CRITICAL MEDICAL AND SURGICAL NURSING JOURNAL
Vol. 14, no. 2, September 2025
Journal Homepage: https://e-journal.unair.ac.id/CMSNJ

The Effect of Abdominal Stretching Exercise Therapy on Dysmenorrhea Pain Intensity in Adolescent Girls

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ARTICLE HISTORY
Received: November 22, 2024
Accepted: September 2, 2025

KEYWORDS
Adolescence girls, abdominal stretching exercise, dysmenorrhea

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ABSTRACT

Introduction: Adolescence is referred to as a transitional period towards adulthood or puberty which is marked by the occurrence of the first menstruation (menarche). Menstruation experienced by adolescent girls mostly causes pain called dysmenorrhea, although this is normal due to the production of prostaglandins. Prostaglandins will stimulate the smooth muscles of the uterine wall to contract. The higher the prostaglandin levels, the stronger the contractions will be, and the pain will also be stronger. This study aims to analyze the effect of abdominal stretching exercise therapy on the intensity of dysmenorrhea pain in adolescent girls.

Methods: The research design used was quantitative with a quasi-experimental research design, namely pre-post test with control group design. The population in this study were junior high school students, sampling using purpose sampling technique with a total sample of 66 respondents (33 intervention groups and 33 control groups) taken according to the inclusion and exclusion criteria. The independent variable of the study was the abdominal stretching exercise technique and the dependent variable was the intensity of dysmenorrhea pain. Abdominal stretching exercise therapy was given using standard operating procedures and pain intensity was measured using the Visual Analog Scale (VAS).

Results: The research data were statistically tested using the Wilcoxon test with a significance level of $p<0.05$. The results of the study showed that there was a significant effect of abdominal stretching exercise techniques on the intensity of dysmenorrhea pain with a value of $p=0.000$ ($p<0.05$).

Conclusion: Abdominal stretching exercise intervention is effective to be applied in solving pain problems in adolescent girls who experience dysmenorrhea. Future research should explore the long-term effects and sustainability of abdominal stretching exercises in managing dysmenorrhea among adolescent girls, including variations in frequency, intensity, and duration of the intervention.

Cite this as: Marini, G., Priyantini, D., Sumara, R., Ghaliza, G.M. (2025). The Effect of Abdominal Stretching Exercise Therapy on Dysmenorrhea Pain Intensity in Adolescent Girls. Crit. Méd. Surgical. Nurs. J, 14(2),67-72.

1. INTRODUCTION

Adolescence is referred to as a transition period from childhood to adulthood or a process of growth towards adulthood which includes mental, emotional, social and physical maturity (Agrawal & Ahmed, 2021). The process of these development stages is marked by the maturity of sexual organs and the achievement of reproductive ability or commonly called puberty, where one of the characteristics of a

woman's puberty is the occurrence of the first menstruation (menarche) (López-Liria et al., 2021). Menstruation experienced by adolescent girls can cause problems, one of which is dysmenorrhea. Menstrual pain in adolescents can interfere with concentration while studying at school. Dysmenorrhea has a significant impact on adolescents (Çelik et al., 2024). The most common problem is decreased concentration and motivation to learn, so that adolescents cannot participate in their learning activities optimally and often cause absence from school. In addition, it also causes excessive anxiety which will affect the abilities and skills of students, this will greatly affect the decline in school activities and achievements (Upganlawar et al., 2023).

Data from the World Health Organization (WHO) in 2017 showed that the incidence of dysmenorrhea was 1,769,425 people (90%) of women who experienced dysmenorrhea with 10-16% experiencing severe dysmenorrhea. Meanwhile, in Indonesia the prevalence of dysmenorrhea reached 60-70%, with the incidence of primary dysmenorrhea 54.89% and secondary dysmenorrhea 45.11%. In a study conducted in 2018 at a high school located in Surabaya City, it was stated that 30 respondents (30.60%) experienced dysmenorrhea and Premenstrual Syndrome (PMS) 30 respondents (30.60%) (Setyowati et al., 2023). Based on a preliminary study conducted at a junior high school in Surabaya, data was obtained on students who had experienced menstrual pain in the last three months, data was obtained in March as many as 72 students experienced menstrual pain, in April as many as 64 students and in May 2023 as many as 74 students.

Dysmenorrhea can be caused by the presence of natural chemicals produced by the cells of the uterine lining called prostaglandins. Prostaglandins will stimulate the smooth muscles of the uterine wall to contract. The higher the levels of prostaglandins, the stronger the contractions will be, so the pain felt will be stronger (Fathy et al., 2022; Ozturk et al., 2023). Factors that influence menstrual pain include menarche, family history, duration of menstruation, stress levels. One problem with dysmenorrhea is the lack of proper treatment by students (Suindri et al., 2021). Only 25.9% of students with dysmenorrhea consulted health experts about their pain, most of whom only did limited treatment such as applying eucalyptus oil or balm, and taking painkillers on the market without a doctor's prescription. There are many ways to treat dysmenorrhea to eliminate or reduce dysmenorrhea, both pharmacologically and non-pharmacologically (Munthe et al., 2023).

Pharmacological treatment, students usually buy over-the-counter analgesic drugs containing paracetamol and hyoscyami extract which are spasmolytics that can reduce pain, headaches, and heartburn that occurs during menstruation (Prastiwi et al., 2021). Women and adolescents also choose to overcome dysmenorrhea problems by consuming painkillers (analgesics) from the Non-Steroid Anti-Inflammatory Drug (NSAID) group such as ibuprofen and mefenamic acid. This can be dangerous because of the side effects of drugs associated with the use of NSAIDs, including abdominal pain, diarrhea, nausea, and liver or kidney damage after stopping treatment (Tyas et al., 2023). Overcoming dysmenorrhea conditions with non-pharmacological management can be an option because it is safer to use and does not cause side effects like drugs. Non-pharmacological management of dysmenorrhea pain also does not require a lot of money because the costs are affordable by utilizing the empowerment of family members and can be done independently (Rejeki et al., 2021). There are several ways that can be done to overcome it such as taking a warm bath, placing a bottle filled with warm water on the stomach and exercise. One of the muscle stretching exercises, especially in the stomach, is the Abdominal stretching exercise (Nurfitri et al., 2021).

Abdominal stretching exercise is one of the relaxation techniques in the form of gymnastic movements to train the pelvic floor muscles to stretch and widen the blood vessels so that blood flow and oxygen can be channeled to the reproductive organs (Wahyuni et al., 2022). This abdominal stretching exercise can be done anywhere and anytime so it is not difficult for teenagers who want to do the exercise. This exercise is also very suitable for teenagers who have a high desire to move where this exercise if done routinely can also burn calories that can help shape the body (Kirmizigil & Demiralp, 2020). Abdominal stretching exercise techniques can increase endorphin levels by the brain due to physical exercise. So that physical exercise can be a specific analgesic for the short term, namely reducing independent pain (Hamdy Nasr Abdelhalim et al., 2023). When doing abdominal stretching exercises, the brain will produce endorphins that inhibit the transmission of pain impulses in the spinal cord, so that primary dysmenorrhea is reduced. Abdominal stretching exercises can stretch the abdominal muscles to create a comfortable and relaxed feeling of abdominal pain. The purpose of this study was to analyze the effect of abdominal stretching exercise therapy on the level of dysmenorrhea pain in adolescent girls.

2. METHODS

Study Design

This study was conducted using a quantitative research design with a quasi-experimental research design, namely a pre-post test with control group design, aimed at analyzing the effect of Abdominal Stretching Exercise intervention on the intensity of dysmenorrhea pain in adolescent girls. This research design involves at least two groups. One group as the intervention group and one other group as the control group. The treatment group in this research design was given Abdominal Stretching Exercise intervention, while the control group was given independent action by adolescent girls when

experiencing dysmenorrhea pain. The study was conducted in May-June 2023 which was carried out at one of the Muhammadiyah organization's junior high schools. The researcher conducted the research in this place because there were students who experienced pain during menstruation and most of these students did not take any action to avoid or reduce the pain they felt. Therefore, the researcher wanted to improve students' knowledge and abilities so that they could manage pain by teaching abdominal stretching exercise therapy.

Population, Samples, and Sampling

Population is the entire object of research that has certain characteristics in a study. The population in this study were female adolescents who had a history of menstrual pain (dysmenorrhea) in one of the Muhammadiyah organization's junior high schools totaling 78 female students. The research sample was determined based on the inclusion criteria: 1) Female adolescents aged 12-15 years; 2) Female adolescents who have experienced menstrual pain for the past 3 months; 3) VAS values with mild and moderate degrees of dysmenorrhea; 4) Cooperative female adolescents, with exclusion criteria Female adolescents who were absent during the study due to illness, permission and truancy. The drop out criteria for the study were female adolescents who decided to stop and did not complete the intervention process. The determination of the sample size used a formula with the addition of a drop out proportion of 10% and the results were 33 respondents in each group. The sampling method in this study was purposive sampling.

Instruments

The independent variable in this study was Abdominal Stretching Exercise and the dependent variable was the intensity of dysmenorrhea pain. The research instrument for implementing dysmenorrhea interventions used standard operating procedures. Abdominal stretching exercise is one of the relaxation techniques that can be used to reduce dysmenorrhea. This exercise is done twice, namely on the first and second day of menstruation. Each movement is repeated 3 times and the time required is approximately 10-15 minutes. The parameters: Cat stretch consists of 3 movements, Lower trunk rotation 2 movements, Buttock / Hip stretch consists of 1 movement, Abdominal stretching: curlp up consists of 2 movements, Lower Abdominal stretching consists of 2 movements and The bridge position consists of 1 movement. The pain intensity of dysmenorrhea patients was measured using the Visual Analogue Scale (VAS). Adolescent girls assess pain using a scale of 0-10 with the interpretation of the pain scale at 0 = no pain, 1-3 = mild pain, 4-6 = moderate pain, 7-9 = severe pain and 10 = very severe pain.

Procedure

The data collection and data collection procedures carried out in the first study were the preparation stage by taking care of research permits and completeness of health research ethics documents. Research that has received an ethical certificate is then continued in implementation by first determining the sample in the study. Young women who meet the requirements as research subjects are given a complete explanation of the research, then young women who are willing to be respondents are asked to sign an informed consent form before taking part in the research process. The researcher first took pre-test data by measuring pain using the VAS instrument before taking action on the first day of menstruation. The intervention group was given Abdominal Stretching Exercise and the control group with the use of eucalyptus oil. The instruments used in providing interventions were standard operating procedures (SOP) for the Abdominal Stretching Exercise technique and leaflets as a guide for young women that can be used in carrying out interventions. The Abdominal Stretching Exercise technique consists of 6 movements where each movement is repeated 3 times and the total time required is approximately 10-15 minutes. Abdominal stretching exercises are performed 2 times, namely on the first and second days of menstruation.

Data Analysis

Descriptive analysis of research data is presented in a frequency table and presented in descriptive analysis in the form of median, standard deviation, minimum and maximum values for each variable. The inferential analysis used in this research is to test homogeneity using the Levene test, data shows homogeneous if the value based on mean shows >0.05. The normality test was carried out using Shapiro Wilk and the data was said to be normally distributed if the significance value was >0.05. In hypothesis testing, the test used is the Wilcoxon signed rank test with a significance level of $p \leq 0.05$.

Ethical Clearance

This study received ethical approval from the Health Research Ethics Committee, Faculty of Nursing, Airlangga University. Respondents were informed about the research objectives, benefits, and potential risks, and their confidentiality was guaranteed. Participation was voluntary, with the right to refuse or withdraw at any time. The researcher upheld honesty, followed the approved methodology, and ensured accurate interpretation of respondents' knowledge levels.

3. RESULTS

Table 1. Distribution of respondents' demographic characteristics and knowledge levels.

Characteristics	Intevention Group		Control Group	
	f	%	f	%
Age				
12 Years	2	6.1	3	9.1
13 Years	18	54.5	24	72.7
14 Years	13	39.4	6	18.2
Homogenity Test	0.000			
First Menstrual Age	17	51.5	16	48.5
≤ 11 Years	16	48.5	16	48.5
12-13 Years	0	0.0	1	3.0
≥ 14 Years				
Homogenity Test	0.002			
Number of Siblings	0	0.0	5	15.2
Only Child	30	90.9	23	69.7
1-3 Children	3	9.1	4	12.1
4-5 Children	0	0.0	1	3.0
>5 Children				
Homogenity Test	0.004			
History of Menstrual Pain	33	100.0	33	100.0
Yes	0	0.0	0	0.0
No				
Homogenity Test	0.000			
Drug Consumption History	0	0.0	0	0.0
Yes	33	100.0	33	100.0
No				
Homogenity Test	0.007			
Menstrual Period Length	0	0.0	1	3.0
1-2 Days	7	21.2	4	12.1
3-6 days	26	78.8	28	84.8
≥ 7 days				
Menstrual Cycle	16	48.5	17	51.5
Regular	17	51.5	16	48.5
Irregular				

Table 1 shows the demographic characteristics of adolescent girls with the intervention group most at the age of 13 years (54.5%) with the first menstrual period of 51.5% ≤ 11 years. The number of siblings is most around 1-3 children in one house (90.9%), with a history of menstrual pain 100.0% and none of them consume drugs. The average duration of menstruation is ≥ 7 days (78.8%) and the menstrual cycle is irregular (51.5%). In the control group, it was shown that 72.7% were 13 years old with the first menstrual period at the age of 12-13 years (48.5%). The number of siblings as many as 69.7% were children 1-3. The history of menstrual pain is the same as 100.0% there is menstrual pain and none of them consume drugs. The length of menstruation is ≥ 7 days (84.8%) and the menstrual cycle is irregular as much as 48.5%. Data on the characteristics of respondents before the intervention was carried out was first tested for homogeneity to prove that the two treatment groups and the control group were homogeneous. Based on the homogeneity test, it shows that all respondent characteristics show a p value <0.05, which means that all respondents from the two groups are not homogeneous (Table 1).

Table 2. Pain Intensity in Adolescence with Dismenore Before and After Intervention (n=66)

Pain Intensity	Treatment Group			
	Pre Test		Post Test	
	n	%	n	%
No Pain	0	0.0	10	30.3
Mild Pain	16	48.5	23	69.7
Moderate Pain	17	51.5	0	0.0
Normality test	0,000		0,005	
Pain Intensity	**Control Group**			
	Pre Test		**Post Test**	
	n	%	n	%
No Pain	0	0.0	0	0.0
Mild Pain	18	54.5	33	100.0
Moderate Pain	15	45.5	0	0.0
Normality test	0,000		0,000	

Table 3. Effect Abdominal Stretching Exercise on Adolescence with Dismenore (n=66)

Pain Intensity	Treatment Group	Control Group
Pretest (Mean ± SD)	2.52± 0.173	2.45± 0,040
P Value	0.340**	
Posttest (Mean ± SD)	1.70± 0.100	2.00± 0,788
P Value	0.001*	
Value Δ	0,05694	00.45
P value	0,000 *	0,514 *

Dysmenorrhea pain in adolescent girls in the intervention group before being given abdominal stretching exercise showed that 48.5% were in the mild pain category and 51.5% were in moderate pain. While after being given the intervention, it was shown

that 30.3% of adolescent girls did not feel pain and 69.7% felt mild pain, this showed that there was an improvement in menstrual pain in adolescent girls. In the control group, it showed that 54.5% were in the mild pain category and 45.5% were in moderate pain, then in the post-test it showed that 100% were in mild pain, the control group showed that all adolescent girls felt menstrual pain. Based on data normality testing, the results show a p value < 0,05 so the data shows that it is not normally distributed. It was found that the data was not normally distributed, so the non-parametric test was chosen as an inferential test, namely using the Wilcoxon rank test.

The results of the inter-group test showed that the pretest values of both groups showed p = 0.340 so that it was known that there was no significant difference in the pretest results of the study. While the post-test showed that the p value = 0.000, this indicates that there was a significant difference after the abdominal stretching exercises intervention was given.

4. DISCUSSION

In menstruating adolescents, dysmenorrhea is a common complaint caused by increased prostaglandin levels that trigger uterine contractions, vasospasm, ischemia, and abdominal cramps, leading to pain that can disrupt daily activities. This causes a decrease in their quality of life (Barati et al., 2021). This is in line with research which shows that adolescent girls with dysmenorrhea experience pain before and during menstruation and most experience pain that comes and goes. In addition, adolescent girls also experience accompanying complaints in the form of back pain and headaches (Purwandani & Anggraini, 2023).

Abdominal stretching exercises can reduce dysmenorrhea experienced by adolescents because there are movements that can stretch and develop flexibility or flexibility of the abdominal area to reduce the intensity of menstrual pain (Kas et al., 2020). The movements carried out focus on the pelvic area so that tense uterine muscles relax and pain will be reduced. This technique can also stimulate an increase in the production of endorphin hormones in the body which are produced by the brain. The release of endorphin hormones in the body has an impact on reducing the pain scale (Agrawal & Ahmed, 2021). This is in line with research about abdominal stretching exercises can reduce dysmenorrhea pain. Exercise will result in an increase in endorphin hormones 4-5 times in the blood which function as natural sedatives so that they create a sense of comfort. Increased endorphins can reduce pain during contractions. This can happen because endorphin hormones are non-specific analgesics (Çelik et al., 2024; López-Liria et al., 2021).

The intensity of menstrual pain in adolescent girls from the results of this study showed a significant decrease in the intervention group compared to the control group. From the results of the pretest and posttest values that had been carried out, it was found that most of the intervention groups experienced a decrease after the action was taken (Setyowati et al., 2023; Upganlawar et al., 2023). This is in line with research there was a significant difference in pain intensity after the abdominal stretching exercise technique was performed. This is also supported by research conducted which found that abdominal stretching exercise can reduce dysmenorrhea pain (Fathy et al., 2022). Where the results of data analysis using the Wilcoxon test showed a value (p = 0.000) with a p value <0.05. Moderate intensity physical exercise can help reduce pain by distracting attention from pain, producing feelings of relaxation and reducing stress.

During dysmenorrhea, some muscles experience tension. In doing abdominal stretching exercise techniques, there are movements that can stretch and flex the abdominal area to reduce the intensity of menstrual pain which is done during dysmenorrhea to increase muscle strength, endurance and muscle flexibility (Suindri et al., 2021). Abdominal stretching done during dysmenorrhea can relax tense muscles (Munthe et al., 2023). The movements carried out focus on the pelvic area so that tense uterine muscles relax and pain will be reduced. In addition, doing abdominal stretching exercise techniques can release endorphins in the body, where the function of endorphins is as a sedative and can reduce dysmenorrhea pain (Prastiwi et al., 2021). Based on the results of this study, it can be assumed that abdominal stretching exercises can be used as a non-pharmacological therapy that can reduce the intensity of dysmenorrhea pain and this exercise is a solution that can be done independently.

5. CONCLUSION

Abdominal stretching exercise technique can reduce the intensity of dysmenorrhea pain in adolescent girls. It is shown from the results of the study where the intensity of menstrual pain felt decreased from an average value before the action was 2.52 after the abdominal stretching exercise technique decreased to 1.70. From the results of the study, it was found that there was an effect of abdominal stretching exercise technique on the intensity of dysmenorrhea pain in adolescents.

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