscles [22].

Adolescents by dysmenorrhea often endure chronic, cyclical cramps in the process of menstruation, particularly in the lower abdomen. When the muscles contract, blood flow is temporarily restricted as the blood vessels are compressed. This contraction leads to improved stages of intramuscular calcium and inorganic phosphate ions, that stimulate glycogen breakdown (glycogenolysis). As muscle glycogen stores are depleted, the muscles require more glucose by the blood to support glycolysis for energy. Intense and prolonged contractions of the uterine wall lead to muscle fatigue and cramping due to the buildup of lactic acid yielded through anaerobic metabolism (glycolysis and glycogenolysis). This lactic acid accumulation triggers abdominal muscle cramps, that in turn cause menstrual pain. Faridah's [23] study found that abdominal stretching exercises help improve blood circulation to the uterus and relax the uterine muscles. This process helps prevent anaerobic metabolism (including glycolysis and glycogenolysis) that leads to lactic acid buildup. Excess lactic acid can cause muscle fatigue, cramps, and pain.

This aligns by Elsera's [24] study, that states that menstrual symptoms can include pain caused by anxiety, making it difficult for adolescents to focus, endure insomnia, loss of appetite, shortness of breath, and emotional disturbances. As proven in Saraswati's study [25], lack of exercise can cause menstrual pain, that, if left untreated, can lead to inability to move and concentrate in daily operations, emotional conflicts, feelings of anxiety, and can cause nausea and vomiting, headaches, dizziness, fatigue, diarrhea, unstable emotions in the process of menstruation, and even fainting. Therefore, this can be addressed as in the study [26], abdominal stretching exercises can be utilized as a non-pharmacological treatment to decrease the degree of dysmenorrhea. This exercise helps improve muscle strength, flexibility, appetite, and memory, decreases muscle tension (cramps), improves blood circulation, decreases anxiety and feelings of being overwhelmed, and stabilizes mood.

Based on Table 3, the outcomes before the intervention revealed a pain stage of 4–6 (moderate to severe menstrual pain, scale 7–9). This pain is usually concentrated in the lower abdomen in the process of menstruation and is often guided by additional symptoms such as headaches, excessive sweating, nausea, vomiting, and diarrhea [10]. Menstrual pain is endured differently by individuals; some may only feel slightly bothered, while others may be severely affected s can lead

to a decrease in quality of life related to functional status or daily operations, psychological function, and physical status in adolescents [27]. After the intervention, most respondents reported mild menstrual pain at a scale of 1–3. This outcome is consistent by the study by Saichfa & Rahayuningsih [28], that states that abdominal stretching exercises are designed to maintain and improve the flexibility of the abdominal, back, waist, and thigh muscles, thereby helping to decrease the degree of dysmenorrhea.

Based on the outcomes of the normality test, the data were not normally distributed, by a significance value of $p = 0.002$ according to the Kolmogorov-Smirnov test. Data transformation was then conducted; however, the distribution remained non-normal. Therefore, the data were analyzed utilizing the Wilcoxon alternative test, that yielded a significant p-value of 0.000 by $\alpha = 0.05$ ($p < \alpha$). These outcomes indicate a significant decrease in pain stages after performing abdominal stretching exercises. Thus, it can be concluded that abdominal stretching exercises are effective in decreasing dysmenorrhea.

Based on Table 5, the bivariate analysis utilizing the Wilcoxon test yielded negative ranks on the dysmenorrhea scale before and after the intervention, by 58 respondents and mean ranks of 29.50 and sum of ranks of 1711.00, revealing that 58 respondents endured a decrease or reduction in dysmenorrhea stages by before the intervention to after the intervention. The chi-square value was 2, revealing that 2 respondents did not endure a reduction. In addition, the p-value of <0.05 further confirms that abdominal stretching exercises are effective in decreasing dysmenorrhea. in the process of physical behavior, the brain and spinal cord release endorphins, that act as natural pain relievers. These endorphins promote relaxation, enhance comfort, decrease pain, and improve oxygen delivery to the muscles [29].

The movements in Abdominal Stretching Exercise consist of six movements: Cat Stretch, Lower Trunk Rotation, Hip Stretch, Abdominal Strengthening Curl Up, Lower Abdominal Strengthening, and The Bridge. One of these movements, the Cat Stretch and Lower Trunk Rotation, can enhance oxygen exchange and carbohydrate metabolism inside of cells while stimulating lymphatic drainage. This helps improve muscle flexibility, restore muscles to their natural length, maintain optimal function, improve tissue elasticity and flexibility, and decrease muscle cramps [30].

The outcomes of this study align by those of Mansoben [31], that demonstrated that abdominal stretching exercises are effective in decreasing the degree of dysmenorrhea in adolescent girls, by a reported p-value of 0.00. Dysmenorrhea endured by adolescent girls can disrupt their daily operations due to the pain felt in the lower abdomen. Sometimes, pain relievers are required. As a outcome, the motivation and quality of life of adolescent girls may decline, and the effects can be long-lasting if not addressed promptly and seriously. Therefore, abdominal stretching exercises as a non-pharmacological treatment are recommended as they have no side effects. This study aligns by Partiwi et al [32], who found that dysmenorrhea exercises and abdominal stretching exercises performed before menstruation can decrease menstrual pain degree in adolescents by dysmenorrhea.

This study also confirmed the effectiveness of abdominal stretching exercises in decreasing dysmenorrhea, as implied by a p-value of 0.00. These exercises help stretch the abdominal, waist, and pelvic muscles, providing a gradual sense of comfort, and can activate the pituitary gland, that enhances pain tolerance [33]. The objective of the intervention was to address the pain endured by the respondents, particularly adolescent girls by dysmenorrhea, by decreasing pain stimuli. This effect was achieved by enhancing muscle strength, endurance, and flexibility in the abdominal area, allowing the muscles to become more relaxed, stretched, and expanded. As a outcome, blood circulation and oxygen supply to the abdominal muscles improved, that helped decrease pain [34].

Abdominal stretching exercises produce endorphins, that also relax the abdominal muscles. The focus of each movement is to relax the abdominal muscles, that often contract in the process of menstruation, causing dysmenorrhea. Through abdominal stretching exercises, the abdominal muscles relax, and this relaxation regulates prostaglandin hormones, thereby decreasing the degree of dysmenorrhea. These exercises are light and easy to perform in the process of free time, such as in the process of holidays or when there are no other operations.

5. Conclusion

This study demonstrates that abdominal stretching exercises significantly reduce the degree of menstrual pain among adolescent girls. Prior to the intervention, most respondents experienced moderate to severe dysmenorrhea, whereas after performing abdominal stretching exercises, the majority reported mild pain levels. The statistically significant difference between pain levels before and after the intervention confirms the effectiveness of abdominal stretching exercises in managing dysmenorrhea.

The findings also reveal that most respondents had never practiced abdominal stretching exercises before the intervention and tended to use passive coping strategies, such as sleeping, to manage menstrual pain. This indicates a lack of awareness regarding effective non-pharmacological pain management methods. Abdominal stretching exercises offer a simple, safe, and accessible approach that can be easily adopted by adolescents to improve menstrual comfort. This intervention promotes better blood circulation, relieves muscle tension in the abdominal area, and enhances muscle relaxation, that in turn helps decrease the degree of dysmenorrhea pain. Therefore, abdominal stretching exercises can be recommended as an effective non-pharmacological approach for managing menstrual pain.

Therefore, abdominal stretching exercises can be recommended as a non-pharmacological intervention for dysmenorrhea management, particularly in adolescent populations. Incorporating this intervention into school health education programs and nursing practice may enhance adolescents' self-care abilities and reduce the impact of menstrual pain on daily activities.

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