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ORIGINAL ARTICLE

Effectiveness of Physiotherapy Interventions in Pain Management During Primary Dysmenorrhea among Young Females

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ABSTRACT

Primary Dysmenorrhea (PD) is a gynecological condition that can manifest with symptoms such as painful menstruation, nausea, breast tenderness, diarrhea, fatigue, headache, dizziness and more rarely, syncope and fever. While the classic presentation of dysmenorrhea involves deficits, it is essential to recognize the effectiveness of physiotherapy interventions in pain management. This manuscript comprehensively reviews the literature examining the effectiveness of Physiotherapy interventions in reducing pain and improving long-term Quality of life. A thorough search of Pubmed and Google Scholar was conducted to identify relevant articles published between 2014 and 2024. Ten studies were selected for analysis, illustrating various interventions of PD in the context of pain. It may lead to the timely diagnosis and physiotherapy management of PD. Further research is warranted to elucidate the underlying mechanisms and optimal physiotherapy treatment strategies for PD presenting with menstrual pain.

KEYWORDS

• Painful Menstruation • Dysmenorrhea • Primary Dysmenorrhea, • Physical Therapy • Physiotherapy • Electrotherapy • Tens • Nonpharmacological

INTRODUCTION

Primary dysmenorrhea (PD) is one of the most common menstrual disorders affecting adolescent and young adult females worldwide. It refers to painful menstrual cramps of uterine origin that occur in the absence of any pelvic pathology. The condition is most prevalent in the age group of 16 to 25 years and is often underreported because many women perceive menstrual

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pain as a normal part of the cycle and do not seek medical attention (Armour *et al.,* 2019). The pain experienced in PD is usually cramping in nature and can be accompanied by other symptoms like nausea, fatigue, diarrhea, headache, breast tenderness, and even syncope (Barcikowska *et al.,* 2022). The severity of PD can negatively impact academic performance, daily activities, social life, and mental well-being (Toprak Celenay *et al.,* 2024).

The underlying pathophysiology of primary dysmenorrhea is associated with increased production of prostaglandins, especially prostaglandin F2α, which leads to stronger and more frequent uterine contractions, decreased uterine blood flow, ischemia, and pain (Xiang *et al.,* 2025). Vasopressin is another hormone implicated in PD as it increases uterine contractility and causes vasoconstriction, further contributing to ischemic pain (Armour *et al.,* 2019). The pain usually begins just before or at the onset of menstruation and lasts for 1–3 days. Despite its high prevalence ranging between 16% and 93% depending on socio-cultural and biological factors PD remains poorly addressed, especially in younger populations (Dhanashree S. Upganlawar *et al.,* 2023).

Traditionally, PD is managed pharmacologically using nonsteroidal anti-inflammatory drugs (NSAIDs) or hormonal contraceptives. However, these treatments may have side effects or may not be suitable for all individuals. As a result, non-pharmacological and physiotherapeutic approaches are gaining popularity due to their safety, effectiveness, and holistic benefits (Remedios López-Liria *et al.,* 2021).

Several physiotherapy interventions have shown promising results in the management of primary dysmenorrhea. Exercise therapy, including stretching, aerobic activity, yoga, and strength training, has been proven effective in reducing pain intensity and improving quality of life in women with PD (Carroquino-Garcia *et al.,* 2019; Xiang *et al.,* 2025). Manual therapy, which includes techniques like diaphragm release, pelvic muscle relaxation, and myofascial trigger point therapy, has been shown to offer similar pain relief to that of ibuprofen while also improving muscular function (Barcikowska *et al.,* 2022).

Progressive muscle relaxation techniques, such as Jacobson's method, have been effective in decreasing menstrual pain, anxiety, and related functional limitations, and can be considered a simple and cost-effective intervention (Toprak Celenay *et al.,* 2024). In addition, other alternative approaches like kinesio taping (Michal Elboim-Gabyzon *et al.,* 2020), heat therapy (Sunita Sharma *et al.,* 2023), transcutaneous electrical nerve stimulation (TENS) (Uttam Manisha *et al.,* 2021), and physical activity interventions like Pilates (Priya Kannan *et al.,* 2014) or Tai Chi (Hai-Yan Bai *et al.,* 2017) have also demonstrated benefits in managing PD symptoms.

Psychological factors, lifestyle habits, and awareness levels also influence the experience and reporting of menstrual pain. For example, studies have shown that increased knowledge about menstrual health and the use of relaxation or physical techniques can significantly improve pain outcomes (Manuela Deodato *et al.,* 2023; Rashid Heidarimoghadam *et al.,* 2019).

In summary, primary dysmenorrhea is a widespread yet often overlooked condition that severely affects the lives of young women. While pharmacological methods remain the first line of treatment, an increasing body of evidence supports the effectiveness of physiotherapeutic interventions in managing menstrual pain. These non-invasive, low-risk methods offer sustainable and holistic relief, making them valuable tools in promoting menstrual health and well-being among adolescents and young adults.

INTERVENTION

There are two approaches to the management of PD that includes pharmacological and non-pharmacological.

- Pharmacological methods include Non-Steroidal Anti-inflammatory Drugs (NSAIDs. ex: ibuprofen) and Oral Contraceptives.[3]

The prolonged use of NSAIDs is also associated with cardiovascular, hepatic and renal problems. Likewise, oral contraceptives are not free from side effects either, related as they are to the frequency of bleeding, weight gain, or the patient's basal risk of venous thromboembolism. All this shows us that there is a need for emphasis on alternative methods

of conservative treatment such as non-pharmacological and non-invasive therapy, safe and easy to use for obtaining relief from dysmenorrhea symptoms.

The non pharma cological methods are safe and quite effective which include hot pack, biofeedback, spinal manipulation, stretching exercise, taping, relaxation techniques, interferential therapy, microwave diathermy, acupressure, infrared ray filament belt and TENS (Transcutaneous Electrical Nerve Stimulation). These physiotherapeutic treatments, being supported by clinical trial data, could be a very useful treatment alternative for women with PD, particularly those who are not eligible for pharmacological therapy, since physiotherapy has no side effects according to the analyzed studies.

Many reviews have evaluated the efficacy of exercise or individual physiotherapy interventions for PD. In 2014, one of these reviews determined the efficacy of physiotherapy modalities in the management of pain.[3]

NEED FOR THE STUDY

Primary Dysmenorrhea is the most common gynecological condition that is seen among young females. By synthesizing and evaluating existing research, this review aims to provide a comprehensive understanding of the effectiveness of Physiotherapy interventions inreducing pain and improving long-term Quality of life, through a literature review.

Primary Objective

The primary objective of this study was to review the effectiveness of various Physiotherapy interventions to reduce pain associated with Primary Dysmenorrhea.

Secondary Objective

The secondary objective of this study is to investigate the impact of Physiotherapy techniques in Primary Dysmenorrhea for enhancing physical function and improving long-term quality of life among young females.

Clinical Significance

Physiotherapy interventions such as exercise therapy, transcutaneous electrical nerve stimulation (TENS), and heat therapy, have shown significant clinical benefits in managing primary dysmenorrhea among young females. These non-invasive treatments can reduce pain intensity, improve quality of life and enhance physical function. By targeting the underlying physiological mechanisms of dysmenorrhea, Physiotherapy offers a valuable alternative or complementary approach to pharmacological treatments, minimizing the need for medications and their potential side effects. These interventions also promote overall well-being and empowerment in managing menstrual pain.

METHODOLOGY

A web-based search was performed in PubMed database with the keywords. The search had 31 articles, out of which 10 articles were included in the review based on the type of study.

Search Strategy

Boolean operators:

OR Data based search: PubMed

Type of study: Literature review

[painful mensturation (Mesh term)] OR [primary dysmenorrhea (title/abstract)] OR [dysmenorrhea (title/abstract)] AND [physiotherapy (title/abstract] OR [physicaltherapy (meshterm)] OR [non-pharmacological management (title/abstract)]

Inclusion Criteria:

- Types of studies: Randomized controlled trial, systematic review, meta-analysis and clinical trials.
- Timeline: Articles published from 2014-2024
- The study's participants had to beyoung females with Primary Dysmenorrhea.
- Studies stating the benefits of non-pharma cological means of alleviating pain during Primary Dysmenorrhea.
- Articles which analyze the effectiveness of exercises, TENS, heat application, manual therapy and other manual methods.

Exclusion Criteria:

- Articles published in languages other than English.
- Articles where free full text was not available.

- Articles published before 2014.
- Articles which do not meet inclusion criteria.

PROCEDURE

A web-based literature source was done, and the database included PubMed and Cochrane library. The search aimed to yield studies which establish the effectiveness of Physiotherapy interventions for pain management during Primary Dysmenorrhea. A search strategy was developed to establish the same using the keywords. Randomized controlled trials, meta-analysis and systematic reviews were included. Timeline chosen was from 2014-2024. Secondary searching was also conducted, where the articles were further assessed based on objectives and data was analyzed and explored. The included articles were studied in detail and a critical appraisal was done.

RESULTS

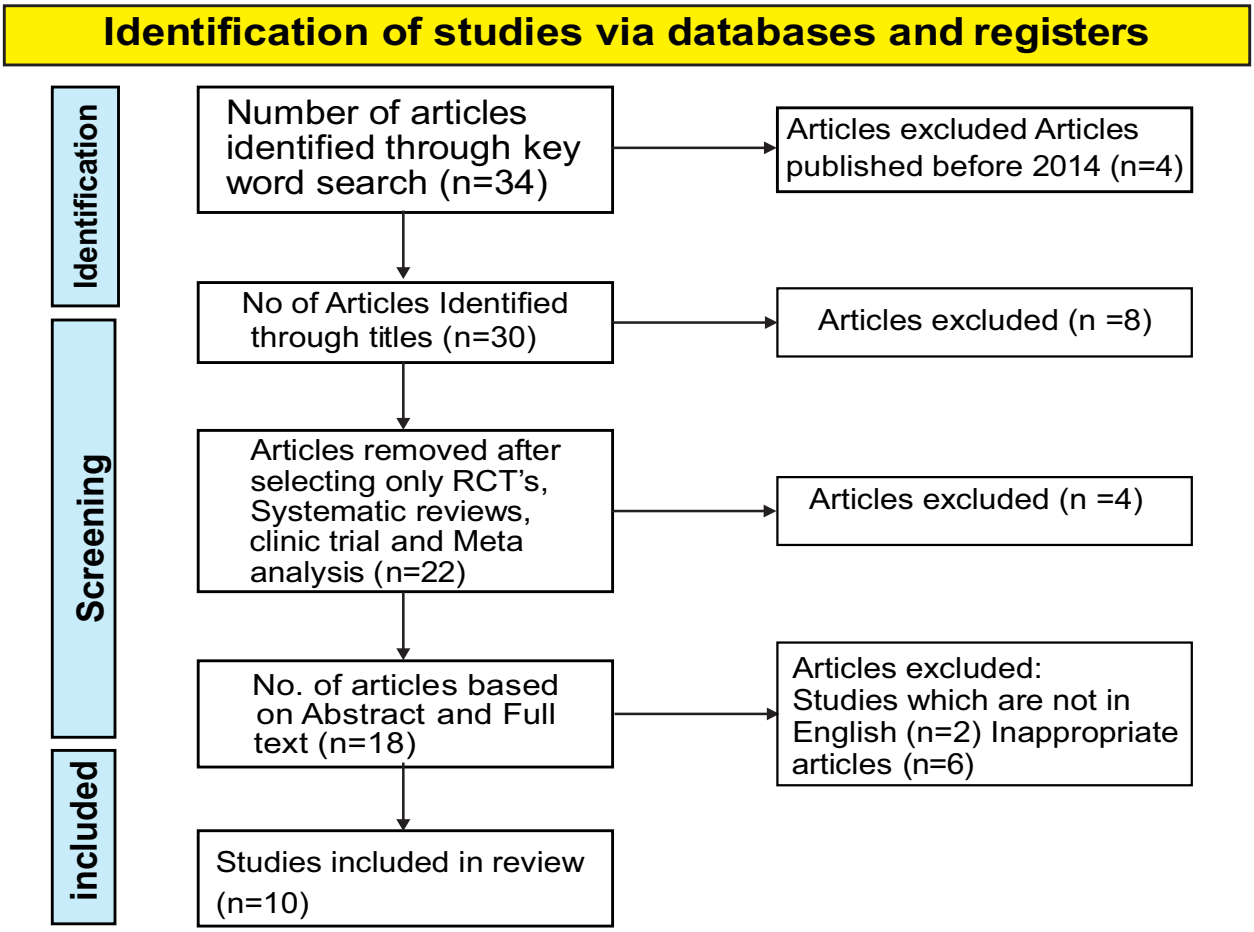

Figure 1: PRISMA flowchart

LITERATURE REVIEW

1. Michal Elboim-Gabyzon et al. (2020) conducted a study to comprehensively review the application of Transcutaneous Electrical Nerve Stimulation (TENS) in the management of primary dysmenorrhea. The authors review existing research on the efficacy and mechanisms of TENS in managing menstrual pain. TENS involves applying electrical stimulation to specific nerve pathways via electrodes placed on the skin. The article highlights various studies demonstrating the effectiveness of TENS in reducing pain associated with primary dysmenorrhea. It discusses the potential mechanisms through which TENS may alleviate menstrual pain, such as by modulating nerve activity and increasing endorphin levels. Furthermore, the authors explore factors that may influence the outcomes of TENS therapy, including the

timing and duration of treatment, electrode placement, and individual differences in pain perception. They also address potential limitations and challenges in the use of TENS for menstrual pain relief, such as variability in treatment response and the need for further research to optimize its effectiveness. Overall, the article provides valuable overview of the current state of research on TENS therapy for primary dysmenorrhea, offering insights into its potential benefits and considerations for its clinical application.[1]

2. Uttam Manisha et al. (2021) conducted a randomized control trial to determine the effect of high frequency Transcutaneous electrical nerve stimulation (TENS) at root level menstrual pain in Primary Dysmenorrhea. The study focuses on evaluating the efficacy of TENS therapy in alleviating menstrual pain at its origin. Using a controlled experimental design, the authors administerhigh-frequency TENS therapytoparticipantsexperiencingprimary dysmenorrhea and assess its effects on root-level menstrual pain. They measure pain intensity and duration before and after TENS treatment, employing standardized pain assessment tools. The results indicate a significant reduction in root level menstrual pain following high-frequency TENS therapy. The authors discuss potential mechanisms underlying the analgesic effects of TENS, such as modulation of nerve activity and release of endogenous pain-relieving substances. Furthermore, the article addresses practical considerations for the application of TENS therapy in managing primary dysmenorrhea, including optimal treatment parameters and electrode placement techniques.

It also acknowledges limitations of the study and suggest savenues for further research to enhance understanding of TENS efficacy in menstrual pain management. Overall, the findings suggest that high-frequency TENS may be a promising intervention for alleviating root level menstrual pain in primary dysmenorrheal, providing valuable insights for clinicians and researchers in the field.[2]

3. Manuela Deodato et al. (2023) conducted a prospective observational study investigating the effectiveness of manual therapy and pelvic floor exercises in reducing pain associated with primary dysmenorrhea. In this study, participants with primary dysmenorrhea underwent a treatment regimen involving manual therapy techniques and pelvic floor exercises. Pain levels were assessed before and after the intervention using standardized pain measurement tools. The results of the study revealed a significant reduction in pain severity following the combined manual therapy and pelvic floor exercises intervention. Participants reported decreased intensity and duration of menstrual pain, indicating the efficacy of the treatment approach. The authors discuss potential mechanisms underlying the effectiveness of manual therapy and pelvic floor exercises in managing primary dysmenorrhea, such as improved pelvic muscle function and reduced pelvic congestion. Furthermore, the article addresses the implications of these findings for clinical practice, highlighting the potential of manual therapy and pelvic floor exercises as non-pharmacological interventions for menstrual pain management. Overall, the study provides valuable insights into the efficacy of manual therapy and pelvic floor exercises in alleviating pain associated with primary dysmenorrhea, offering a non-invasive treatment option for individuals experiencing menstrual pain.[3]

4. Priya Kannan et al. (2014) conducted a systematic review of randomized controlled trial with meta-analysis that investigates the efficacy of various physiotherapy treatments in alleviating menstrual pain among women with primary dysmenorrhea. There view synthesizes findings from multiple studies to assess the effectiveness of physiotherapy interventions as non-pharmacological approaches to managing menstrual pain. The authors analyze a range of physiotherapy techniques, including exercise therapy, manual therapy, electrotherapy modalities, and pelvic floor rehabilitation. They evaluate these interventions outcomes in terms of pain intensity, duration and functional limitations associated with primary dysmenorrhea. The review identifies several physiotherapy treatments that demonstrate promise in reducing menstrual pain. Exercise therapy, particularly aerobic exercise and yoga, emerges as effective in mitigating pain severity and improving overall well-being. Additionally, manual therapy techniques such as massage and spinal manipulation show potential for pain relief. Furthermore, the authors discuss the underlying mechanisms by which physiotherapy treatments may alleviate menstrual pain, such as promoting relaxation, reducing muscle tension, and

enhancing blood flow to the pelvic region. Overall, the systematic review underscores the potential of physiotherapy interventions as valuable alternatives or complements to pharmacological approaches for managing primary dysmenorrhea. The findings provide clinicians with evidence-based insights into selecting appropriate physiotherapy strategies to address menstrual pain and improve the quality of life for affected individuals.[4]

5. Dhanashree S. Upganlawar et al. (2023) conducted a study to review the effectiveness of connective tissue therapy (CTT) and abdominal stretching exercises in managing primary dysmenorrhea. The authors critically evaluate existing research studies to assess the impact of CTT and abdominal stretching exercises on menstrual pain severity and associated symptoms. They discuss the potential mechanisms through which these interventions may alleviate dysmenorrhea, including improving pelvic circulation, reducing muscle tension, and enhancing tissue flexibility. Through their review, the authors highlight promising findings indicating that CTT and abdominal stretching exercises can lead to significant reductions in menstrual pain intensity and duration. They emphasize the importance of personalized treatment approaches tailored to individual needs and preferences. Furthermore, the article addresses practical considerations for implementing CTT and abdominal stretching exercises in clinical settings, including appropriate techniques, treatment duration, and frequency. Overall, the review underscores the potential of CTT and abdominal stretching exercises as non-pharmacological interventions for primary dysmenorrhea. It provides valuable insights for healthcare professionals seeking evidence based strategies to improve the management of menstrual pain and enhance the quality of life for individuals with this condition.[5]

6. Armour M et al. (2019) conducted a systematic review that provides an overview of the effectiveness of exercise as a therapeutic intervention for dysmenorrhea. The authors systematically analyze existing literature to evaluate the impact of various types of exercise on menstrual pain severity and associated symptoms. They consider a range of exercise modalities, including aerobic exercise, resistance training, yoga, and Pilates, among others. Through their review, the authors highlight consistent evidence suggesting that exercise can effectively reduce dysmenorrhea symptoms. Aerobic exercise appears particularly beneficial in alleviating pain intensity and improving overall well-being. Additionally, mind-body exercises like yoga and Pilates show promise in reducing menstrual pain through relaxation techniques and enhancing pelvic muscle strength and flexibility. There view also discusses potential mechanisms underlying the positive effects of exercise on dysmenorrhea, such as reducing inflammation, modulating pain perception, and promoting endorphin release. Furthermore, the authors address practical considerations for implementing exercise interventions in the management of dysmenorrhea, including exercise frequency, duration, and intensity. Overall, the review provides valuable insights into the role of exercise as a non-pharmacological approach to managing dysmenorrhea, offering healthcare professionals evidence-based strategies to improve the quality of life for individuals experiencing menstrual pain.[6]

7. Hai-Yan Bai et al. (2017) conducted a randomized, sham-controlled trial and systematic review study that explores the efficacy of transcutaneous electrical nerve stimulation (TENS) therapy in managing primary dysmenorrhea. Through a systematic investigation, the authors evaluate the impact of TENS therapy on menstrual pain severity and associated symptoms. They consider factors such as treatment duration, frequency, and intensity of TENS sessions. The findings suggest that TENS therapy holds promise as an effective treatment for primary dysmenorrhea. The therapy demonstrates a significant reduction in menstrual pain intensity and duration, leading to improved quality of life for individuals with this condition. Moreover, the article discusses potential mechanisms underlying the therapeutic effects of TENS, including modulation of pain signals and release of endogenous opioids. The authors also address practical considerations for the application of TENS therapy in clinical settings, including optimal electrode placement and patient compliance. Overall, the study provides valuable insights into the effectiveness of TENS therapy as a non-pharmacological intervention for primary dysmenorrhea, offering healthcare professionals evidence-based guidance for managing menstrual pain

and enhancing patient outcomes.[7]

8. Remedios López-Liria et al. (2021) conducted a systematic review and meta-analysis of the effectiveness of physiotherapy interventions in managing primary dysmenorrhea. Through a systematic review and meta-analysis, the authors analyze existing research to evaluate the impact of various physiotherapy treatments on menstrual pain severity and associated symptoms. They consider a wide range of interventions, including exercise therapy, manual therapy, electrotherapy modalities, and pelvic floor rehabilitation. The findings of the meta-analysis indicate that physiotherapy treatments significantly reduce pain intensity and duration in individuals with primary dysmenorrhea. Specifically, exercise therapy and manual therapy demonstrate notable efficacy in alleviating menstrual pain. Furthermore, the article discusses potential mechanisms underlying the effectiveness of physiotherapy interventions, such as improving pelvic muscle function, reducing pelvic congestion, and modulating pain perception. Practical implications for healthcare professionals are also addressed, including considerations for treatment planning, implementation, and patient education. Overall, the systematic review and meta-analysis provide robust evidence supporting the use of physiotherapy as a valuable non-pharmacological approach to managing primary dysmenorrhea, offering insights that can inform clinical practice and improve outcomes for individuals experiencing menstrual pain.[8]

9. Sunita Sharma et al. (2023) conducted a systematic review and meta-analysis provides a comprehensive evaluation of exercise therapy and electrotherapy as interventions for primary dysmenorrhea. Through a systematic review and meta-analysis, the authors assess the effectiveness of these interventions in reducing menstrual pain severity and associated symptoms. They analyze a wide range of studies that investigate various forms of exercise therapy, including aerobic exercise, yoga, and Pilates, as well as different types of electrotherapy modalities such as transcutaneous electrical nerve stimulation (TENS). The findings of them-analysis indicate that both exercise therapy and electrotherapy significantly alleviate menstrual pain in individuals with primary dysmenorrhea. Specifically, aerobic exercise and TENS demonstrate notable efficacy in reducing pain intensity and duration. Furthermore, the article discusses potential mechanisms underlying the effectiveness of these interventions such as promoting relaxation, reducing muscle tension and modulating pain perception. Practical considerations for healthcare professionals are also addressed, including recommendations for the implementation of exercise therapy and electrotherapy in clinical practice. Overall, the systematic review and meta-analysis offer robust evidence supporting the use of exercise therapy and electrotherapy as effective non-pharmacological interventions for managing primary dysmenorrhea, providing valuable insights for clinicians and researchers in the field.[9]

10. Rashid Heidarimoghadam et al. (2019) conducted arandomized clinical trial investigates the impact of an exercise regimen following the FITT (Frequency, Intensity, Time and Type) protocol on primary dysmenorrheal among medical students. Through a clinical trial, the authors assess the effectiveness of the exercise plan in reducing menstrual pain severity and associated symptoms in medical students experiencing primary dysmenorrhea. The study evaluates the outcomes of the intervention, including changes in pain intensity, duration and functional limitations related to dysmenorrhea. The study's findings indicate that the exercise plan based on the FITT protocol significantly reduces primary dysmenorrhea symptoms in medical students. Participants who adhered to the exercise regimen reported decreased pain severity and duration, leading to improved quality of life during menstruation. Furthermore, the article discusses potential mechanisms underlying the beneficial effects of exercise in managing primary dysmenorrhea, such as improving pelvic circulation reducing muscle tension and enhancing endorphin release. Practical implications for healthcare professionals are also addressed, including recommendations for implementing exercise plans tailored to individual needs and preferences. Overall, the clinical trial provides evidence supporting the effectiveness of exercise interventions following the FITT protocol as a non-pharmacological approach to managing primary dysmenorrhea among medical students, offering valuable insights for healthcare practitioners and educators.[10]

11 Toprak Celenay S et. al (2023) examines how well Jacobson's Progressive Muscle Relaxation Technique (JPMRT) manages primary dysmenorrhea (PD) in young women. Primary dysmenorrhea is marked by lower abdominal menstrual pain without any underlying pelvic issues. It significantly affects women's quality of life (QoL), daily activities, and academic or work performance. Various factors, including hormonal, physiological, and psychological influences in particular, higher prostaglandin production and psychological stress have been linked to its onset and severity. Jacobson's technique involves systematically tensing and relaxing major muscle groups. It aims to lessen physiological stress, muscle tension, and anxiety. This method has been applied in various conditions such as musculoskeletal pain, cancer pain, and psychological disorders. However, few rigorous studies have examined its specific effects on PD. In this randomized controlled trial, 55 women with PD were split into two groups: a JPMRT intervention group and a control group that received no treatment. The JPMRT group took part in three weekly supervised sessions from ovulation to the start of menstruation. Each session included diaphragmatic breathing along with progressive muscle relaxation, lasting 20 to 30 minutes. The results measured included menstrual pain intensity (using the Visual Analog Scale), menstrual symptoms (with the Menstrual Symptom Questionnaire), anxiety (assessed by the State-Trait Anxiety Inventory), and the effects on QoL, social activities, and academic/ work performance (also using the VAS). The study compared results before and after the intervention, both within and between groups. The findings showed that JPMRT notably reduced menstrual pain intensity ($p = 0.003$), menstrual symptoms ($p = 0.045$), and trait anxiety ($p = 0.011$). It improved QoL ($p = 0.047$), social activity ($p = 0.004$), and work/school performance ($p = 0.040$) in the intervention group. In contrast, the control group showed little improvement or worsening of symptoms, especially with increased menstrual symptoms and anxiety. The comparisons between groups after the intervention also showed significant differences favoring the JPMRT group, particularly in pain intensity, menstrual symptoms, and the overall effect on daily life. These results are in line with earlier research, which indicates that relaxation techniques can effectively decrease pain perception and anxiety through both cognitive and sensory feedback pathways. The study also emphasizes that JPMRT is non-invasive, cost-effective, and easy to administer, making it a promising option for treating PD alongside physiotherapy. In conclusion, JPMRT provides a safe and effective way to reduce menstrual pain and its associated psychological stress in young women with primary dysmenorrhea. Given these advantages, JPMRT can be recommended as part of a comprehensive physiotherapy plan in both clinical and educational healthcare environments. More long-term studies are needed to evaluate its lasting effects and potential use with other physiotherapeutic approaches.[11]

12. Xiang Y et. al (2025) conducted a study that explains Primary dysmenorrhea (PD), a common condition that causes menstrual pain without any underlying pelvic issues, impacting many women of reproductive age. The pain from PD often leads to a lower quality of life, less daily functioning, and more missed days in school or work. Traditional treatments like NSAIDs and oral contraceptives can relieve pain but can also cause side effects, including gastrointestinal problems, weight gain, and heart risks. This creates a need for safer, non-drug options like therapeutic exercise. In this context, Xiang *et al.* (2025) carried out a thorough systematic review and meta-analysis to assess how effective and safe therapeutic exercise is for managing pain in people with primary dysmenorrhea. Their study included 29 randomized controlled trials (RCTs) with a total of 1,268 participants in 36 intervention groups and 927 in control groups. The interventions varied across six types of exercise: strength training, aerobic exercise, relaxation techniques, stretching exercises, mind-body therapy, and multicomponent training. The duration of these programs ranged from 4 to 48 weeks, with session lengths from 10 to 60 minutes. The meta-analysis showed that exercise significantly reduced menstrual pain intensity measured by the Visual Analog Scale (VAS), with a weighted mean difference (WMD) of −2.62. Among the exercise types, strength training was the most

effective for reducing pain, followed by aerobic and relaxation exercises. Subgroup analyses found that interventions lasting ≥8 weeks, performed more than three times a week, with sessions longer than 30 minutes, and totaling at least 90 minutes per week produced the best results. The study also examined how exercise helps reduce pain related to dysmenorrhea. It suggested that physical activity triggers the release of β-endorphins, which are natural pain relievers, boosts blood flow to the uterus, lowers inflammation by balancing cytokine levels, and regulates prostaglandin concentrations, which are often higher in women with PD. Despite some variations in methodology among the included studies, the results remained consistent across sensitivity and regression checks. However, the authors pointed out some limitations, such as the lack of representation of older women and those with irregular menstrual cycles. Additionally, varying reports on exercise frequency and duration in some studies affected the accuracy of subgroup analyses. Still, the evidence strongly backs the recommendation of structured exercise programs as an effective, safe, and accessible treatment for PD. In conclusion, this review supports the role of therapeutic exercise especially strength training as a very effective non-drug approach to managing primary dysmenorrhea. It highlights the need for consistent, regular, and appropriately timed exercise interventions to reduce menstrual pain and enhance overall well-being for those affected.[12]

13. Barcikowska Z et. al (2022) performed an important randomized clinical trial to compare the effects of manual therapy and ibuprofen in treating primary dysmenorrhea (PD). They looked at how PD relates to inflammatory markers, sex hormones, and musculoskeletal issues in young women. Primary dysmenorrhea involves painful menstrual cramps without any underlying medical conditions and is common among women of reproductive age. It often connects to high levels of prostaglandins, hormonal changes, and inflammation. The study included 35 young women with clinically confirmed PD, who were randomly divided into two groups: Group A received manual therapy, while Group B took ibuprofen. The manual therapy sessions happened weekly for one menstrual cycle and included diaphragm mobilization, pelvic floor muscle normalization, post-isometric muscle release, and trigger point therapy. Group B was told to take ibuprofen (400 mg, three times a day) during their next period. The authors looked for changes in several biochemical markers, such as prostaglandins (PGE2 and PGF2α), vascular endothelial growth factor (VEGF), C-reactive protein (CRP), and sex hormones (progesterone and 17-β estradiol) before and after the treatments. They also measured the severity of dysmenorrhea using the Numerical Pain Rating Scale (NPRS) and checked for musculoskeletal issues by examining trigger points and muscle flexibility. Results showed that both manual therapy and ibuprofen significantly reduced menstrual pain. However, manual therapy was particularly effective in lowering the number of dysfunctional muscles ($p = 0.0005$), which ibuprofen did not achieve. Biochemically, both treatments caused a significant drop in progesterone levels, while manual therapy led to a small, non-significant rise in estradiol levels. In contrast, ibuprofen reduced estradiol levels. A notable difference in post-treatment estradiol levels was found between the groups ($p = 0.036$), favoring manual therapy. Although changes in PGE2, PGF2α, VEGF, and CRP were not statistically significant, the study revealed strong negative correlations between estradiol and CRP ($\rho = -0.659$, $p = 0.002$) and between CRP and progesterone ($\rho = -0.537$, $p = 0.022$) in the manual therapy group. These findings indicate that manual therapy can effectively reduce menstrual pain and enhance musculoskeletal function in PD patients. Its benefits are comparable to those of ibuprofen, but it does not cause the side effects associated with medication. Furthermore, manual therapy may influence hormonal responses and inflammation, suggesting potential benefits beyond simply relieving pain. The study concludes that manual therapy is a promising non-drug option for managing PD. It provides safe, non-invasive, and beneficial outcomes. However, the authors note some limitations, such as a small sample size and the absence of blinding, and they recommend additional large-scale studies to better explore the underlying mechanisms and long-term advantages.

14. Carroquino-Garcia P et. al (2019) conducted a study that explains Primary dysmenorrhea, which is painful menstruation without any underlying pelvic issues, poses a significant health challenge. It has considerable

social and economic effects, often causing people to miss work. The World Health Organization estimates its prevalence ranges from 16.8% to 81.0%, typically decreasing after age 25. Common symptoms include lower abdominal pain, bloating, sadness, depression, irritability, breast pain, low back pain, nausea, vomiting, and diarrhea. These symptoms can be moderate to severe and negatively impact the quality of life for many women. While genetic and personal factors play a role, excessive production of prostaglandins is a major cause. This leads to uterine contractions and reduction in blood flow to the uterus. Other factors may include menstrual bleeding, lysosomes, progesterones, arachidonic acid, vasopressin, pro-inflammatory cytokines, growth factors, and ovarian hormones. Changes in the brain related to pain processing have also been observed in those affected. Current treatments include medications like nonsteroidal anti-inflammatory drugs and oral contraceptives, which have shown effectiveness. However, therapeutic exercise offers a promising, low-cost option without side effects. The idea of using exercise to treat primary dysmenorrhea dates back to Mosler's 1914 hypothesis. It suggests that exercise may alleviate menstrual pain by improving blood flow to the uterus. More recent studies indicate that physical activity reduces stress, pain, and prostaglandin levels, thereby improving pain symptoms, mental health, and overall quality of life. Despite this, the exact effectiveness of therapeutic exercise is still debated because of the limited number of high-quality randomized clinical trials. Previous systematic reviews have looked into the effectiveness of exercise for dysmenorrhea, focusing on pain intensity and duration across various age groups. This current systematic review and meta-analysis aimed to examine the effectiveness of physical exercise specifically for pain intensity, pain duration, and quality of life in younger women aged 16 to 25, a group that experiences more severe symptoms. The study followed PRISMA standards, conducting bibliographic searches between February 2017 and May 2018 across databases such as Web of Science, PEDro, PubMed, Scopus, CINAHL, and Dialnet, using thorough search terms related to dysmenorrhea and exercise. Inclusion criteria required randomized controlled trials in English or Spanish that focused on the specified age group with primary dysmenorrhea and evaluated pain and/or quality of life. Exclusions included women with irregular cycles, gynecological diseases, surgical histories, serious illnesses, or those using contraceptives. From an initial 455 studies, 16 were included in the systematic review, and 11 proceeded to three meta-analyses. Two independent authors performed data extraction, and methodological quality was assessed using the PEDro scale, categorizing studies as excellent, good, or fair quality. The meta-analyses examined pain intensity (post-intervention and pre/post-intervention differences) and pain duration. They used random-effects models for heterogeneous data and fixed-effect models for homogeneous data. Publication bias was evaluated using Begg and Egger tests as well as funnel plots. The interventions varied among the included studies, including stretching, Kegel exercises, isometric exercises, jogging, yoga, aerobics, and relaxation techniques. Exercise programs typically lasted 8 to 12 weeks, with varying frequencies and session durations, some of which were supervised. Control groups received no intervention or alternative treatments like medication or hot-water bottles. Pain intensity was measured using tools like the Visual Analog Scale (VAS) and Numerical Rating Scale. Quality of life was assessed using the SF-36 and Menstrual Distress Questionnaire. Overall, results showed that therapeutic exercise significantly reduced pain intensity in most studies, indicating moderate to strong evidence of its effectiveness. Two meta-analyses on pain intensity consistently favored exercise, showing significant reduction in post-intervention pain and a greater difference between pre and post-treatment pain levels in the exercise groups. Evidence for pain duration was low, although one meta-analysis found a statistically significant shorter duration of menstrual pain in the exercise group. Improvements in quality of life due to exercise had very low evidence since only four studies looked at this factor, and most had fair methodological quality. Notably, studies by Abbaspour et al. and Azima et al. demonstrated significant effects on both pain intensity and duration, often involving stretching or isometric exercises. The findings of this review align with earlier reviews by Abaraogu et al. and Matthewman et al., suggesting that therapeutic exercise can be a helpful option for primary dysmenorrhea.

However, like prior research, the overall quality of the studies included was not consistently high, which calls for careful interpretation of the findings. A key strength of this review is its specific focus on young women aged 16 to 25, a group that is often severely impacted, and its inclusion of quality of life as an important secondary outcome.

RESULTS

Michal Elboim-Gabyzon, Leonid Kalichman conducted a review the use of TENS for treating primary dysmenorrhea with score CASP-7.[1] Uttam Manisha, Lehri Anuradha performed RCT to determine the effect of highfrequency Transcutaneous electrical nerve stimulation (TENS) at root level menstrual pain in Primary Dysmenorrhea with score CASP-9.[2] Manuela Deodato *et al.* (2023) conducted a prospective observational study investigating the effectiveness of manual therapy and pelvic floor exercises in reducing pain associated with primary dysmenorrheal with score CASP-8.[3] Priya Kannan et al. (2014) conducted a systematic review of randomized controlled trial with meta-analysis that investigates the efficacy of various physiotherapy treatments in alleviating menstrual pain among women with primary dysmenorrheal with score CASP-9.[4]

Dhanashree S. Upganlawar *et al.* (2023) conducted a study to review the effectiveness of connective tissue therapy (CTT) and abdominal stretching exercises in managing primary dysmenorrhea score CASP-8.[5] Armour M *et al.* (2019) conducted a systematic review that provides an overview of the effectiveness of exercise as a therapeutic intervention for dysmenorrheal with score CASP-10.[6] Hai-YanBai *et al.* (2017) conducted arandomized, sham-controlledtrialandsyste maticreview study that explores the efficacy of transcutaneous electrical nerve stimulation (TENS) therapy in managing primary dysmenorrhea score CASP-8.[7] Remedios López-Liria *et al.* (2021) conducted a systematic review and meta-analysis of the effectiveness of physiotherapy interventions in managing primary dysmenorrhea score CASP-9.[8] Sunita Sharma *et al.* (2023) conducted a systematic review and meta-analysis provides a comprehensive evaluation of exercise therapy and electrotherapy as interventions for primary dysmenorrhea score CASP-10.[9] Rashid Heidarimoghadam *et al.* (2019) conducted randomized clinical trial investigates the impact of an exercise regimen following the FITT (Frequency, Intensity, Time, and Type) protocol on primary dysmenorrheal among medical students score CASP-8.[10]

Toprak Celenay S *et. al* (2023) conducted This randomized controlled trial demonstrated that Jacobson's Progressive Muscle Relaxation Technique (JPMRT) significantly decreased menstrual pain intensity, associated symptoms, and anxiety levels. Furthermore, the technique led to notable improvements in the participants' quality of life, social activity, and overall work/school performance. The study concluded that JPMRT significantly decreased menstrual pain intensity, symptoms, anxiety, and improved quality of life and performance, suggesting its use as an alternative treatment with CASP 10.[11] Xiang Y et. al (2025) conducted This comprehensive systematic review and meta-analysis concluded that therapeutic exercise significantly reduces pain intensity in primary dysmenorrhea. Their subgroup analyses indicated that strength training, exercise durations of at least 8 weeks, frequencies over 3 times per week, and session lengths exceeding 30 minutes yielded the most superior pain reduction with CASP 10.5.[12] Barcikowska Z *et. al* (2022) conducted This study and found that both manual therapy and ibuprofen significantly reduced primary dysmenorrhea severity and progesterone levels. The manual therapy group additionally experienced fewer muscle dysfunctions. The authors concluded that manual therapy had a comparable effect on dysmenorrhea severity to ibuprofen, indicating its potential as an alternative treatment with CASP 10.[13] Carroquino-Garcia P et al (2019) conducted This systematic review and meta-analysis found moderate evidence that therapeutic exercise is effective in significantly reducing pain intensity in young women with primary dysmenorrhea. However, the evidence for its effectiveness in decreasing pain duration was low, and for improving quality of life, it was very low with a CASP score of 7.[14]

DISCUSSION

The goal of current review was to examine the evidence regarding the efficacy of physiotherapy techniques in pain management during primary dysmenorrhea. Various studies have explored the efficacy

of physiotherapy treatments for alleviating primary dysmenorrhea. Kannan and Claydon's systematic review suggest that diverse physiotherapy interventions can effectively reduce menstrual pain and enhance the quality of life, despite variability in methodologies.[4] Heidarimoghadam *et al.* demonstrated that an exercise plan based on the FITT protocol significantly decreases pain severity and duration among medical students.[10] Armour *et al.* reviewed the impact of exercise, finding consistent pain reduction and quality of life improvements.[6] Sharma *et al.'s* meta-analysis on exercise therapy and electrotherapy corroborated these findings, highlighting significant pain relief and better daily functioning.[9] Bai *et al.* reported substantial pain reduction using high-frequency TENS, a result echoed in Elboim-Gabyzon and Kalichman's overview of TENS therapy.[1,7] Upganlawar *et al.* found connective tissue therapy and abdominal stretching exercises effective for pain relief.[5] Deodato *et al.* observed that manual therapy and pelvic floor exercises also reduce pain and improve quality of life.[3] López-Liriaetal.'s systematic review confirmed the benefits of various physiotherapy treatments, though heterogeneity and short follow-up periods were noted.[8] Manisha and Anuradha emphasized the efficacy of high-frequency TENS at the root level for menstrual pain relief. Collectively, these studies affirm the potential of physiotherapy interventions in managing primary dysmenorrhea, though further high-quality research is needed.[2]

Author	Intervention	Benefits	Evidence Level
Michal Elboim-Gabyzon *et al.*(2020)	Transcutaneous Electrical Nerve Stimulation (TENS)	Effective pain reduction, minimal side effects	Level III
Uttam Manisha *et al.* (2021)	High frequency transcutaneous electricalnerve stimulation (TENS)	Significant reduction In menstrual pain	Level I
Manuela Deodato *et al.* (2023)	Manual therapy and pelvic floor exercises	Pain reduction, Enhanced quality of life	Level III
Priya Kannan *et al.* (2014)	Various physiotherapy treatments	Reduction in menstrual pain, improved quality of life	Level I
Dhana shree S. *et al.* (2023)	Connective tissue therapy and abdominal stretching exercises	Significant reduction in menstrual pain, improved quality of life	Level I
Armour M *et al.* (2019)	Various forms of exercise	Pain reduction, Improvement in quality of life	Level I
Hai-Yan Bai *et al.* (2017)	Transcutaneous Electrical Nerve Stimulation (TENS)	Significant reduction in menstrual pain	Level I
Remedios López-Liria *et al.* (2023)	Various physiotherapy treatments	Significant reduction In pain, improved quality of life	Level I
Sunita Sharma *et al.* (2023)	Exercise therapy and electrotherapy	Significant pain reduction, improved daily activities and Quality of life	Level I
Rashid Heidarimoghadam *et al.* (2019)	Exercise plan based on FITT (Frequency, Intensity, Time, Type) protocol	Significant reduction in pain severity and duration, improved Quality of life	Level II
Toprak Celenay *et al.* (2024)	This randomized controlled trial investigated the use of Jacobson's Progressive Muscle Relaxation Technique (JPMRT) for women with primary dysmenorrhea.	JPMRT significantly reduced menstrual pain, associated symptoms, and anxiety, while also improving the participants' quality of life and daily functioning.	Level II
Xiang *et al.* (2025)	This systematic review and meta-analysis examined various therapeutic exercise types for primary dysmenorrhea, also identifying optimal exercise parameters.	The review confirmed that exercise significantly reduces pain intensity. It further suggested that strength training and longer, more frequent exercise regimens are particularly effective.	Level I
Barcikowska *et al.* (2022)	This randomized controlled trial compared the effectiveness of manual therapy techniques against ibuprofen for managing primary dysmenorrhea symptoms.	Both manual therapy and ibuprofen were effective in reducing menstrual pain and progesterone levels, with manual therapy additionally leading to fewer muscle dysfunctions	Level II
Carroquino-Garcia *et al.* (2019)	This systematic review and meta-analysis synthesized findings on various therapeutic exercise interventions for primary dysmenorrhea in young women (16-25 years).	It found moderate evidence that exercise reduces pain intensity. However, evidence for its impact on pain duration and quality of life was low to very low.	Level I

LIMITATIONS OF THE STUDY

Although the studies reviewed provide strong evidence supporting physiotherapy interventions for managing primary dysmenorrhea, several limitations must be acknowledged. Many studies had small sample sizes and short intervention durations, which reduce the generalizability of their findings (Barcikowska *et al.,* 2022; Toprak Celenay *et al.,* 2024). Lack of blinding and participant bias was common in trials involving manual therapy, relaxation, or exercise interventions (Michal Elboim-Gabyzon *et al.,* 2020; Priya Kannan *et al.,* 2014). Some systematic reviews included studies of variable quality and diversity, affecting the consistency of results (Carroquino-Garcia *et al.,* 2019; Xiang *et al.,* 2025). Moreover, several studies relied on subjective outcome measures like pain scales without objective biological markers (Sunita Sharma *et al.,* 2023; Rashid Heidarimoghadam *et al.,* 2019). Cultural and demographic differences, along with limited long-term follow-up, also make it hard to standardize physiotherapy protocols across various populations (Armour *et al.,* 2019; Deodato et al., 2023; Remedios López-Liria *et al.,* 2021).

CONCLUSION

The reviewed studies emphasize the growing evidence that physiotherapy interventions can effectively manage primary dysmenorrhea in young females. Techniques like therapeutic exercise, manual therapy, progressive muscle relaxation, electrotherapy, and yoga consistently produce significant reductions in pain intensity and symptom duration, along with improvements in quality of life. Systematic reviews by Carroquino-Garcia (2019) and Xiang *et al.* (2025) confirm that exercise, particularly strength and aerobic training, is safe and effective for relieving dysmenorrhea symptoms. Individual randomized controlled trials, such as those by Barcikowska *et al.* (2022) and Celenay *et al.* (2024), demonstrate that manual therapy and relaxation techniques can be viable alternatives to medication, offering both hormonal and musculoskeletal benefits. Research by Armour M *et al.* (2019) and Remedios López-Liria *et al.* (2021) highlights the broader role of integrative therapies like acupuncture and multidisciplinary physiotherapy. Overall, these findings strongly support physiotherapy as either a primary or added treatment for dysmenorrhea, promoting a non-invasive, holistic, and patient-centered approach to menstrual health.

FUTURE DIRECTIONS FOR THE RESEARCH STUDY

Future research on physiotherapy interventions for primary dysmenorrhea should focus on conducting large-scale, multi-centered randomized controlled trials with longer follow-up periods to assess sustained effects (Xiang *et al.,* 2025; Carroquino-Garcia *et al.,* 2019). Studies should aim to include diverse populations across different age groups and socio-cultural backgrounds for broader applicability (Armour *et al.,* 2019; Deodato *et al.,* 2023). There is also a need to incorporate objective outcome measures, such as hormonal or inflammatory biomarkers, along with pain scales to strengthen the evidence base (Barcikowska *et al.,* 2022). Comparative studies between various physiotherapy methods, like kinesio taping, TENS, yoga, Pilates, and progressive muscle relaxation, would help identify the most effective approaches (Uttam Manisha *et al.,* 2021; Priya Kannan *et al.,* 2014; Toprak Celenay *et al.,* 2024). Additionally, integrating patient education and lifestyle changes as part of physiotherapy protocols may improve long-term management and raise awareness of menstrual health (Remedios López-Liria *et al.,* 2021; Rashid Heidari moghadam *et al.,* 2019).

REFERENCES

1. Elboim-Gabyzon M, Kalichman L. Transcutaneous electrical nerve stimulation (TENS) for primary dysmenorrhea: an overview. Int J Womens Health. 2018;10:169-177. doi:10.2147/IJWH.S157655.
2. Manisha U, Anuradha L. Effect of high frequency transcutaneous electrical nerve stimulation at root level menstrual pain in primary dysmenorrhea. Indian Journal of Pain. 2018;32(2):77-81. doi:10.4103/ijpn.ijpn_14_18.
3. Deodato M, Grosso G, Drago A, Martini M, Dudine E, Murena L, et al. Efficacy of manual therapy and pelvic floor exercises for pain reduction in primary dysmenorrhea: a prospective observational study. Journal of Bodywork & Movement Therapies. 2020;24(1):67-73. doi:10.1016/j.jbmt.2019.09.007.

4. Kannan P, Claydon LS. Some physiotherapy treatments may relieve menstrual pain in women with primary dysmenorrhea: a systematic review. Journal of Physiotherapy. 2020;66(1):64-70. doi:10.1016/j.jphys. 2019. 11.002.
5. Upganlawar DS, Patil S, Dhage PP. Efficacy of connective tissue therapy and abdominal stretching exercises in individuals with primary dysmenorrhea: a review. Indian J Physiother Occup Ther. 2019;13(4):225-30. doi:10.5958/0973-5674.2019.00231.0.
6. Armour M, EeCC, Naidoo D, Ayati Z, Chalmers KJ, Steel KA, *et al.* Exercise for dysmenorrhea (Review). Cochrane Database Systematic Review. 2019;2019(9) doi:10.1002/14651858. CD004142.pub3.
7. Bai HY, BaiHY, Yang ZQ. Effect of trans cutaneous electric al nerv estimulation therapy for the treatment of primary dysmenorrhea. Medicine (Baltimore). 2017;96(36) doi:10.1097/ MD. 0000000000007959.
8. López-Liria R, Torres-Álamo L, Vega-Ramírez FA, García-Luengo AV, Aguilar-Parra JM, Trigueros-Ramos R, *et al.* Efficacy of physiotherapy treatment in primary dysmenorrhea: a systematic review and meta-analysis. International Journal of Environment Research Public Health. 2020;17(20):7248. doi:10.3390/ijerph17207248.
9. Sharma S, Ali K, Narula H, Malhotra N, Rai RH, Bansal N, *et al.* Exercise therapy and electrotherapy as an intervention for primary dysmenorrhea: as ystematic review and meta-analysis. J Bodyw Mov Ther. 2021;25:210-20. doi:10.1016/j.jbmt.2020.10.003.
10. 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. Journal Education Health Promotion. 2020;9:82. doi:10.4103/jehp.jehp_94_20.
11. Celenay ST, Ozcelikel G. Efficacy of progressive muscle relaxation technique in primary dysmenorrhea: A randomized controlled trial. Taiwan J Obstet Gynecol. 2024;63(2):195–201.
12. Xiang Y, Li Q, Lu Z, Yu Z, Ma G, Liu S, Li Y. Efficacy and safety of therapeutic exercise for primary dysmenorrhea: a systematic review and meta-analysis. Front Med (Lausanne). 2025;12:1198757.
13. Barcikowska Z, Grzybowska ME, Wąż P, Jaskulak M, Kurpas M, Sotomski M, *et al.* Effect of manual therapy compared to ibuprofen on primary dysmenorrhea in young women—concentration assessment of C-reactive protein, vascular endothelial growth factor, prostaglandins and sex hormones. J Clin Med. 2022;11(9):2686.
14. Carroquino-Garcia P, Jiménez-Rejano JJ, Medrano-Sanchez E, de la Casa-Almeida M, Diaz-Mohedo E, Suarez-Serrano C. Therapeutic exercise in the treatment of primary dysmenorrhea: A systematic review and meta-analysis. Physiother Theory Pract. 2019;35(12):1138–56.