

# The effectiveness of abdominal stretching exercise versus breathing relaxation with nature sounds on the level of dysmenorrhea

Faridah Umamah, R. Khairiyatul Afiyah

Department of Nursing, Nursing and Midwifery Faculty, Universitas Nahdlatul Ulama Surabaya, Indonesia

## Abstract

Menstruation usually comes accompanied by several complaints, such as dysmenorrhea. The intervention of abdominal stretching and breathing relaxation with Nature sounds can increase muscle relaxation so as to reduce menstrual pain. This study aimed to analyze the effectiveness of abdominal stretching exercise versus breathing relaxation with nature sounds on dysmenorrhea levels. This study was a quasi-experimental design with a two-group comparison using a pre-test and post-test approach. The experimental group received abdominal stretching, while the control group underwent breathing relaxation with

nature sounds. The inclusion criteria were adolescents aged 11–20 years who experienced primary dysmenorrhea. The total sample consisted of 30 young women in the abdominal stretching intervention group and 30 young women in the breathing relaxation with nature sounds group. Data were collected using a pain assessment instrument, namely the Numerical Rating Scale (NRS). The data were analyzed using paired t-tests to measure differences in pre-test and post-test scores within the groups and independent sample t-tests to compare post-test scores between the two groups. The results of the paired T-test showed that abdominal stretching and breathing relaxation with nature had an effect on pain level during menstruation with p-value was 0.000 ( $p < 0.05$ ). After the intervention, the menstrual pain was reduced in both groups. Abdominal stretching exercise and breathing relaxation with Nature sounds were able to reduce menstrual pain in adolescent girls, therefore these interventions were recommended for young women who experience primary dysmenorrhea.

Correspondence: Faridah Umamah, Department of Nursing, Nursing and Midwifery Faculty, 60237, Universitas Nahdlatul Ulama Surabaya, Indonesia.

E-mail: umamahfarida@unusa.ac.id

Key words: abdominal stretching; breathing relaxation; dysmenorrhea; adolescents.

Contributions: FU conceptualization, data curation, formal analysis, methodology, validation, visualization, writing – original draft, review & editing; RKA conceptualization, investigation, methodology, validation, and writing – original draft, review & editing.

Conflict of interest: the authors declare no conflict of interest.

Ethics approval and consent to participate: this study was granted ethical clearance from Institutional review board Universitas Nahdlatul Ulama, Surabaya, Indonesia. Number: 026/EC/KEPK/UNUSA/2021.

Patient consent for publication: participants who agreed to join in this study must signed the informed consent, however if the participants feel tired, they allowed to withdraw in the middle session.

Funding: this research did not receive external funding

Availability of data and materials: all data generated or analyzed during this study are included in this published article.

Acknowledgement: we would like to thankful to Universitas Nahdlatul Ulama, Surabaya, Indonesia for their valuable support.

Received: 23 November 2024.

Accepted: 5 March 2025.

Early access: 24 April 2025.

This work is licensed under a Creative Commons Attribution 4.0 License (by-nc 4.0).

©Copyright: the Author(s), 2025

Licensee PAGEPress, Italy

Healthcare in Low-resource Settings 2025; 13(s1):13416

doi:10.4081/hls.2025.13416

*Publisher's note: all claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article or claim that may be made by its manufacturer is not guaranteed or endorsed by the publisher.*

## Introduction

Menstruation is a natural physiological process that often comes with various complaints, one of the most common being menstrual pain or dysmenorrhea. Dysmenorrhea typically lasts for one to several days during menstruation and represents one of the most prevalent gynecological issues, affecting over 50% of women globally.<sup>1-3</sup> This condition frequently impairs daily activities, sometimes causing school or work absences for up to three days, especially among adolescents.<sup>4,5</sup> Such disruptions negatively impact the teaching and learning process, making it challenging for young women to concentrate due to the discomfort caused by menstrual pain.<sup>6</sup>

The World Health Organization (WHO) reports that the global incidence of dysmenorrhea is alarmingly high, with an average prevalence of approximately 90%.<sup>7,8</sup> In Indonesia, the prevalence of primary dysmenorrhea is reported to be 54.89%, while secondary dysmenorrhea accounts for 9.36%.<sup>9</sup> The primary causes of dysmenorrhea include hormonal changes during menstruation,<sup>10</sup> which are often exacerbated by factors such as anxiety and stress.<sup>11,12</sup> The stress response triggers the activation of the sympathetic nervous system, releasing hormones and peptides that stimulate uterine muscle contractions. Elevated levels of prostaglandins and vasopressin amplify these contractions,<sup>13</sup> compressing nerve endings and intensifying menstrual pain. Typically, prostaglandin levels peak on the first day of menstruation and gradually decrease over subsequent days, leading to a reduction in pain intensity.<sup>14</sup>

While pharmacological treatments are commonly used for dysmenorrhea, non-pharmacological therapies have gained increasing attention due to their accessibility and minimal side effects.<sup>15-17</sup> Previous studies have explored the efficacy of non-pharmacological interventions such as exercise and breathing

relaxation techniques;<sup>18,19</sup> however, research in this area remains limited. Exercise, for example, can alleviate menstrual pain by promoting blood circulation and stimulating the release of endorphins.<sup>20,21</sup> Abdominal stretching exercises, in particular, have been shown to enhance muscle relaxation, endurance, and flexibility, thereby reducing pain. Similarly, breathing relaxation techniques increase oxygen supply to the brain, which can promote calmness and alleviate discomfort. Notably, the combination of breathing relaxation with nature sounds has been reported to enhance relaxation and comfort in patients.

This study aims to address the existing gaps in research by comparing the effectiveness of abdominal stretching exercises and breathing relaxation with nature sounds in alleviating primary dysmenorrhea. By providing empirical evidence on the comparative benefits of these interventions, this study seeks to offer practical, non-pharmacological solutions for managing dysmenorrhea. The findings have the potential to guide young women in choosing appropriate and effective methods for relieving menstrual pain, thereby improving their overall quality of life.

## Materials and Methods

### Study design

This study was quasi-experimental, with two groups comparison pre and post design. Experiment group was abdominal stretching and control group was breathing relaxation with nature sounds

### Sample and sampling

Total sample was 60 people, 30 young women who were given an intervention using abdominal stretching exercise and 30 young women were given an intervention using breathing relaxation with Nature sounds. This study used a purposive sampling technique following inclusion criteria respondents who experienced menstrual pain (dysmenorrhea) which begins within 1-2 years after menarche, pain starts before or at the onset of menstruation and lasts 1-3 days, pain in the lower abdomen, and may radiate to the lower back and legs, pain is felt as cramping, intermittent, or as a dull ache. Exclusion criteria was adolescents who take anti-pain medication when menstrual pain occurs (dysmenorrhea). This study was conducted at one of senior high school in East Java, Indonesia. in April-June 2021.

### Study collection

The level of dysmenorrhea was measured periodically using a pain assessment instrument: the Numerical Rating Scale (NRS). The intervention in this study was abdominal stretching exercise and breathing relaxation with nature sounds were given on the first day when the samples experienced menstrual pain. Before intervention, we measured the level of menstrual pain using NRS. Each intervention was given with duration 15-20 minutes, three times a day, throughout the menstrual cycle. We measured level of pain on the last day of the treatment. In this study, we followed the previous abdominal stretch exercise guideline.<sup>22</sup>

### Variables and instruments

The independent variables of this study were abdominal stretching exercise versus breathing relaxation with nature sounds, while the dependent variable was pain level during menstruation. The level of dysmenorrhea was measured periodically using a pain assessment instrument: the Numerical Rating Scale (NRS).

## Data analysis

Data was analyzed using Paired t Test to measure the difference in pre-test and post-test scores in two groups (the abdominal stretching exercise group versus the breathing relaxation with Nature sounds group). In addition, independent sample t test to measure the difference in post test between the two groups. The significance level was considered less than 0.05.

## Ethical clearance

This study was granted ethical clearance from Institutional review board Universitas Nahdlatul Ulama, Surabaya, Indonesia. Number: 026/EC/KEPK/UNUSA/2021. Participants who agreed to join in this study must signed the informed consent, however if the participants feel tired, they allowed to withdraw in the middle session.

## Results

### Characteristic of respondents

The respondents' characteristics based on age were categorized following Hurlock (2011) into early adolescence (11–13 years), middle adolescence (14–16 years), and late adolescence (17–20 years).<sup>23</sup> Most respondents fell within the middle adolescence group (14–16 years). Regarding the age at first menstruation (menarche), it was categorized into early menarche (<11 years), normal menarche (11–13 years), and late menarche (>13 years).<sup>24</sup> The majority of respondents had normal menarche, with most experiencing it on the first day (Table 1).

### The effect of abdominal stretching exercise on dysmenorrhea and nature sound on dysmenorrhea

Table 2 showed the result of abdominal stretching exercise was 0.000 ( $p < 0.05$ ), which means that abdominal stretching exercised reduced the level of dysmenorrhea pain. After intervention, the menstrual pain was reduced from 4.34 to 2.34 (1.90 difference). Meanwhile, breathing relaxation with nature sounds also reduced the level of dysmenorrhea pain ( $p < 0.05$ ). After intervention, the menstrual pain was reduced from 6.44 to 4.84 (1.60 difference)

**Table 1.** Characteristic of respondents.

	Frequency (n)	Percentage (%)
Age (years old)		
11-13	0	0
14-16	40	66.7
17-20	20	33.3
Total	60	100.0
Menarche		
<11	2	3.3
11-13	52	86.7
>13	6	10.0
Total	60	100.0
Time of menstrual pain (day)		
1	18	30.0
2	20	33.3
3	22	36.7
Total	60	100.0

### The effectiveness of abdominal stretching exercise versus breathing relaxation with nature sounds on level of dysmenorrhea

Table 3 showed the significance value (2-tailed) was 0.000 ( $p < 0.05$ ), which means there was an average difference for both groups. The mean value of abdominal stretching exercise was lower than breathing relaxation with nature sounds.

### Discussion

This study demonstrated that both abdominal stretching exercise and breathing relaxation with nature sounds significantly reduced dysmenorrhea levels among adolescent girls. However, abdominal stretching exercise was found to be more effective, as indicated by a greater mean difference in pain reduction compared to breathing relaxation with nature sounds.

The results of this study showed that abdominal stretching exercise was able to reduce the menstrual pain. Abdominal stretching exercise is a physical exercise by stretching the abdominal muscles during menstrual pain.<sup>16,19</sup> This exercise is for muscle flexibility, increasing muscle strength, reducing muscle tension, reducing anxiety,<sup>27</sup> reducing the risk of injury and reducing pain.<sup>28</sup> Abdominal stretching exercises can trigger the brain to produce endorphins. Peripheral pain neurons send signals to synapses and endorphins will block the release of substance P from sensory neurons. So transmission of pain impulses in the spinal cord is inhibited.<sup>29</sup> The finding of this study similar with previous study which mentioned that exercise may have effect on decreasing menstrual pain.<sup>26,30</sup> Specifically, there is a study regarding abdominal stretching exercise, it was mentioned that abdominal stretching exercise effective to reduce menstrual pain, it

was reduced from 7.04 to 1.91 (5.09 difference).<sup>22</sup> The results of this study also showed that breathing relaxation was able to reduce the menstrual pain. The breathing relaxation with nature sounds is breathing relaxation techniques that involves an element of belief so it can decrease in Oxygen consumption and can create comfort as well as feeling calm.<sup>31,32</sup> Nature sounds music will provide peace for those who listen it.<sup>33</sup> This music has a constant rhythm and provides balance to a person’s heartbeat and pulse. If oxygen levels are sufficient in the brain, the body will relax.<sup>34</sup> This study in line with previous study that mentioned that breathing relaxation can reduce of patient’s pain, especially in primary dysmenorrhea.<sup>35</sup>

This study also compares the mean difference pain between abdominal stretching exercise and breathing relaxation with Nature sounds on menstrual pain. Abdominal stretching exercise was more effective than breathing relaxation with Nature sounds to reduce the level of menstrual pain. This result in line with previous study that mentioned abdominal stretching exercise was effective to decrease menstrual pain, however this study compare with cold compress therapy.<sup>22</sup> Abdominal stretching exercise can be an alternative therapy to reduce menstrual pain among adolescents.

Several limitations in this study were considered. This study used the experimental methods with a short time, once during menstrual cycle and it was similar with previous study,<sup>22</sup> further study is needed to conduct intervention for long period to maintain the effect of interventions. This study did not measure prostaglandin level, so it was required to measure prostaglandin as a more objective level of pain. Purposive sampling, minimum sample size and sampling area were also our limitation, so it must be careful to interpret the results. Beside these limitations our study revealed that abdominal stretching and breathing relaxation with Nature sounds were able to reduce the level of menstrual pain. Both of these interventions have the same benefit for the management of menstrual pain, including making relaxation,

**Table 2.** Paired sample T test for experiment and control group.

		Total score		Paired Differences			p
		Mean	Std. Deviation	95% Confidence interval of the difference	Lower	Upper	
Group 1	Before intervention	139	4.34	1.67			
	After Intervention	78	2.44	1.56			
	Pre Intervention - Post Intervention	21	1.60	0.95	1.26	1.92	0.000*
Group 2	Before intervention	113	6.44	1.36			
	After Intervention	92	4.84	1.41			
	Pre Intervention - Post Intervention	21	1.60	0.95	1.26	1.92	0.000*

**Table 3.** The difference in menstrual pain between the abdominal stretching exercise group and breathing relaxation with nature sounds.

Variable	Group		p
	Abdominal stretching exercise	Breathing relaxation with nature sounds	
Before intervention			
Mean±SD	4.34±1.67	6.44 ±1.36	0.321
After intervention			
Mean±SD	2.44±1.56	4.84±1.41	0.000*
Differences of pain before and after intervention	0.000	0.000	
Mean difference			
Mean±SD	1.90 ±0.11	1.60 ±0.95	0.000*

\* $p < 0.05$ .

reducing anxiety, pain and muscle tension. However, based on this study the mean of abdominal stretching in adolescent girls was lower which means it was better to reduce the level of dysmenorrhea pain compared to breathing relaxation on faith with Nature sounds. Based on these results, participant can choose both of these interventions to decrease menstrual pain or prefer to choose abdominal stretching exercise.

## Conclusions

The results of the study showed that there was a statistically significant difference of menstrual pain before and after intervention mean difference between the groups of abdominal stretching exercise and breathing relaxation with Nature sounds. Abdominal stretching was proven to be more effective in reducing the level of menstrual pain based on score of menstrual pain. Suggestions for adolescent girls who experience menstrual pain can do abdominal stretching exercises or breathing relaxation, as an alternative to reduce menstrual pain.

## References

- Fernandez H, Barea A, Chanavaz-Lacheray I. Prevalence, intensity, impact on quality of life and insights of dysmenorrhea among French women: A cross-sectional web survey. *J Gynecol Obstet Hum Reprod* 2020;49:101889.
- Ameade EPK, Amalba A, Mohammed BS. Prevalence of dysmenorrhea among University students in Northern Ghana; its impact and management strategies. *BMC Womens Health* 2018;18:39.
- Arafah AE, Senosy SA, Helmy HK, Mohamed AA. Prevalence and patterns of dysmenorrhea and premenstrual syndrome among Egyptian girls (12–25 years). *Middle East Fertil Soc J* 2018;23:486–90.
- Al-Matouq S, Al-Mutairi H, Al-Mutairi O, Abdulaziz F, Al-Basri D, Al-Enzi M, et al. Dysmenorrhea among high-school students and its associated factors in Kuwait. *BMC Pediatr* 2019;19:80.
- Lutfiandini CT, Kusumaningrum T, Armini NKA. Pain Self-management in Adolescent with Dysmenorrhea. *Pediatric Nurs J* 2020;6:66–73.
- Suvitie P. Dysmenorrhea in teenagers. *Duodecim* 2017;133:285–91.
- Al-Kindi R, Al-Bulushi A. Prevalence and Impact of Dysmenorrhoea among Omani High School Students. *Sultan Qaboos Univ Med J* 2011;11:485–91.
- Tangchai K, Titapant V, Boriboonhirunsarn D. Dysmenorrhea in Thai adolescents: prevalence, impact and knowledge of treatment. *J Med Assoc Thai* 2004;87:S69-73.
- Ismail IF, Kundre R, Lolong J. Hubungan Tingkat Stres Dengan Kejadian Dismenorea Pada Mahasiswi Semester VIII Program Studi Ilmu Keperawatan Fakultas Kedokteran Universitas Sam Ratulangi Manado. *E-journal Keperawatan (e-Kp)* 2015;3:1–8.
- Barcikowska Z, Rajkowska-Labon E, Grzybowska ME, et al. Inflammatory markers in dysmenorrhea and therapeutic options. *Int J Environ Res Public Health* 2020;17:1191.
- Pakpour AH, Kazemi F, Alimoradi Z, Griffiths MD. Depression, anxiety, stress, and dysmenorrhea: a protocol for a systematic review. *Syst Rev* 2020;9:65.
- Nursalam N, Oktaviani, Armini, Efendi F. Analysis of the stressor and coping strategies of adolescents with dysmenorrhoea. *Indian J Public Heal Res Dev* 2018;9:381–6.
- Buckley S, Uvnäs-Moberg K, Pajalic Z, et al. Maternal and newborn plasma oxytocin levels in response to maternal synthetic oxytocin administration during labour, birth and postpartum - a systematic review with implications for the function of the oxytocinergic system. *BMC Pregn Childbirth* 2023;23:137.
- Smith RP. The role of prostaglandins in dysmenorrhea and menorrhagia. In *Dysmenorrhea and menorrhagia. A clinician's guide*. Springer Nature: 2018; pp. 75–88.
- Herviana C, Farapti F. The relationship between knowledge and patterns of herbal drink product consumption with dysmenorrhea of female adolescent. *Amerta Nutr* 2023;7:203–9.
- Imandiri A, Faizah R, Rakhmawati. Acupuncture and papaya leaf powder (*Carica papaya L*) to treat dysmenorrhea. *Malaysian J Med Heal Sci* 2019;15:37–9.
- Noor S, Norfitri R. The changes of premenstrual symptoms after aerobic exercise intervention. *J Ners* 2015;10:38–47.
- Renuka K, Jeyagowri S. Stretching exercise therapy and primary dysmenorrhea – nursing perspectives. *IOSR J Nurs Heal Sci Ver III* 2015;4:1-4.
- Carroquino-Garcia P, Jiménez-Rejano JJ, Medrano-Sanchez E, et al. Therapeutic exercise in the treatment of primary dysmenorrhea: a systematic review and meta-analysis. *Phys Ther* 2019;99:1371–80.
- Shahrjerdi S, Sheikhhoseini R, Eyvazi M. Effects of stretching exercises on primary dysmenorrhea in adolescent girls. *Biomed Hum Kinet* 2012;4:127-32.
- Kusumaningrum T, Nastiti AA, Dewi LC, Lutfiani A. The correlation between physical activity and primary dysmenorrhea in female adolescents. *Indian J Public Heal Res Dev* 2019;10:2559–63.
- Cahya Rosyida DA, Suwandono A, Ariyanti I, et al. Comparison of effects of abdominal stretching exercise and cold compress therapy on menstrual pain intensity in teenage girls. *Belitung Nurs J* 2017;3:221–8.
- Hurlock EB. Adolescent development. Adolescent development. New York, NY, US: McGraw-Hill; 1973.
- Chumlea WC, Schubert CM, Roche AF, et al. Age at menarche and racial comparisons in US girls. *Pediatrics* 2003;111:110–3.
- Handayani SG, Ayubi N, Komaini A, Lesmana HS, Kusnanik NW, Herawati L, et al. N-3 polyunsaturated fatty acids (PUFAs) and physical exercise have the potential to reduce pain intensity in women with primary dysmenorrhea: Systematic Review. *Retos* 2023;48:106–12.
- Pitaloka SA, Triharini M, Nimah L. Relationship between Nutritional Status, Exercise Level and Recreational Level with Dysmenorrhea in Nursing Students at Airlangga University. *Pediatric Nurs J* 2022;8:26–37.
- Gordon BR, McDowell CP, Lyons M, Herring MP. Acute and chronic effects of resistance exercise training among young adults with and without analogue Generalized Anxiety Disorder: A protocol for pilot randomized controlled trials. *Mental Health Phys Act.* 2020;18:100321.
- Murtiningsih M, Solihah L, Yuniarti S. The effect of abdominal stretching exercise on dysmenorrhea in adolescent girls. *J Matern Care Reprod Heal* 2019;2. DOI: <https://doi.org/10.36780/jmcrh.v2i3.104>
- Joyce Young J. Handbook for Brunner & Suddarth's textbook

- of medical-surgical nursing.—12th ed. Wolters Kluwer Health/Lippincott Williams & Wilkins.; 2010.
30. Armour M, Ee CC, Naidoo D, et al. Exercise for dysmenorrhoea. *Cochrane database Syst Rev* 2019;9: CD004142.
  31. Toussaint L, Nguyen QA, Roettger C, et al. Effectiveness of progressive muscle relaxation, deep breathing, and guided imagery in promoting psychological and physiological states of relaxation. *Evid Based Complement Alternat Med* 2021;2021:5924040.
  32. Zuriati Z, Surya M, Zahlimar. Effectiveness Active Cycle of Breathing Technique (ACBT) with Pursed Lips Breathing Technique (PLBT) to tripod position in increase oxygen saturation in patients with COPD, West Sumatera. *Enfermería Clínica* 2020;30:164–7.
  33. Chiang LC. The effects of music and nature sounds on cancer pain and anxiety in hospice cancer patients. [Case Western Reserve University School of Graduate Studies]: Case Western Reserve University School of Graduate Studies; 2011.
  34. Horden P (Ed. ). *Music as medicine: the history of music therapy since antiquity* (1st ed.). In: 2000. Routledge;
  35. Purnamasari KD, Rohita T, Zen DN, Ningrum WM. The effect of deep breathing exercise on menstrual pain perception in adolescents with primary dysmenorrhea. *Pertanika J* 2020;2: 649–57.