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THE ROLE OF PHYSICAL ACTIVITY IN REDUCING PAIN IN PRIMARY DYSMENORRHEA: A NARRATIVE REVIEW

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ABSTRACT

Background: Primary dysmenorrhea is one of the most common gynecological disorders among women of reproductive age, often associated with significant limitations in daily functioning. First-line treatment of primary dysmenorrhea is based on the use of NSAIDs, which may be associated with various side effects. To avoid pharmacological methods there is growing interest in alternative methods of pain reduction, including physical activity.

Aim: The aim of this narrative review was to assess the current scientific evidence on the effects of various forms of physical activity on pain intensity in primary dysmenorrhea.

Material and methods: A narrative literature review was conducted using PubMed and Google Scholar databases. Studies published mainly between 2016 and 2026 were analyzed, focusing on clinical trials, controlled clinical trials, randomized controlled trials, clinical studies, observational studies, and reviews.

Results: Most of the studies analyzed showed a significant reduction in pain intensity after regular aerobic exercise, Pilates, stretching, yoga, and HIIT training. In addition, some studies have observed an improvement in quality of life and functioning, as well as a reduction in premenstrual symptoms. However, a study on Zumba did not show a statistically significant reduction in pain.

Conclusions: Regular physical activity plays an important role in the non-pharmacological treatment of primary dysmenorrhea. Appropriately selected exercises can effectively contribute to reducing pain and improving the quality of life among women struggling with this disease. Physical exercise should be considered a supportive element of standard therapeutic strategies in the treatment of primary dysmenorrhea.

KEYWORDS

Physical Activity, Exercise, Primary Dysmenorrhea, Menstrual Pain, Pain Reduction, Non-Pharmacological Treatment

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1. Introduction

Primary dysmenorrhea is defined as pain and cramps, occurring during menstruation without any identifiable pathological cause. It most often appears within 6-24 months after the first menstruation. Lower abdominal pain is recurrent, acute, spasmodic, and radiating to the lumbosacral region of the back. The intensity of the pain is usually greatest during the first 3 days of menstruation [1, 2]. Studies show that it is the most common gynecological problem during puberty. Worldwide, primary dysmenorrhea affects 45-95% among women of reproductive age, with 29% of them classifying the pain as very severe, preventing them from functioning normally and requiring absence from school or work [1, 3, 4]. The etiology of menstrual pain is not fully understood, but it is believed that the cause of it may be excessive production of prostaglandins, which leads to increased uterine contractions and narrowing of blood vessels. This causes insufficient blood flow, decreased oxygen supply to the uterus, and increased sensitivity of nerve endings [5, 6]. Considering the pathomechanism described above, the first-line treatment for painful menstruation are the commonly used NSAIDs, which are drugs whose mechanism is based on inhibiting prostaglandin synthesis. The use of these drugs may be associated with side effects, such as damage to the stomach mucosa, gastric erosion, ulcers, gastrointestinal bleeding, as well as negative effects on the liver and kidneys [6]. Therefore, there is growing interest in alternative non-pharmacological methods of pain relief without the risk of side effects from drugs. Many studies suggest a possible mechanism for reducing menstrual pain through improved blood flow to the uterus, increased endorphin secretion, and reduced prostaglandin production during exercise [16]. This review compiles the results of recent scientific studies to determine how different types of exercise, such as aerobic exercise, stretching, Pilates, yoga, HIIT training and Zumba, reduce the intensity of pain in women with primary dysmenorrhea.

2. Research materials and methods

A narrative review of the literature was conducted using the PubMed and Google Scholar databases. Articles were searched using the following keywords: “primary dysmenorrhea”, “physical activity”, “exercise”, “menstrual pain”, “chronic pain”, “aerobic”, “Pilates”, “stretching”, “yoga”, “HIIT”, “Zumba”. The search was limited to articles published mainly between 2016 and 2026, written in English. Filters were applied to include clinical trials, controlled clinical trials, randomized controlled trials, clinical studies, observational studies, and reviews.

3. Research results

3.1. Aerobic exercise

Aerobic exercise is planned, rhythmic, long-lasting physical activities, during which muscles obtain energy using aerobic processes. These are low or moderate intensity exercises that engage large muscle groups. During these exercises, the heart rate should not exceed 70-80% of the person's maximum heart rate, appropriate for their age. Examples of such exercises include cycling, running, walking on a treadmill, and swimming [29, 30].

In a randomized controlled clinical trial [7] involving 70 women, assessed the effect of aerobic exercise on a treadmill on pain relief in primary dysmenorrhea. The greatest difference in results between the exercising and non-exercising groups was recorded using a 100 mm VAS (Visual Analog Scale). Pain intensity in the exercise group was lower by 19 mm after 4 weeks of exercise and 21 mm after 7 months of exercise. The study demonstrated that aerobic exercise has a beneficial effect on pain quality (MD -1.9, 95% CI 3.8 to -0.04, $p < 0.05$) and intensity (MD -4.7, 95% CI -9.3 to -0.09, $p < 0.05$), as well as improved quality of life and functioning compared to the control group [7].

A randomized controlled clinical trial [8] comparing the effects of aerobic and isometric exercise on primary dysmenorrhea confirmed the effectiveness of both types of physical activity in reducing pain intensity. The study involved 105 women with similar symptoms, who were divided into three groups: aerobic exercise group, isometric exercise group and control group. After 8 weeks of training 3 times a week, the results showed that both types of exercise significantly reduced pain intensity (aerobic group $p = 0.001$, Cohen's $d = 0.607$, isometric group $p = 0.001$, Cohen's $d = 0.633$), while aerobic exercise was associated with greater improvement in menstrual symptoms (aerobic group Cohen's $d = 0.607$, isometric group Cohen's $d = 0.462$) [8].

In a recent systematic review [9], 16 qualifying studies were comprehensively analyzed to examine the effect of aerobic exercise on alleviating primary dysmenorrhea and investigate the dose-response relationships. The review noted that aerobic exercise may reduce pain intensity (SMD = -1.728, $p = 0.00$, 95% CI -2.26 to -1.31) and pain duration (WMD = -12.53h, $p = 0.01$, 95% CI -21.38 to -3.68). Moderate-quality evidence suggests a dose-effect relationship between exercise dose and the alleviation of primary dysmenorrhea pain intensity, and low intensity, 46-60 minutes, ≤ 2 times per week and two menstrual cycles showed more efficiency in alleviating primary dysmenorrhea [9].

3.2. Pilates

Recently, interest in Pilates among young women has been growing rapidly. Pilates is a physical activity that focuses on posture control and stability, activation and strengthening of the deep muscles of the abdomen, pelvis, and back [10]. In the last few years, numerous clinical studies have confirmed the hypothesis that Pilates helps alleviate various types of pain, such as neck or back pain [11, 12]. However, few studies have been conducted on pain relief during primary dysmenorrhea.

A 12-week randomized controlled clinical trial [13] examined the effect of Pilates on pain, general functioning, sleep quality and psychological factors in women struggling with primary dysmenorrhea. The results obtained after 12 weeks of the study showed that women who practiced Pilates twice a week, compared to the control group, experienced a significant reduction in pain intensity ($p < 0.001$), measured using the VAS scale, a reduction in the frequency and severity of menstrual symptoms ($p < 0.001$), measured using the CMSS (Cox Menstrual Symptom Scale) and PSST (Premenstrual Symptoms Screening Tool) scales, an improvement in back flexibility and hip girdle muscle strength ($p < 0.01$), as well as an improvement in sleep quality ($p < 0.01$), measured using the PSQI (Pittsburg Sleep Quality Index). The authors also noted a decrease in the use of painkillers in Pilates training group during the trial. However, the hypotheses about the beneficial effects of Pilates on anxiety and depression were not confirmed in this study [13].

In quasi-experimental study [14] the authors analyzed the effect of Pilates and cumin supplementation on prostaglandin E2 levels and painful menstruation in adolescent girls. The 44 participants were randomly

divided into four groups: practicing Pilates and taking cumin supplements, only practicing Pilates, only taking cumin supplements, and control group. Pilates training for the respective groups took place three times a week for 8 weeks. The groups supplementing cumin took 20 drops of cumin extract every 8 hours for 8 weeks. The final results clearly confirmed that in comparison with the control group, Pilates training and cumin supplementation, both in combination and used independently, significantly reduced menstrual pain ($p \leq 0.05$) and prostaglandin E2 levels ($p \leq 0.05$). This is beneficial because high levels of prostaglandin E2 contribute to increased uterine contractions and pain [14].

An experimental comparative study [15] conducted over a period of 12 weeks with 30 young participants aimed to compare the effects of Pilates and gym ball exercises on primary dysmenorrhea. The comparison was made based on the assessment of the degree of discomfort using the Moos MDQ (Moos Menstrual Distress Questionnaire) and the intensity of pain using VAS. Comparing the mean VAS scores between the two groups, it was observed that both groups significantly reduced pain, but the difference was greater in the Pilates group (5.53) than in the gym ball group (2.40). In addition, it was found that Pilates is also a more effective option for reducing discomfort and negative symptoms associated with menstruation [15].

3.3. Stretching

Stretching is a technique involving controlled changes in joint position with the goal of increasing the elasticity of muscles, tendons and tissues and improving maximum range of motion in joints [31]. This type of physical activity is based on repetitive lengthening and increasing flexibility of soft tissues such as muscles, fasciae, and ligaments. In the case of primary dysmenorrhea, exercises focus mainly on the pelvic area, abdomen, back, and hip girdle.

Aboushady and El-Saidy conducted a quasi-experimental study in which they assessed the correlation between performing stretching exercises at home and a reduction in pain intensity associated with primary dysmenorrhea and premenstrual syndrome symptoms. The study involved 80 adolescent females who were randomly assigned to the exercise group and the control group. The stretching exercises, performed for 8 weeks, 3 times a week, twice a day, for 20-30 minutes, focused on stretching back and abdomen. The study used the VAS scale and a menstrual symptom assessment questionnaire. The authors of the article proved that the most common symptoms of premenstrual tension are fatigue, headaches, mood swings, constipation and excessive sweating. These symptoms decreased in girls who did stretching exercises. Similarly, reduction in pain intensity was noted in the stretching group, from 37.5% before the study to 12.5% after the study [17].

Another quasi-experimental study involving 96 nursing students [18] focused on examining how abdominal stretching exercises can affect pain during dysmenorrhea. Half of the students performed abdominal stretching exercises for only 15 minutes, twice a week, for 3 weeks. The other half was the control group. Despite relatively short stretching sessions, the results showed a significant reduction in menstrual pain in the exercise group compared to the control group ($p = 0.001$). In the exercise group, the intensity of pain decreased from an average of 4.85 (moderate pain) to 3.00 (mild pain), using the 0-10 NRS (Numeric Rating Scale). Additionally, it was confirmed that the age of first menstruation and the duration of menstruation did not affect the severity of pain [18].

A randomized controlled clinical trial conducted in 2023 by Ibrahim et al. examined the effectiveness of active stretching exercises in reducing the intensity of primary dysmenorrhea symptoms in young women. Three groups of women were formed: group implementing a supervised active stretching program, group practicing non-supervised active stretching and the control group. The exercises lasted about 40 minutes, were performed 3 times a week, for 4 weeks, and focused on stretching specific muscles such as the iliopsoas, rectus femoris, hamstrings, lower back muscles, lower abdominal muscles and adductor muscles. In summary, the study results showed a significant reduction in pain intensity using the VAS scale in both exercise groups (supervised group $p = 0.003$, unsupervised group $p = 0.007$) and significant improvement in functioning and reduction in general symptoms using the VMS (Verbal Multidimensional Scoring System) in the supervised exercise group ($p = 0.003$) [19].

3.4. Yoga

Yoga is an ancient discipline that focuses on balance and physical, mental, emotional, and spiritual health. Elements of yoga commonly used for their health benefits are asanas (physical postures), pranayama (breath control), and dhyana (meditation). Yoga combines physical activity with meditation to build strength, flexibility, and endurance while reducing stress and improving mood. The most common positions in yoga practice are child pose, cobra pose, cat pose, boat pose, and fish pose [20-22].

A randomized controlled clinical trial, conducted by Yang and Kim in 2016, aimed to examine the effect of yoga on cramps and menstrual symptoms in female students with primary dysmenorrhea. The group exercised for 12 weeks, once a week, under the supervision of a specialist, undergoing a session consisting of three stages: “sura namaskara” which is 12 positions and breathing exercises, then “shabasana” which is active relaxation, and finally “yoga nidra” which is conscious sleep. The control group did not participate in the exercises. At the end of the study, compared to the control group, the yoga group showed a significantly reduced intensity of menstrual pain (between-group difference -0.94 ; 95% CI, -1.47 to -0.42 ; $p = 0.001$) and reduced menstrual symptoms (between-group difference -1.13 ; 95% CI, -1.47 to -0.82 ; $p < 0.0001$). The study also showed that yoga does not affect the duration of menstruation [23].

Juzer et al. in 2025 compared the effects of Pilates and yoga on menstrual pain intensity, quality of life and sleep in girls struggling with primary dysmenorrhea. During the three-month study, the Pilates and yoga groups showed a significant reduction in pain intensity ($p < 0.001$) and an improvement in quality of life ($p < 0.001$) and sleep quality ($p < 0.001$) compared to the control group. However, yoga had a slightly better effect on pain intensity, while Pilates proved to be more effective in improving quality of life and sleep. Furthermore, absenteeism was also compared among the study participants. Both groups practicing Pilates and yoga showed significant improvement compared to the control group [22].

Tele-yoga is an alternative method of practicing yoga at home, virtual programs make it possible to practice yoga regardless of location. A randomized controlled clinical trial [24] examined the effect of online yoga-based exercises on the symptoms of primary dysmenorrhea. Fifty women aged 18-35 participated in the study, which lasted eight weeks. Half of them, who were qualified for the study group, performed online yoga-based exercises twice a week, with each session lasting 50 minutes. The study used VAS, MAS (Menstruation Attitude Scale), BAQ (Body Awareness Questionnaire), and SF-36 (The Short Form – 36 Questionnaire used to assess quality of life). Based on the scales and questionnaires, the results confirmed the positive effects of yoga training. The yoga training group reported a reduction in pain intensity (VAS score decreased from 6.76 to 3.76 points), improvement in menstrual attitude, body awareness, and the quality of life. In addition, patients in the study group were asked how they preferred to practice yoga, online or face-to-face. As many as 60% responded that they preferred the virtual method [24].

3.5. HIIT

High-Intensity Interval Training (HIIT) is a training strategy that involves performing a series of short, very intense exercise intervals with low-intensity exercise or rest during the breaks. The high-intensity phase uses anaerobic metabolism, while the low-intensity phase uses aerobic metabolism. Numerous studies have shown that this type of training improves cardiovascular endurance, metabolic health, body composition, and helps reduce body weight [25]. This strategy can be used in running, walking, cycling, spinning, functional training with your own body weight, and tabata.

The effects of interval training using a spinning bike on the symptoms of primary dysmenorrhea were examined in a randomized controlled clinical trial by Huang et al. in 2022. During the 10-week study, HIIT training was performed twice a week, and the intensity of the training was confirmed by heart rate monitors and BORG rating of perceived exertion. Based on the PSST (Premenstrual Symptoms Screening Tool), compared to the group that did not train, the group that trained HIIT showed a reduction in premenstrual symptoms such as anger, irritability, tension, and fatigue. After summarizing the results, it was noted that among women struggling with primary dysmenorrhea in the training group, there was a reduction in pain intensity of approximately 29 mm on a 100 mm VAS scale. The additional aspect that was analyzed was the level of prostaglandins in the blood. Women suffering from primary dysmenorrhea had higher baseline levels of PGF2 and PGE2 prostaglandins before the experiment than those without the disease. After 10 weeks, a significant decrease in prostaglandin levels was observed in the exercise group compared to pre-study levels. Therefore, it can be assumed that this change may have had a significant pathophysiological effect on reducing pain in primary dysmenorrhea [26].

3.6. Zumba

Zumba is an organized exercise program based on dancing to energetic music, usually Latin, which combines various elements of aerobic, interval, and strength training. Studies show that Zumba helps reduce body weight and body fat, strengthen the body, and improve cardiovascular and respiratory function [27].

In 2021, Mutha'alimah et al. conducted an observational study among 49 female students at the Faculty of Medicine, Diponegoro University. The aim of the study was to determine the effect of Zumba on primary dysmenorrhea. The students were divided into control group and study group, which underwent 60 minutes of Zumba training, twice a week, for 8 weeks. In both groups, pain levels were measured by completing a painful menstruation questionnaire before the study, in the middle of the study, and at the end of the study. Pain in the questionnaire was to be classified as "no pain", "mild pain", "moderate pain" or "severe pain". After the study was completed, the data from the questionnaires were statistically processed using the Friedman test and the Wilcoxon test. In both tests, the significance value (p) was > 0.05 , which means that there is no statistically significant difference between the pain levels in the study group and the control group. The study rejected the hypothesis that physical exercise, such as Zumba, reduces the intensity of pain in primary dysmenorrhea [28].

4. Discussion

This narrative review indicates that regular physical activity may be an effective non-pharmacological method of reducing pain in primary dysmenorrhea. Importantly, physical activity should not be treated as a uniform intervention, but as a spectrum of training methods that differ in frequency, intensity, dynamics, and mechanism.

The strongest evidence is for aerobic exercise, whose effectiveness has been confirmed in randomized controlled trials and meta-analyses. The importance of appropriately selected exercise intensity and frequency, as well as the relationship between dose and response, was emphasized. Moderate intensity interventions such as Pilates, stretching and yoga have also shown significant effectiveness in reducing pain intensity. Often, these exercise programs brought additional benefits in the form of improved sleep quality and reduced premenstrual symptoms. Yoga, which combines physical activity with relaxation techniques, may also positively influence psychosocial factors such as stress and pain perception. Despite its higher intensity, HIIT training resulted in a significant reduction in pain and prostaglandin levels, which may suggest a potential relationship between these variables.

In contrast to the above physical exercises, a study on Zumba did not show a statistically significant reduction in pain, suggesting that not every form of physical activity can produce comparable effects, or that the regularity and type of training program is important.

From a public health perspective, promoting regular physical activity may be an accessible and safe strategy to support the treatment of primary dysmenorrhea, particularly to reduce the need for pharmacotherapy and the occurrence of possible drug side effects. Future research should focus on determining optimal training parameters, comparing the long-term effectiveness of different forms of exercise, and identifying the biological mechanisms responsible for pain reduction in primary dysmenorrhea.

5. Conclusions

Regular physical activity can be a safe and effective method of reducing pain in primary dysmenorrhea. Aerobic exercise, Pilates, stretching, yoga, and HIIT training all have a significant impact on reducing pain intensity and improving the functioning and quality of life of women struggling with primary dysmenorrhea. The effectiveness of the intervention depends on the appropriately selected frequency, intensity, and regularity of training. Therapeutic strategies based on physical activity should be considered as a supportive element of standard treatment for primary dysmenorrhea.

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Software: IM, PŽ

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Formal analysis: IM, PŽ, PP

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