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ABDOMINAL STRETCHING EXERCISE AS A COMPLEMENTARY THERAPY FOR DYSMENORRHEA PAIN IN ADOLESCENT GIRLS

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ABSTRACT
Dysmenorrhoea is a reproductive health problem commonly experienced by adolescent girls and women of reproductive age, with a high prevalence and significant impact on daily activities, emotional well-being, and quality of life. Physical exercise, particularly abdominal stretching exercises, has the potential to be a non-pharmacological intervention in attenuating the pain scale of dysmenorrhea through increased comfort and muscle relaxation. This study was conducted to determine the effect of abdominal stretching exercises on attenuating the pain scale of dysmenorrhea at SMA Negeri 2 Sukoharjo. This study used a quantitative method with a one-group pretest–posttest quasi-experimental design. The study was conducted in September 2025 on 87 female students in grade XI at SMA N 2 Sukoharjo who were selected using purposive sampling according to the inclusion criteria. The intervention given was abdominal stretching exercises. The severity level of dysmenorrhea pain was assessed pre- and post-intervention employing the Numeric Rating Scale (NRS). Data analysis included univariate and bivariate analyses. Normality was tested using Kolmogorov–Smirnov and showed that the data were not normally distributed, so bivariate analysis used the Wilcoxon signed rank test with a confidence level of 95% and $\alpha = 0.05$. The results showed that the majority of respondents were 16 years old with a dominant age of menarche of 12 years and had a normal menstrual cycle and duration. Before the intervention, most respondents experienced moderate dysmenorrhea pain (scale 5). After being given abdominal stretching exercises, there was a decrease in the intensity of dysmenorrhea pain, with the majority of respondents experiencing low pain (scale 2). Bivariate analysis using the Wilcoxon signed rank test showed a significant difference between the pain scale before and after the intervention ($p \leq 0.05$), indicating that abdominal stretching exercises are effective in reducing the scale of dysmenorrhea pain. This study shows that abdominal stretching exercises are effective in reducing the pain scale of dysmenorrhoea in adolescent girls.

Keywords: abdominal stretching exercise; adolescent; dysmenorrhoea

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INTRODUCTION

Menstruation is one of the important signs that indicate that a woman has entered the stage of sexual and psychological maturity (De Fretes et al., 2020) . Menstruation is defined as vaginal bleeding that occurs in a certain period and is caused by the shedding of the uterine wall or lining. During the menstrual period, many women often experience discomfort or severe pain known as menstrual pain or dysmenorrhoea (Pawae et al., 2024). Dysmenorrhoea is classified into two categories, namely primary dysmenorrhoea and secondary dysmenorrhoea. Primary dysmenorrhoea is menstrual pain that occurs without any genital dysfunction or accompanying genital disease. This menstrual pain is characterised by spasms in the lower abdomen that then spread to the waist and thighs (Horman et al., 2021) . Meanwhile, secondary dysmenorrhoea is menstrual pain accompanied by genital abnormalities. This type of dysmenorrhoea is usually experienced by women in their 30s (Tsamara et al., 2020) . Secondary dysmenorrhoea is pain that can occur due to female reproductive disorders such as endometriosis, which causes macroscopic anatomical or pathological changes in the reproductive organs (Syafriani et al., 2021) .

According to the World Health Organisation (WHO) in 2017, the prevalence of dysmenorrhoea data shows that 1,769,425 women worldwide reported experiencing dysmenorrhoea, and 10-16% of

them experienced severe menstrual pain. In Indonesia alone, the incidence of dysmenorrhoea is quite significant, with approximately 106,673 women (64.25%) affected, comprising 59,671 women (54.89%) with primary dysmenorrhoea and 9,496 women (9.36%) with secondary dysmenorrhoea. The population of Central Java in 2019 was 33,772,141, and 5,632,143 adolescent girls aged 10-19 years experienced dysmenorrhoea. Meanwhile, the prevalence of dysmenorrhoea in Surakarta was 89.8% (Wulandari & Widiyaningsih, 2023) . Dysmenorrhoea is one of the leading causes of morbidity in women of reproductive age. Dysmenorrhoea often goes undiagnosed and untreated because patients often do not seek available treatment or help, even though dysmenorrhoea greatly interferes with their daily activities and causes mood swings, anxiety, and depression (MacGregor et al., 2023) .

Referring to research reviewed by Mery Solon et al., it can be concluded that exercise or physical activity can produce endorphins. When we engage in physical activity, the central nervous system in the brain and spinal cord produces endorphins, which act as natural painkillers and provide a sense of comfort (Solon et al., 2024) . When someone does sports activities such as abdominal stretching exercises, the body increases the secretion of the hormone oestrogen and produces beta-endorphins, which can make the brain happy. When the brain is happy, the supply of oxygen to the muscles becomes more optimal and maximal, including the muscles in the pelvis and reproductive organs, including the uterus (Tyas et al., 2023) .

A study by Nuralam et al. (2020) found that the pain scale for dysmenorrhoea decreased after abdominal stretching exercise intervention. This occurs because the movement of the lower abdominal and waist muscles puts pressure on the blood vessels in the abdomen, increasing the volume of blood flowing throughout the body, including to the reproductive organs, so that oxygen can flow smoothly into the vessels experiencing vasoconstriction, ultimately reducing dysmenorrhoea pain (Nuralam et al., 2020) . The results of this study are also consistent with the findings of research conducted by Manalu et al. (2020), which indicate that abdominal stretching exercises can increase muscle strength, physical endurance, and flexibility, thereby reducing dysmenorrhoea pain (Manalu et al., 2022). This study aims to elucidate the association between abdominal stretching exercise and the attenuation of dysmenorrheal pain intensity among adolescent females.

METHOD

This study applies a quantitative method with a quasi-experimental research method and uses a one-group pretest-posttest design. Quantitative research focuses on the systematic collection and analysis of numerical data. This type of research aims to measure variables, identify patterns, and test hypotheses through statistical methods. This research is commonly used in various fields, including social sciences, psychology, and market research, to draw conclusions that can be applied to a larger population. This research was conducted in September 2025 using a population of 100 female students in grade XI at SMA N 2 Sukoharjo. Purposive sampling was used to select 87 female students who met the inclusion criteria, including female students aged 12–19 years, currently menstruating, and experiencing dysmenorrhea pain with a pain scale of $1 \leq \geq 6/10$. Pain scale measurements were conducted using the Numeric Rating Scale (NRS).

The independent variable in this study was abdominal stretching exercise, while the dependent variable was the reduction in dysmenorrhea pain intensity. Measurements were taken using the Numeric Rating Scale (NRS) to assess intensity before and after treatment, a questionnaire to group students who met the inclusion criteria or not, and a questionnaire for pre- and post-intervention pain scale data. The questionnaire used in this study served solely to collect respondents' demographic and menstrual characteristics and to determine eligibility criteria; therefore, statistical validity and reliability testing were not required. Dysmenorrhea pain intensity was assessed using the Numeric Rating Scale (NRS), a standardized single-item instrument with established validity.

Univariate analysis was applied to explore the descriptive characteristics of menstrual pain intensity, including the mean and data distribution (standard deviation) before and after the abdominal stretching exercise intervention, while bivariate analysis was performed to assess the effect of the intervention on changes in menstrual pain intensity by comparing the conditions before and after the abdominal stretching exercise treatment. To assess whether the data used was normally distributed or not, the Kolmogorov-Smirnov test was used and the results showed that the data was not normally distributed. The test results showed that the sample N=87 had a sig. value <0.001. Statistical testing was performed using the Wilcoxon signed rank test due to the ordinal scale data and non-normal distribution with a confidence interval (CI) of 95% and a value of $\alpha = 0.05$ and a value of ($p \leq 0.05$). This study has undergone an ethical feasibility test and has been declared to have passed the ethical test by the Health Research Ethics Committee (KEPK) FK UMS with number 5844/B.1/KEPK-FKUMS/IX/2025.

RESULT

Table 1.
Age Distribution of Respondents (n=87)

Age	f	%
15 years	2	2.3
16 years	71	81.6
17 years	14	16.1

The results of the analysis in table 1 show that the highest percentage of respondents were 16 years old, numbering 71 people (81.6%).

Table 2.
Distribution of Respondents' Age at Menarche (n=87)

Age at Menarche	f	%
10	6	6.9
11 years	33	37.9
12 years	34	39.1
13 years	11	12.6
14 years	3	3.4

The results of the analysis in table 2 show that the highest percentage of respondents experienced their first menstruation at the age of 12, numbering 34 people (39.1%).

Table 3.
Distribution of Respondents' Menstrual Cycles (n=87)

Menstrual Cycle	f	%
<21 days	34	39.1
21–35 days	49	56.3
>35 days	4	4.6

The results of the analysis in Table 3 show that the highest percentage of respondents had a menstrual cycle of 21-35 days, totalling 49 people (56.3%).

Table 4.
Distribution of Menstrual Duration per Period Respondents (n=87)

Menstrual Period Length	f	%
≤7 days	78	89.7
>7 days	9	10.3

The results of the analysis in Table 4 show that the highest percentage of respondents had a menstrual period lasting ≤7 days, totalling 78 people (89.7%).

Table 5.
Distribution of Pain Scale Before *Abdominal Stretching Exercise* Respondents (n=87)

Times	f	%
1	3	3.4
2	4	4.6
3	8	9.2
4	27	31.0
5	28	32.2

6	17	19.5

The results of the analysis in Table 5 show that the highest percentage of respondents before being given abdominal stretching exercises experienced dysmenorrhoea scale 5, numbering 28 people (32.2%).

Table 5.
Distribution of Pain Scale Before *Abdominal Stretching Exercise* Respondents (n=87)

Duration of Menstruation per Period	f	%
1	3	3.4
2	4	4.6
3	8	9.2
4	27	31.0
5	28	32.2
6	17	19.5

The results of the analysis in Table 5 show that the highest percentage of respondents before being given abdominal stretching exercises experienced dysmenorrhoea scale 5, numbering 28 people (32.2%).

Table 6.
Distribution of Pain Scale After *Abdominal Stretching Exercise* Respondents (n=87)

Duration of Menstruation per Period	f	%
0	9	10.3
1	22	25.3
2	25	28.7
3	12	13.8
4	15	17.2
5	4	4.6

The results of the analysis in Table 6 show that the highest percentage of respondents after being given abdominal stretching exercises experienced dysmenorrhoea scale 2, numbering 25 people (28.7%).

Table 7.
Distribution of the Average Difference in Pain Scale Before and After *Abdominal Stretching Exercise* Respondents (n=87)

Variable	Mean Before	Mean After	Difference	p-value
Dysmenorrhoea pain scale	4.43	2.16	2.27	0.00

The results of the analysis in Table 7 indicate a significant difference in the mean scores before and after the *abdominal stretching exercise.* A large number of respondents experienced dysmenorrhoea with a scale of 2 after the abdominal stretching exercise, totalling 25 people (28.7%).

DISCUSSION

The dominant age group of respondents in this study was 16 years old, which falls within the mid-adolescent phase. During this phase, women generally experience reproductive system maturity. However, many menstrual complaints such as dysmenorrhoea occur during this phase (Gutman et al., 2022) . In mid-adolescence, pain response tends to be more sensitive due to hormonal instability (Li et al., 2023). The results presented in Table 2 show that the majority of respondents experienced menarche at the age of 12, which is considered a normal age for menarche. The age of menarche is related to prostaglandin exposure, where earlier menarche results in greater prostaglandin exposure during menstruation compared to later menarche. Prostaglandins play a role in the occurrence of pain during menstruation (Portengen et al., 2025) .

The distribution of the respondents' menstrual cycles showed that the majority of respondents had a normal menstrual cycle of 21-35 days with a menstrual period of ≤7 days, which means that most respondents did not experience pathological menstrual disorders, so the dysmenorrhoea experienced by the respondents referred to primary dysmenorrhoea, not secondary dysmenorrhoea (Hendianti et al., 2022) . Primary dysmenorrhoea is menstrual pain that occurs without any obvious genital abnormalities and is generally associated with increased uterine contractions and prostaglandin

levels. Since primary dysmenorrhoea is not related to genital disease, it can be managed with non-pharmacological approaches such as stretching exercises, one of which is abdominal stretching (Zapała et al., 2023) .

The findings of the present investigation suggest that abdominal stretching exercises are effective in reducing the pain scale of dysmenorrhoea. Table 5 shows that the majority of the 87 respondents experienced a pain scale of 5 (moderate category) before the intervention, and after the intervention, most experienced a decrease in the pain scale, as shown in Table 6, which indicates that the majority of the 87 respondents experienced a pain scale of 2 (low category). The findings in this study indicate that abdominal stretching exercises cause a change in the pain scale of dysmenorrhoea from a higher level to a lower level.

The findings in this study can be scientifically proven, explaining the physiological mechanism by which abdominal stretching exercises can attenuate the pain scale of dysmenorrhoea. Physical exercise can increase endorphin levels triggered by steroid hormones in fertile women, thereby effectively reducing pain during menstruation (Jaleel et al., 2022) . Endorphins are hormones produced in the brain and spinal cord nervous system, functioning as natural sedatives and providing a sense of comfort. Endorphins also act as natural pain relievers and can improve mood (Ghosh et al., 2024) .

Stretching exercises are beneficial for relaxing the muscles and ligaments in the body, thereby maintaining muscle flexibility. Maintaining muscle flexibility can attenuate muscle tension and spasms, particularly in the abdomen and pelvis, which are directly related to the menstrual process (Talekar et al., 2022) . Stretching exercises are also beneficial for reducing prostaglandin E2 (PGE2), which is the primary mediator involved in increasing uterine contractions and pain intensity during menstruation. By reducing prostaglandin levels, contractions decrease, thereby reducing menstrual pain (Maringga et al., 2025) .

In addition, abdominal stretching exercises are also beneficial in increasing blood flow to the pelvis and uterus (Seales et al., 2021) . With increased blood circulation to these areas, the oxygen supply to tissues experiencing ischaemia due to uterine contractions can be improved, thereby reducing pain (Durmuş & Eryılmaz, 2022). The results of this study align with a previous national study conducted by Rejeki, Pratama, and colleagues (2021). That study involved 130 adolescent girls. After the study, it was found that before the intervention, the average dysmenorrhea pain score was 4.58 on a scale of 2 to 8, but after the intervention, the average pain score decreased to 1.46 (Rejeki et al., 2021) .

The similarity of these findings indicates that abdominal stretching exercises are efficacy in attenuating the dysmenorrhea pain scale in various adolescent groups. However, this study presents a novelty in the application of abdominal stretching exercises as a complementary therapy conducted in a structured manner in school adolescents with relatively normal menstrual cycles. Furthermore, this approach serves as evidence that non-pharmacological interventions can be practically applied in the context of promoting and preventing adolescent reproductive health in a school setting. Additionally, this study has limitations, namely the absence of a control group and the use of subjective pain scale measurements.

CONCLUSION

This study demonstrate that abdominal stretching exercises demonstrate efficacy in attenuating the pain score of dysmenorrhoea in adolescent girls. The implementation of abdominal stretching exercises as a non-pharmacological adjunctive intervention can attenuate the pain scores. The mechanism of this intervention is related to physiological processes such as relaxation of the abdominal and pelvic muscles, increased blood circulation, and the release of endorphins, which act

as natural analgesics. Based on these findings, future research should employ a control group design, extend the intervention duration, and consider other factors that may influence dysmenorrhoea pain to provide a more comprehensive picture.

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