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Research Article

The Effectiveness of Exercise in Reducing Dysmenorrhoea Pain in Adolescent Women: A Literature Study

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Abstract.
This literature study aimed to identify the effectiveness of exercise in reducing pain thresholds in adolescents with dysmenorrhea. A literature search on Pubmed, Research Gate, ScienceDirect, and Proquest, was conducted from March to June 2022. Stretching, Zumba, FITT, Yoga, Aerobics, and Physical activity were the exercises found in the journal, and the study population was devoted to adolescents. The research design was a Randomized Controlled Trial (RCT) and Quasi-Experiment. The pain scale in the journal used the Visual Analogue Scale for Pain (VASP), Visual Analog Scale (VAS), MCGILL Pain, and the Numeric Rating Scale (NRS). Of the ten journals that were analyzed, exercise was the most effective in reducing pain threshold when adolescents experienced dysmenorrhea. Of the five kinds of exercise found when analyzing the 10 journals, the most effective exercises reduced pain score is 5.62.

Keywords: Dysmenorrhea, exercise, Pain

1. INTRODUCTION

Menstruation is a feature of a woman's maturity and the cycle that occurs during the reproductive period of a woman's life. The menstrual cycle starts from 12-15 years old, a sign that the woman is pubescent (1). Generally, A woman's menstrual period is 3 to 8 days, with an average menstrual cycle of 28 days. Each woman's menstrual cycle is different and varies. Problems are often encountered in most women who feel excruciating pain on the first or second day of menstruation, which is called dysmenorrhea (1).

Dysmenorrhea is the presence of painful cramping of uterine origin that occurs during menstruation and is one of the most common causes of pelvic pain and menstrual disorders (2). Women feel pain during menstruation in the lower abdomen (8). Dysmenorrhea is caused by the contraction of the uterine muscle wall and then pressing the blood vessels and surrounding areas due to obstruction of oxygen supply to the uterus and can trigger pain (4). According to the World Health Organization (WHO), in the research of Yulita et al. (2019), the incidence of dysmenorrhea is relatively high globally, around 16.8 to 81%. On average, in Europe, 45-97% of Bulgarian women have dysmenorrhea, 8.8%, and in Finland, 94% (5). In Indonesia, dysmenorrhea is around 64.25%, consisting of 54.89% primary dysmenorrhea and 9.36% secondary dysmenorrhea (6).

Non-pharmacological management is safer because it does not cause side effects like drugs (7). One effort to eliminate or reduce pain in dysmenorrhea is to exercise where this action does not cause side effects because it uses the body's physiology (8). Exercises during dysmenorrhea increase muscle strength, endurance, and flexibility (dysmenorrhea) (9). Purnamayanti & Utarini (2018) *exercise* can increase oxygenation and stimulate the flow of lymphatic drainage to increase muscle flexibility and maintain and increase the elasticity and flexibility of body tissues. If the exercise is carried out premenstrual, it can reduce the size of a woman's menstrual pain when she has dysmenorrhea.

Exercise or physical exercise can stimulate the release of endorphins in the brain. The spinal cord becomes a natural sedative because it can make you calm and comfortable and reduce pain during menstruation (11). Increased endorphins can have the effect of reducing pain, improving memory, increasing appetite, increasing sex, blood pressure, and breathing; exercise is effective in reducing dysmenorrhea pain (12). the aim study analyzes the effectiveness of exercise in reducing dysmenorrhea pain.

2. MATERIALS AND METHODS

2.1. MATERIALS

One of the treatments for dysmenorrhea for teenagers is exercise. Doing exercise will produce endorphins produced by the brain and spinal cord. The endorphin hormone functions as a natural sedative, causing a feeling of relaxation and comfort. Exercise has been shown to increase levels of -endorphins four to five times in the blood. So the more you exercise, the higher your endorphins. Increased endorphins are closely

related to decreased pain, improved memory, increased appetite, sexual ability, blood pressure, and breathing (13).

Pain is an unpleasant emotional and sensory experience due to actual or potential tissue damage and describes the conditions under which the damage occurred. In addition, pain is a warning sensation for the brain against a stimulus that can cause damage to body tissues (14). Dysmenorrhea or dysmenorrhea is pain during menstruation. The word dysmenorrhea comes from the ancient Greek (Greek) word that comes from ”days,” which means difficult, abnormal pain, which means moon, and ”rhea,” which means flow or current. In short, *dysmenorrhea* can be defined as difficult and painful menstrual flow (15).

Types of exercise that can reduce dysmenorrhea (16) **:**

2.2. Aerobics

This exercise can reduce the disruption of dysmenorrhea in quality of life and social activities. Women who exercise regularly experience fewer side effects and physical symptoms throughout the menstrual cycle. Aerobic exercises, such as pelvic tilts, walking, cycling, and swimming, are recommended by health care providers for women. Those women increase blood flow, relax abdominal muscles, reduce pelvic pain, and reduce pressure on the nerve center, pelvic organs, and digestive tract (17).

2.3. Zumba

The Zumba training program is inspired by combining rhythm and step aerobics that engages the entire body and creates a less formal choreography, easier and more effective. Zumba has beneficial effects on weight loss, has social and psychological benefits, and provides a slight increase in muscle strength, flexibility, and aerobic capacity. Therefore, Zumba can be more beneficial than other types of exercise for relieving menstrual pain or dysmenorrhea (18)..

2.4. Abdominal stretching exercise

Physical exercise stretches the muscles, especially the stomach, for 10-15 minutes. This exercise is designed to increase muscle strength, endurance, and flexibility, reduce muscle tension, increase blood circulation, reduce anxiety, and reduce risk. Abdominal stretching exercise is one of the non-pharmacological interventions that can be done to

prevent and reduce dysmenorrhea pain experienced by adolescent girls. The abdominal stretching exercise intervention consisted of regular and structured movements that naturally stimulated mechanoreceptors and beta A neurons to more quickly release inhibitory neurotransmitters. This defense mechanism or pain gate, called the gelatinous substance, is closed and stimulates weak T cells (13).

2.5. Pilates

Pilates exercise can increase mental and physical strength, increase flexibility, muscle strength, coordination, balance, and breathing, produce stretching of the structures involved, and reduce prostaglandin levels to relieve pain (19). Pilates exercise can also increase circulating levels of endorphins. Pilates exercise stimulates the brain to secrete endorphins into the blood four to five times and raises the pain threshold. In addition, the pituitary gland produces endorphins, which function as the body's natural pain reliever (20).

2.6. METHODS

The research design used is a literature study or Literature Review. Databases used are PubMed, Research gate, Science Direct, and ProQuest. Keywords used Exercise OR Physical Activity AND Dysmenorrhea OR Menstrual Pain. Inclusion Criteria: 2015-2022 journals; adolescent and adult population; research design RCT (Randomized Controlled Trial), Quasy Experimental. Exclusion criteria: literature review, systematic review, meta-analysis, cross-sectional; the percentage of JBI is below 70%. Check the mesh terms using PICOS: Population: Teenagers and adults; Intervention: Exercise; Outcome: Dysmenorrhea; Study design: RCT, Quasy experimental.

3. RESULTS

The search results in this study used the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines. At the beginning journal, the results in the database yielded 27,233 journals, and the results of those journals were adjusted according to the inclusion criteria so that the final results obtained 10 journals that were analyzed, as shown in flowchart 1 below:

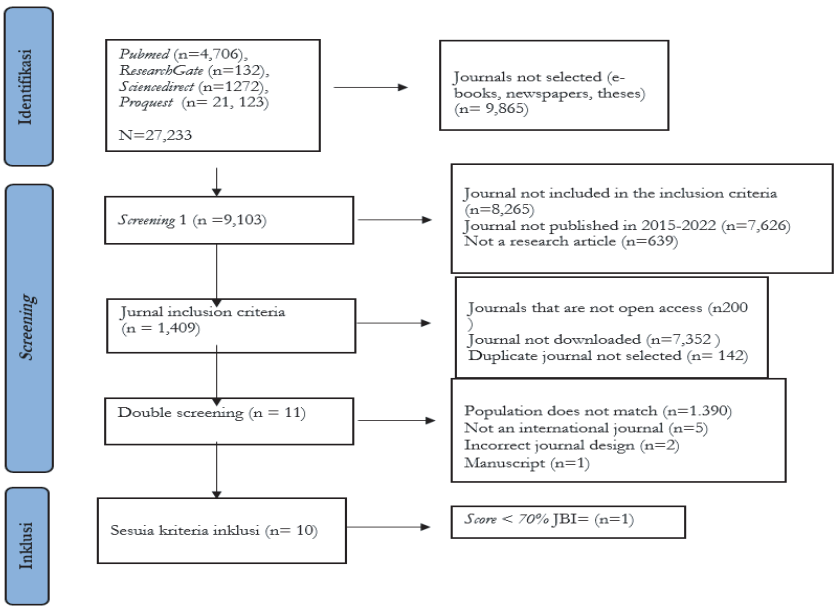

Figure 1: Journal Search Strategy.

Based on the results of the analysis of 10 journals in accordance with the theme of the effectiveness of exercise in reducing dysmenorrhea pain, the results are depicted in flowchart 1.

Table 1 describes the results of the majority analysis using the Visual Analog Scale (VAS) instrument and only 2 (20%) journals using a quasi-experimental journal design. In the 10 international journals that have been analyzed, several exercises are effective in reducing pain in dysmenorrhea, namely.

Table 2 shows that stretching exercises can reduce the pain scale by 5.62 from the initial pain he felt. *Stretching* is stretching the stomach for 10-15 minutes. In addition, physical activity is a type of exercise that reduces the pain scale by only 0.47. Therefore, the action taken is to carry out an exercise program in the form of warming up and cooling down for 10 minutes, warming up and cooling exercises that include walking and jogging, as well as doing physical activity stretching and core strengthening exercises performed for 35 minutes.

4. DISCUSSION

Table 1: Summary of studies.

No	Title (Author)	Study Design	Population	Aim	Results
1.	Effects of a Yoga Program on Menstrual Cramps and Menstrual Distress in Undergraduate Students with Primary Dysmenorrhea: A Single-Blind, Randomized Controlled Trial (Yang & Kim, 2016)	Single-blind, randomized controlled trial.	The population was divided into the yoga group (n=18) and the control group (n=18). Visual Analogue Scale for Pain (VASP) pain measurement tool	Assess the effects of an integrated yoga program for the management of menstrual cramps and menstrual distress in undergraduate Students with primary dysmenorrhea.	The results of the study of the yoga group significantly reduced the intensity of menstrual pain with a P value of <0.0001. Reduction in pain between the intervention and control groups 1.28.
2.	Effect of yoga on the menstrual pain, physical fitness, and quality of life of young women with primary dysmenorrhea (Yonglitthipagon et al., 2017)	Randomized controlled trial	62 participants, yoga group and control group, each group randomly got (n=17) participants.. measure pain Visual Analog Scale (VAS)	Study was to investigate the effect of the specially designed yoga program 4 on the menstrual pain, physical fitness, and quality of life (QOL) of non-athlete women 5 with primary dysmenorrhea (PD) aged 18–22 years	The results showed that yoga could significantly reduce the severity of primary dysmenorrhea and improve physical fitness with a P value <0.05. This intervention can reduce pain 1.8.
3.	Use of ginger versus stretching exercises for the treatment of primary dysmenorrhea: a randomized controlled trial (Shirvani et al., 2017)	Randomized controlled trial.	In this study, there were (n=122) female students, divided into the gymnastic training group (n=61) and the ginger group (n=61). Visual Analog Scale (VAS) pain measurement tool	Use of ginger versus stretching exercises for the treatment of primary dysmenorrhea: a randomized controlled trial	The results showed that stretching exercises had a more effective and significant effect with P<0.001. Reduction in pain between the intervention and control groups 2.25.
4.	Comparison Of Effects Of Abdominal Stretching Exercise And Cold Compress Therapy On Menstrual Pain Intensity In Teenage Girls (Cahya Rosyida et al., 2017)	Quasy experimental	46 participants 23 samples in the abdominal stretching exercise group and 23 samples in the cold compress group. Visual Analog Scale (VAS .) pain measurement tool	Examine the effect of abdominal stretching exercise and cold compress therapy to decrease the intensity of menstrual pain in young women.	The results showed that there was a significant effect on abdominal stretching exercises to reduce the intensity of menstrual pain with a P value <0.05. Reduction in pain between the intervention and control groups 3.91.
5.	Abdominal Stretching Exercise in Decreasing Pain of Dysmenorrhea Among Nursing Students (Bustan et al., 2018)	Quasy experimental	Participants were divided into two groups, the intervention group (n=48) who received stretching exercises and the control group (n=48) who did not receive stretching exercises.	The effect of abdominal stretching in reducing dysmenorrheal pain rate among students operational.	The results of the study have proven that the intervention group can significantly reduce the degree of dysmenorrhea pain, with a P value = 0.001.
6.	The difference in the effectiveness of warm compress and active stretching exercise in reducing dysmenorrhea pain (Tianing et al., 2021)	Randomized controlled trial	This study had as many as (n=20) female students who were divided into two groups, namely the control group who was given warm compresses and the treatment group who received active stretching exercises. Each group got (n=10) students. Menstrual Distress Questionnaire (MDQ) pain measurement tool	Research on the relationship of prostaglandins with the appearance of pain during menstruation.	Active stretching exercise was significant to reduce dysmenorrhea pain, with P<0.05. Reduction in pain level was 5.62.
7.	The Effect of Zumba Exercise on Reducing Menstrual Pain in Young Women with Primary Dysmenorrhea: A Randomized Controlled Trial (Samy et al., 2019)	Randomized controlled trial	Participants were divided into two groups, namely the Zumba group and the control group, each group getting (n=49) participants. Visual Analog Scale (VAS) pain measurement tool	The effect of 8 weeks of regular Zumba exercise on the severity and the duration of menstrual pain in patients with PD	The results of the intervention in the Zumba group were able to significantly reduce the severity and duration of menstrual pain, with a P value of .001. Pain reduction in the control 3.37.

Table 1: Summary of studies.

No	Title (Author)	Study Design	Population	Aim	Results
8.	The Effect of Exercise Plan Based on FITT Protocol on Primary Dysmenorrhea in Medical Students: A Clinical Trial Study (Heidarimoghadam et al., 2019)	Randomized controlled trial study	The 86 participants were divided into two groups, namely physical group 1 or intervention group and physical group 2 or control group, each group received. MCGILL pain gauge	Investigate the effect of an exercise course based on the ACSM protocol and according to the FITT on the severity and duration of dysmenorrhea.	The results of this study showed that performing sports activities based on the FITT exercise program led to a significant reduction in the severity and duration of dysmenorrhea, with a P value <0.001. Reduction in pain between the intervention and control groups 2.26.
9	Effectiveness of Group Aerobic Training on Menstrual Cycle Symptoms in Primary Dysmenorrhea (Akbaş & Erdem, 2019)	Randomized controlled experimental study	The population of 45, divided into two in the AEG (Aerobic exercise grub) group (n=23) and the control group (n=22). But 5 participants in the group (AEG) and 3 participants from the control group were excluded from the study for using drugs. So that the final population only (n=37) participants were divided into AEG (n=18) and (n=19) groups. Visual Analog Scale (VAS) pain measurement tool	Investigate the effectiveness of a four-week group aerobic training program on premenstrual symptoms, menstrual symptoms, emotional state, and quality of life in females with primary dysmenorrhea.	The results showed that the AEG (Aerobic exercise grub) group given an aerobic training program was effective in reducing premenstrual symptoms, contributing to pain reduction, and improving quality of life in women with primary dysmenorrhea, with a P value = 0.021. the reduction in pain between the intervention and control groups was 0.83.
10	Effectiveness of Physical Activity and Relaxation Techniques in Primary Dysmenorrhea among College Students (Yonglitthipagon et al., 2017)	randomized controlled experimental	30 adolescents with dysmenorrhea were divided into an experimental group and a control group. Each group got (n=15) students.	The effectiveness of physical activities and relaxation techniques in primary dysmenorrhea and related depression among college students.	The results of this study showed that there was an effective change in reducing menstrual-related pain and depression in the intervention and control groups, but there was no significant change between the two groups, with P<0.05. reduction in pain between the intervention and control groups 0.47.

Table 2: Characteristics of tool score pain.

Data Characteristics	N	(%)
Pain Instruments		
Visual Analogue Scale for Pain (VASP)	1	10
Visual Analog Scale (VAS)	6	60
MCGILL Pain	1	10
Numeric Rating Scale (NRS)	1	10
Menstrual Distress Questionnaire (MDQ)	1	10
Research design		
Randomized Controlled Trial (RCT)	8	80
Quasy experimental	2	20

Table 3: Types of exercise and scores for reducing pain levels.

Type of Exercise	Drop Score Pain Level
Yoga exercise	1.8
Stretching exercise	5.62
Zumba exercise	3.37
*Exercise*carried out based on FITT	2.26
Aerobic exercise	0.83
Pscal activity	0.47

4.1. Types and Effectiveness of Exercise to Reduce Dysmenorrhea Pain Scale

The results of the analysis of 10 journals that have been analyzed show the most effective exercise to reduce the pain threshold in women, especially women during dysmenorrhea. This stretching exercise is the most effective intervention that can decrease the score of 5, starting up too. The second sequence of types of exercise was used from 10 journals, namely Zumba, FITT, yoga exercise, aerobic exercise, and physical activity, to reduce the pain scale in dysmenorrhea patients.

4.2. Stretching exercises

The stretching exercise is an intervention to reduce the most significant pain level after the intervention. Stretching exercises are movements to stretch the abdomen and hips that are carried out for 10 to 15 minutes. Stretching can maintain and develop flexibility or flexibility; stretching will also stretch the abdomen's muscles to increase blood flow to the uterus and relax the uterine muscles, and anaerobic metabolism does not occur. Stretching will also affect the body's physiological processes by releasing the hormone Corticotropin Releasing Factor (CRF), which will stimulate the pituitary gland and produce beta-endorphins, causing the body to relax and reduce pain (30). This type of stretching can reduce the pain scale by 5.62 from the initial pain scale.

The results of the ten journals studied showed that it effectively reduced the pain scale of dysmenorrhea. The result has the same results as research by Ouda et al., (2020), which has effective results in reducing dysmenorrhea pain after being given intervention with this stretching action.

4.3. Zumba exercise

The intervention in this study used Zumba exercise movements that were carried out for 60 minutes; the Zumba movement consisted of continuous dance movements with Latin music with varying intensity levels throughout the session, then low-intensity movements started during the first 5 minutes of each session. Each session includes a warm-up song, a cool-down song, and the main body based on steps from the 6 dance styles commonly used in Zumba (Merengue, cumbia, reggaeton, salsa, belly dancing, and pop).

Zumba releases endorphins beta level, which acts as a system analgesic against pain by increasing blood circulation to reduce pain in primary dysmenorrhea (18). Doing Zumba can reduce the pain scale by 3.37. These results indicate that the Zumba intervention effectively reduces the pain scale of dysmenorrhea. However, research (32) had the opposite result, namely having ineffective results or no difference after being given a Zumba intervention to reduce the pain scale of dysmenorrhea.

4.4. FITT

his exercise is done 3 times a week for 8 weeks with different types of exercise, and each first training session starts with 20 minutes, then adds 2-3 minutes to reach 47 minutes.

This journal research uses exercise interventions based on the FITT exercise program:

F: Frequency of exercise program sessions every 8 weeks with 3 sessions, each for a specified period.

I: Maximum heart rate using Karvonen's rule is used to evaluate exercise intensity according to the formula

Q: Exercise time was calculated using ACSM guidelines. Based on this protocol, training sessions start at 20 minutes per session and gradually increase to 47 minutes. During each training session, the time increases by a few minutes (2-3 minutes) until it reaches 47 minutes and then stays at that level.

Q: The workout types are different over 24 sessions and include a series of aerobic exercises on a primary walking basis. In each training session, the first 5 minutes are spent warming up the body and the last 5 minutes cooling down.

Sugiharti (2018) doing sports, the body will produce endorphine hormones produced in the brain and spinal cord. This hormone can function as a natural sedative produced by the brain so as to create a sense of comfort through relaxation techniques and also

the resulting recreation so that it can be used to reduce pain symptoms caused by dysmenorrhea.

This type of intervention is one of the programs to reduce the pain scale of dysmenorrhea. This type of program can reduce the pain scale of dysmenorrhea. The effectiveness of reducing the pain scale is 2.26. In line with the research conducted (32)) doing exercise with the FITT program can reduce the pain scale of dysmenorrhea.

4.5. Yoga Exercises

Of the 10 journals that have been analyzed, 2 journals provide yoga exercises. This intervention was carried out for 10 solar cycles for 15 minutes. First, Shavasana for 5 minutes for relaxation, followed by five cycles of yoga poses, cat, cobra, and fish performed for 10 minutes, and the last one performed several yoga Nidra steps such as rotation of awareness, awareness breath, feeling, sensation and visualization for 30 minutes. The intervention was the selected yoga poses; several sessions were carried out, for the first session 30 minutes before breakfast or dinner or at least 2 hours after breakfast or dinner. Doing Shavasana poses, Surya Namaskar, Supta Vajrasana, Janu Sirsasana, and Pashimottanasana performed twice weekly over a 12-week trial period.Yang & Kim, (2016) those that yoga interventions may be effective in reducing stress, promoting relaxation, and increasing circulation based on gate control theory, which describes the regulation of pain centers in the spinal cord that reduce pain and release natural painkillers in the body.

The relaxation response of the yoga intervention can reduce tension and fear, so that the yoga intervention in our study can effectively reduce the intensity of menstrual pain. In addition, yoga can also activate the pain modulation system in the brain that is projected to the spinal cord and increase the secretion of beta-endorphins, which are natural painkillers in the body (22). This type of exercise can reduce the dysmenorrhea pain scale by 1.8 after being given the intervention. Research from these two journals showed effective results in reducing the pain scale of dysmenorrhea. Kim (2019)has an effective effect in reducing the pain scale of dysmenorrhea.

4.6. Aerobic exercise

The aerobic intervention provided training which was carried out 3 times a week for 4 weeks under the supervision of an experienced physical therapist. Each session lasts

approximately 50 minutes, consisting of five minutes of warm-up, 40 minutes of aerobic fitness training, and five minutes of cooling down.

Aerobics can reduce the symptoms of menstrual disorders such as dysmenorrhea by reducing fatigue and stress. In this case, dysmenorrhea reduction therapy in the form of aerobic exercise is one of the relaxation techniques. In addition, exercise or physical exercise can produce endorphins, and exercise has been shown to increase the levels of endorphins four to five times in the blood, thereby reducing the effects of dysmenorrhea (36).

This aerobic exercise can reduce the dysmenorrhea pain scale by 0.83 and effectively reduce dysmenorrhea pain. Aerobic exercise effectively reduces the pain scale of dysmenorrhea (37).

4.7. Physical activity

The physical activity used in the journal carried out an exercise program in the form of warming up and cooling down for 10 minutes, warming up and cooling down including walking and jogging, and doing physical activity stretching and core strengthening exercises for 35 minutes.

Physical activity affects primary dysmenorrhea because this activity increases the secretion of endorphins. Another side of this intervention facilitates the supply of blood flow to the genital area of adolescents, relaxes the abdominal muscles, and increases vasodilation of blood vessels, thereby causing a decrease in menstrual pain in adolescents. The type of physical activity in question is a moderate physical activity that can prevent and treat dysmenorrhea pain in adolescents (38).

This type of intervention can reduce the pain scale only by 0.47 and has slightly effective results in reducing dysmenorrhea pain. However, Abidin et al. (2019) effectively reduce the pain of dysmenorrhea.

Limitations in this study only focused on primary menstrual pain. Future research is expected to be more complex by analyzing secondary and primary pain.

5. CONCLUSION

The results of the analysis of literary studies from 10 journals can show that of the six exercises: Yoga exercise, *Stretching exercise*, *Zumba exercise*, *Exercise*carried out based on FITT, Aerobic exercise and Physical activity, this type of stretching is the most effective exercise to reduce pain scale in women who experience dysmenorrhea. The

pain threshold score, if done regularly, can reduce to 5.62 from the initial pain scale before this intervention is carried out for 10-15 minutes. Physical activity is an intervention with the slightest reduction in pain relief from dysmenorrhea from the 10 journals, only decreasing by 0.47.

References

[1] Mathur N. Effectiveness Of Exercise In Menstruation Symptoms In Late Adolescents (17-20 Years Of Age). Inreincom. 2020;5(2):5.

[2] Petraglia F, Bernardi M, Lazzeri L, Perelli F, Reis F. Dysmenorrhea And Related Disorders. F1000 Res. 2017;6(0):1–7.

[3] Agustina D. Maryaningsih, Agustin L. Perbedaan Pengaruh Abdominal Streching Exercise Dengan Kompres Hangat Terhadap Penurunan Nyeri Haid (Dismenorhea) Pada Mahasiswi Fisioterapi Stikes Siti Hajar Medan Tahun 2018. Gentle Birth. 2019;2(1):43–7.

[4] Dolang Mw. Air Kelapa Hijau Menurunkan Dismenore Pada Remaja Putri. Visikes J Kesehat Masy. 2021;20(2).https://doi.org/10.33633/visikes.v20i2.4825.

[5] Febrina R. Gambaran Derajat Dismenore Dan Upaya Mengatasinya Di Pondok Pesantren Darussalam Al-Hafidz Kota Jambi. J Akad Baiturrahim Jambi. 2021;10(1):187.

[6] Anggriani W. Relationship Between Stress Level And Sleep Quality With Dysmenorrhea Incidence : Literature Review. Lppmptam; 2021. pp. 316–25.

[7] Fikriyah U. Penerapan Abdominal Stretching Terhadap Penurunan Intensitas Nyeri Dismenore. 2017;877–81.

[8] Setiawan A, Intihana R, Handayani H. Pengaruh Cat Stretch Exercise Terhadap Intensitas Dismenore Pada Siswi Di Sma Muhammadiyah Tasikmalaya. Healthc Nurs J. 2021;3(1):81–9.

[9] Wulandari Y, Subekti Wulandari I, Murharyati A. Cat Stretch Exercise Sebagai Salah Satu Solusi Mengatasi Dismenore Pada Remaja Putri. Jurnalempathycom. 2020;1(1):50–7.

[10] Purnamayanti D, Utarini E. Study Literatur Pengaruh Senam Peroudik (Peregangan Otot Perut Dan Kompres Dingin). Terhadap Penurunan Nyeri Haid Pada Remaja Putri. 2018;8511:87–95.

[11] Partiwi N, Musliha S. Efektivitas Senam Dismenore Dan Abdominal Stretching Exercise Terhadap Intensitas Nyeri Haid Pada Remaja Dismenore Primer Pendahuluan

Dismenore Merupakan Kram Atau Fisik Telah Menarik Perhatian Sebagai Terapi Untuk Mengatasi Nyeri Yang Dirasakan Pada Bagi. J Ber Kesehat. 2021;Xiv(1).

[12] Yulina R, Indrawati I, et al. Efektivitas Senam Yoga Teradap Penurunan Nyeri Disminore Pada Mahasisiwi Di Universitas Pahlawan Tuanku Tambusai Tahun 2020. J Ners. 2020;4:75–80.

[13] Murtiningsih SL, Yuniarti S. The Effect Of Abdominal Stretching Exercise On Dysmenorrhea In Adolescent Girls. Jmcrh. 2018;2(3):247–56.

[14] Hilda Sulistia Alam Sstmtk. Upaya Mengurangi Nyeri Persalinan Dengan Metode Akupresur. Media Sains Indonesia; 2020.

[15] Haerani DU, Hidayah BN, Ariani NN, Rupa A Am KM. Deskripsi Pengetahuan Remaja Putri Tentang Dismenore Di Kelurahan Benjala Kecamatan Bontobahari Kabupaten Bulukumba. Med AlkhairaatJ Penelit Kedokt Dan Kesehat. 2020;2(2):81–90.

[16] Kirmizigil B, Demiralp C. Effectiveness of functional exercises on pain and sleep quality in patients with primary dysmenorrhea: a randomized clinical trial. Arch Gynecol Obstet. 2020 Jul;302(1):153–63.

[17] 17. Elbandrawy AM, Elhakk SM. Comparison Between The Effects Of Aerobic And Isometric Exercises On Primary Dysmenorrhea. Acta Gymnica. 2021;51:0–https://doi.org/10.5507/ag.2021.014.

[18] Samy A, Zaki SS, Metwally AA, Mahmoud DS, Elzahaby IM, Amin AH, et al. The Effect of Zumba Exercise on Reducing Menstrual Pain in Young Women with Primary Dysmenorrhea: A Randomized Controlled Trial. J Pediatr Adolesc Gynecol. 2019 Oct;32(5):541–5.

[19] Eun A. Chang, Koo Is, Choi Jh. The Effect Of Pilates Stabilization Exercise And Kinesio Taping On The Dysmenorrhea And Prostaglandin F2α Of Female University Students. J Int Acad Phys Ther Res. 2018;9(3):1558–63.

[20] Purba R, Saraswati PA, Widnyana M, Adiputra LM. Saraswati Pas, Widnyana M, Adiputra Lmish. Pemberian Pilates Exercise Menurunkan Derajat Dismenore Primer Pada Siswi Di Sma Negeri 3 Denpasar. Maj Ilm Fisioter Indones. 2021;9(1):49.

[21] Yang NY, Kim SD. Effects of a Yoga Program on Menstrual Cramps and Menstrual Distress in Undergraduate Students with Primary Dysmenorrhea: A Single-Blind, Randomized Controlled Trial. J Altern Complement Med. 2016 Sep;22(9):732–8.

[22] Yonglitthipagon P, Muansiangsai S, Wongkhumngern W, Donpunha W, Chanavirut R, Siritaratiwat W, et al. Effect of yoga on the menstrual pain, physical fitness, and quality of life of young women with primary dysmenorrhea. J Bodyw Mov Ther. 2017 Oct;21(4):840–6.

[23] Shirvani MA, Motahari-Tabari N, Alipour A. Use of ginger versus stretching exercises for the treatment of primary dysmenorrhea: a randomized controlled trial. J Integr Med. 2017 Jul;15(4):295–301.

[24] Cahya Rosyida DA, Suwandono A, Ariyanti I, Suhartono S, Mashoedi ID, Fatmasari D; Cahya Rosyida Da. Suwandono A, Ariyanti I, Suhartono S, Mashoedi Id, Fatmasari D. Comparison Of Effects Of Abdominal Stretching Exercise And Cold Compress Therapy On Menstrual Pain Intensity In Teenage Girls. Belitung Nurs J. 2017;3(3):221–8.

[25] Bustan M, Seweng A. Ernawati. Abdominal Stretching Exercise In Decreasing Pain Of Dysmenorrhea Among Nursing Students. J Phys Conf Ser. 2018 Jun;1028(1).

[26] Tianing N, Nugraha MH, Indrayani AW, Widyadharma IP. Nugraha Mhs, Indrayani Aw, Widyadharma Ipe. The Difference In The Effectiveness Of Warm Compress And Active Stretching Exercise In Reducing Dysmenorrhea Pain. Bali Med J. 2021;10(3):1041–4.

[27] Heidarimoghadam R, Abdolmaleki E, Kazemi F, Masoumi SZ, Khodakarami B, Mohammadi Y. The Effect of Exercise Plan Based on FITT Protocol on Primary Dysmenorrhea in Medical Students: A Clinical Trial Study. J Res Health Sci. 2019 Aug;19(3):e00456.

[28] Akbaş E, Erdem E. Effectiveness Of Group Aerobic Training On Menstrual Cycle Symptoms In Primary Dysmenorrhea. Med J Bakirkoy. 2019;15(3):209–16.

[29] Sa G, Suresh G. M Fp, Alias H. Effectiveness Of Physical Activity And Relaxation Techniques In Primary Dysmenorrhea Among College Student. Int J Sci Res. 2018;8(11):531–3.

[30] Wahyuni, Yulia Wahidah S. Manfaat Active Stretching Exercise Untuk Menurunkan Dismenore Primer. 2020;190–6.

[31] Ouda S, Elmoniem A. Abd-Elhakam Em, Soliman R, El A. Effect Of Heat Application Versus Stretching Exercises On Relieving Discomforts Of Primary Dysmenorrhea Among University Student Girls. 2020;9(4):20–32.

[32] Mutha H, Marijo M, Trisetiyono Y, Sekar Wiyati P. The Effect Of Zumba On Dysmenorrhea In Students Of The Faculty Of Medicine, Diponegoro University. Ejournal3undipacid. 2021;10(3):172–6.

[33] Rosi Kurnia Sugiharti Ts. Hubungan Antara Kebiasaan Olahraga Dengan Kejadian Nyeri Haid Primer Pada Remaja. J Publ Kebidanan. 2018;9(1):114–23.

[34] Oktafiani H, Susiarno H, Murniarti V. Spinning ExerciseIntensitas Sedang Menurunkan Gejala Dismenore Primer Mahasiswi Diii Kebidanan. CareJ Ilm Ilmu Kesehat. 2020;8(1):92.

[35] Kim SD. Yoga for menstrual pain in primary dysmenorrhea: A meta-analysis of randomized controlled trials. Complement Ther Clin Pract. 2019 Aug;36:94–9.

[36] Oktamulyanisa E. Pengaruh Senam Aerobic Terhadap Skala Dismenore Pada Peserta Senam Di Gedung Barata. 2021;2(1):24–32.

[37] Parveen N, Alshammari R, Alshammari H, Alshammari T, Alsamaan S, Ali N. Aerobic Exercises And Its Effects On Primary Dysmenorrhea Among Women At Hail City, Saudi Arabia. Int J Med Dev Ctries. 2020;4(April):869–74.

[38] Eliska Br Gurusinga S, Bertilova Carmelita A, Rahman Jabal A. Literature Review : Hubungan Aktivitas Fisik Dengan Dismenore Primer Pada Remaja. J Kedokt Univ Palangka Raya. 2021;9(1):1266–74.

[39] Abidin J, Supriyadi S, Surendra M. Pengaruh William Flexion Exercise Terhadap Penurunan Intensitas Nyeri Haid (Dysmenorrhea) Pada Siswi Sman 7 Kota Malang. J Sports Sci. 2019;9(1):39.