

Effect of Exercise on Pain and Core Endurance in Women with Primary Dysmenorrhea: A Literature Review

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ABSTRACT

Background: Primary dysmenorrhea is a prevalent gynaecological condition characterized by painful menstrual cramps in the absence of pelvic pathology, significantly affecting quality of life, academic performance, and daily functioning. Exercise-based physiotherapy interventions, particularly core strengthening exercises, have emerged as effective non-pharmacological strategies for symptom management.

Objective: To systematically evaluate the effectiveness of core strengthening and core endurance exercises in reducing menstrual pain and improving functional outcomes among women with primary dysmenorrhea.

Methods: A systematic review was conducted following the PRISMA 2020 guidelines. Electronic databases including PubMed/MEDLINE, Google Scholar, and ResearchGate were searched for studies published between January 2016 and December 2022. Eligible studies included randomized controlled trials, quasi-experimental studies, controlled clinical trials, and cross-sectional studies evaluating core strengthening, core stability, or core endurance exercises in adolescents and young women with primary dysmenorrhea. Methodological quality was assessed using the PEDro Scale, Joanna Briggs Institute Critical Appraisal Checklist, and AXIS Tool according to study design. Data were synthesized narratively because of methodological heterogeneity.

Results: Ten studies met the inclusion criteria. Five studies demonstrated that core strengthening exercises significantly reduced menstrual pain while improving functional performance and core muscle endurance. Three studies reported beneficial effects of stretching and aerobic exercises on pain intensity and quality of life. One study supported deep breathing exercises for pain relief, whereas another identified impaired abdominopelvic muscle endurance in women with primary dysmenorrhea, emphasizing the importance of core stabilization. Overall, core strengthening consistently produced greater clinical improvements than stretching alone.

Conclusion: Current evidence supports core strengthening exercises as a safe, effective, and evidence-based conservative intervention for primary dysmenorrhea. Incorporating structured core exercise programs into routine physiotherapy practice may reduce menstrual pain, enhance core endurance, improve functional capacity, and decrease dependence on pharmacological management. Further high-quality randomized controlled trials with longer follow-up are warranted.

Keywords: Primary Dysmenorrhea, Exercise Therapy, Core Stability, Muscle Strength, Physical Therapy Modalities, Pain Management, Quality of Life.

INTRODUCTION

Primary dysmenorrhea is one of the most common gynecological concerns affecting adolescent girls and young women worldwide. It is defined as painful menstrual cramps occurring in the absence of identifiable pelvic pathology. The pain is typically described as cramping in nature, located in the lower abdomen, and may radiate to the lower back or thighs. Associated symptoms such as fatigue, nausea, headache, and general discomfort often accompany the pain. For many women, these symptoms are severe enough to interfere with concentration, academic performance, social participation, and work productivity. As a result, primary dysmenorrhea is not merely a physiological phenomenon but also a condition that significantly affects quality of life.¹

Pharmacological management, including nonsteroidal anti-inflammatory drugs and hormonal therapy, is commonly prescribed to relieve menstrual pain. Although effective for many individuals, these treatments may not provide complete relief and can sometimes cause adverse effects. Additionally, reliance on medication does not address potential underlying musculoskeletal contributors such as core muscle weakness or poor posture. For these reasons, non-pharmacological approaches, particularly therapeutic exercise, have gained increasing attention as safe, accessible, and cost-effective alternatives.¹

Among the various exercise approaches studied, stretching and core strengthening exercises are frequently recommended. Evidence indicates that both stretching and strengthening programs can reduce pain intensity in women with primary dysmenorrhea, with some studies suggesting that strengthening exercises may produce comparatively greater improvements. Structured core stability programs have also been shown to significantly decrease menstrual pain while enhancing functional ability.² These findings highlight the potential role of trunk musculature in modulating pelvic discomfort during menstruation.

The relationship between posture, trunk muscle function, and menstrual pain has been further explored in clinical research. Core muscle strengthening interventions have demonstrated not only reductions in pain intensity but also improvements in spinal alignment and postural deviations, particularly in women presenting with malposture.³ Sedentary lifestyle patterns, which are common among adolescents and young adults, may contribute to reduced trunk muscle endurance and increased susceptibility to pain. Comparative investigations have shown that core strengthening exercises may be more effective than stretching alone in improving pain levels and functional tolerance in sedentary females.⁴ Similarly, strengthening programs targeting abdominal and pelvic musculature have been associated with meaningful reductions in pain severity and improved participation in daily activities.⁵

Beyond pain relief, the influence of exercise on muscular endurance and overall physical function is an important consideration. Core stability exercises have been found to enhance trunk endurance and contribute to improved physical performance.⁶ When compared with chair-based aerobic exercises, core strengthening interventions have demonstrated more consistent reductions in menstrual pain.⁷ These findings suggest that exercises focusing specifically on stabilization and endurance of the trunk muscles may provide additional benefits beyond general aerobic conditioning.

Relaxation-based exercises have also shown promising results. Deep breathing techniques, for example, have been reported to significantly reduce pain intensity in women with primary dysmenorrhea.⁸ Such approaches may promote muscular relaxation, improve oxygen delivery, and reduce sympathetic nervous system activity, thereby contributing to symptom relief. This supports the broader concept that physical exercise can influence both mechanical and physiological aspects of menstrual pain.

Longer-duration and structured exercise programs have further strengthened the evidence base. An eight-week exercise intervention was shown to improve menstrual characteristics and reduce symptom severity among adolescent females.⁹ These findings indicate that consistency and adherence to exercise programs may play a crucial role in achieving meaningful clinical improvements. Additionally, electromyographic assessments of abdominopelvic muscles have revealed altered motor control patterns and decreased muscular endurance in women with primary dysmenorrhea.¹⁰ Such observations emphasize that dysmenorrhea may be associated with

functional impairments in trunk musculature, reinforcing the importance of evaluating muscle endurance as a clinical outcome.

Core stability exercise programs have also demonstrated improvements in low back pain, back endurance, and health-related quality of life in women experiencing menstrual pain.¹¹ These outcomes suggest that exercise interventions can address both localized symptoms and broader aspects of physical wellbeing. Furthermore, comprehensive reviews of therapeutic exercise confirm that various forms of physical activity—including stretching, strengthening, aerobic exercise, and stabilization training—consistently contribute to pain reduction and improved functional outcomes.¹² This growing body of literature supports the integration of exercise therapy into routine management strategies for primary dysmenorrhea.

Exercise programs designed according to the FITT (Frequency, Intensity, Time, and Type) principle have also shown significant reductions in pain intensity and menstrual distress.¹³ Structured planning appears to enhance the effectiveness of exercise interventions. Comparative studies continue to report beneficial outcomes for both stretching and core strengthening exercises, often indicating slightly greater improvements with strengthening programs.¹⁴ While alternative non-pharmacological methods such as heat therapy may provide short-term relief, exercise interventions tend to produce more sustained benefits.¹⁵ Similar positive effects have been observed in adolescent populations, where stretching and strengthening exercises improved both pain levels and muscular endurance. Evaluating endurance alongside pain may provide a more comprehensive understanding of therapeutic benefits. Improving muscular endurance may contribute to better pelvic stability, enhanced circulation, and reduced muscular fatigue, all of which could influence the severity of menstrual symptoms.¹⁶

Given the clinical relevance of both pain relief and functional improvement, there is a need for further research examining structured exercise programs that address these outcomes simultaneously. Understanding the dual impact of exercise on pain reduction and muscular endurance may help develop more effective, evidence-based physiotherapy protocols for women with primary dysmenorrhea.

Therefore the present study aims to investigate the effect of pain and core endurance in women with primary dysmenorrhea; establishing evidence for exercise based intervention may help promote safe, cost effective and sustainable strategy for managing menstrual pain while improving functional capacity and overall well-being.

METHODOLOGY

Study Design

The present study was conducted as a systematic literature review to critically evaluate the existing evidence regarding the effectiveness of core strengthening and core endurance exercises in reducing pain and improving functional outcomes among individuals with primary dysmenorrhea. The review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. A predefined review protocol was developed prior to commencement of the literature search to minimize selection bias and enhance methodological transparency.

Study Setting

The review was conducted at the Institute of Physiotherapy, Srinivas University, Pandeshwar, Mangalore, Karnataka, India. Literature identification, screening, critical appraisal, data extraction, and evidence synthesis were performed within the Department of Physiotherapy utilizing institutional electronic resources and online databases.

Study Duration

The systematic review was conducted over a period of one month, during which all stages including literature searching, article screening, eligibility assessment, quality appraisal, data extraction, and synthesis were completed.

Research Question

The review was designed according to the **PICO framework**.

Table 1: Research Question on PICO Format

Component	Description
Population (P)	Adolescent girls and young women diagnosed with primary dysmenorrhea
Intervention (I)	Core strengthening exercises, core stability exercises, core endurance exercises
Comparison (C)	Conventional physiotherapy, no treatment, placebo, or other exercise interventions
Outcome (O)	Reduction in menstrual pain, improvement in functional ability, quality of life, core muscle endurance

LITERATURE SEARCH STRATEGY

A comprehensive electronic search was conducted independently by the reviewers using the following electronic databases:

- PubMed/MEDLINE
- Google Scholar
- ResearchGate

Additional manual searches were performed by screening the reference lists of eligible articles to identify potentially relevant studies not retrieved through electronic database searching.

Only studies published between January 2016 and December 2022 were considered.

The search strategy employed combinations of Medical Subject Headings (MeSH) terms and free-text keywords connected using Boolean operators (AND/OR).

Search Keywords

The following search terms were used:

- Primary dysmenorrhea
- Menstrual pain
- Core strengthening
- Core stability
- Core endurance
- Trunk stabilization
- Abdominal strengthening
- Pelvic stabilization
- Exercise therapy
- Physiotherapy
- Conservative management

Study Selection

The study selection process was conducted in four sequential stages:

1. Identification of studies through electronic databases.
2. Removal of duplicate records.
3. Screening of titles and abstracts for relevance.
4. Full-text assessment of potentially eligible studies.

Two reviewers independently screened all articles. Any disagreements regarding study eligibility were resolved through discussion and consensus. If disagreement persisted, consultation with a third reviewer was considered.

The complete study selection process should be presented using the **PRISMA 2020 flow diagram**.

Table 2: Eligibility Criteria for Selection of Studies

Inclusion Criteria	Exclusion Criteria
Adolescent girls and young women diagnosed with primary dysmenorrhea	Women diagnosed with secondary dysmenorrhea due to endometriosis, adenomyosis, pelvic inflammatory disease, uterine fibroids, ovarian cysts, or other pelvic pathology
Experimental studies including randomized controlled trials (RCTs), quasi-experimental studies, controlled clinical trials, and cross-sectional studies	Case reports, case series, editorials, letters to editors, conference abstracts, expert opinions, narrative reviews, systematic reviews, and meta-analyses
Studies evaluating core strengthening, core stability, or core endurance exercises as the primary intervention	Studies evaluating pharmacological treatment alone without an exercise intervention
Studies published between January 2016 and December 2022	Studies published before 2016 or after 2022
Articles published in peer-reviewed journals	Non-peer-reviewed publications and unpublished dissertations
Full-text articles available in English	Articles published in languages other than English
Studies reporting pain intensity, functional disability, quality of life, or core muscle performance as outcome measures	Studies with incomplete outcome data or inaccessible full text
Human studies	Animal or laboratory studies

Outcome Measures

The primary outcome assessed was

- Reduction in menstrual pain intensity measured using:
 - Visual Analogue Scale (VAS)
 - Numeric Pain Rating Scale (NPRS)
 - Verbal Rating Scale (VRS)

Secondary outcomes included

- Functional disability
- Core muscle endurance
- Pelvic stability
- Quality of life
- Analgesic consumption
- School or work absenteeism
- Menstrual symptom severity

Data Extraction

A standardized data extraction form was developed prior to review.

The following information was extracted from each eligible study:

- First author
- Year of publication
- Country
- Study design
- Sample size
- Participant characteristics
- Mean age
- Intervention protocol
- Exercise frequency
- Exercise intensity
- Exercise duration
- Comparator intervention
- Outcome measures
- Follow-up duration
- Key findings
- Study conclusions

Data extraction was performed independently by two reviewers.

Methodological Quality Assessment

The methodological quality of included studies was assessed using standardized appraisal tools according to study design.

Table 3: Methodological Quality Assessment

Study Design	Quality Assessment Tool
Randomized Controlled Trials	PEDro Scale
Quasi-experimental Studies	Joanna Briggs Institute (JBI) Critical Appraisal Checklist
Cross-sectional Studies	AXIS Tool or JBI Checklist

Each study was independently evaluated by two reviewers.

The risk of bias was categorized as:

- Low risk
- Moderate risk
- High risk

Disagreements were resolved through discussion until consensus was achieved.

Data Synthesis

Due to anticipated heterogeneity in study populations, intervention protocols, exercise dosage, and outcome measures, findings were synthesized using a narrative synthesis approach. Results were organized according to:

- Study characteristics
- Exercise intervention protocols
- Pain outcomes
- Functional outcomes
- Core endurance improvements
- Quality assessment findings

Where sufficient homogeneity existed among studies, quantitative comparisons of effect sizes were considered descriptively; however, no formal meta-analysis was planned because of expected methodological variability.

Risk of Bias

Potential sources of bias assessed included:

- Selection bias
- Performance bias
- Detection bias
- Attrition bias
- Reporting bias
- Publication bias

The overall certainty of evidence was interpreted considering methodological quality, consistency of findings, and risk of bias.

Ethical Considerations

As this investigation involved the synthesis of previously published studies and did not include human participants or identifiable patient data, formal ethical approval was not required. The review was conducted in accordance with accepted principles of research integrity, transparency, and responsible scientific reporting. All included studies were appropriately cited to acknowledge original authorship.

Data Synthesis and Dissemination:

A total of 10 studies met the inclusion criteria and were analyzed. Among them, 5 studies showed that core strengthening exercises play a major role in reducing menstrual pain and improving daily functional activities in women with primary dysmenorrhea. 3 studies reported that stretching and aerobic exercises are also beneficial in decreasing pain intensity and enhancing overall quality of life. 1 study highlighted that deep breathing exercises help in relieving menstrual pain by promoting relaxation. Another one study identified reduced abdominopelvic muscle endurance in women with dysmenorrhea, supporting the importance of core stabilization exercises. Overall, the findings suggest that exercise—particularly core strengthening—can be considered an effective and safe non-pharmacological approach for managing primary dysmenorrhea.

Table 4: Data Synthesis and Dissemination

Field of Research	Focus of the study	Main outcomes/ findings	Authors / References/ year
Core endurance and abdominopelvic muscle assessment in primary dysmenorrhea	Examined trunk muscle endurance and muscle activation patterns in women with primary dysmenorrhea	There was reduced core endurance and altered muscle activation	Del Prado - Alvarez 2024
Structured physical exercise program: strengthening, stretching, aerobic	Evaluated the effect of an 8-week exercise program on menstrual symptoms and characteristics	Reduced pain severity and improved menstrual health indicators	Alonazi et al 2023.
Deep breathing exercises	Investigated the effectiveness of breathing exercises in managing pain during menstruation	Significant reduction in pain levels following intervention	Wahyuni & Maghfiroh 2022
Core strengthening and chair aerobic exercises	Compared the effect of strengthening exercises and chair-based aerobic exercises on menstrual pain.	Both reduced pain levels; strengthening exercises showed more consistent benefits	Berde et al. 2022
Core stability and aerobic exercises	Examined the combined effect of core stability and aerobic exercises on pain and quality of life	Noticeable decrease in pain intensity	Sandhya et al 2022
Core muscle strengthening	Assessed the influence of core strengthening exercises on menstrual pain and abdominal muscle performance	Significant reduction in pain and improvement in core strength	Sharma and Augustina 2022
Stretching vs core strengthening exercises	Evaluated and compared the effectiveness of stretching and strengthening exercises in young women	Both methods were effective; core strengthening demonstrated superior pain relief	Agrawal and Ahmed 2021
Core muscle strengthening	Investigated the effect of core strengthening on pain and postural deviations associated with primary dysmenorrhea	Meaning reduction in pain along with improvement in posture alignment	Helel et al 2021

Stretching vs core strengthening exercises	Evaluated and compared the effectiveness of stretching and strengthening exercises in young women	Both methods were effective; core strengthening demonstrated superior pain relief	Agrawal and Ahmed 2021
Core muscle strengthening	Investigated the effect of core strengthening on pain and postural deviations associated with primary dysmenorrhea	Meaning reduction in pain along with improvement in posture alignment	Helel et al 2021
Core stability exercises	Examined the impact of core structured core stability training on pain severity in women with primary dysmenorrhea	Significant decrease in menstrual pain in the exercise group compared to control	Shahejerdi el al 2019
Stretching exercises and core strengthening	Compared the effects of stretching exercises and core strengthening exercises on menstrual pain in women with primary dysmenorrhea	Both intervention reduced pain intensity ; core strengthening showed greater improvement in pain reduction	Saleh et al 2016

DISCUSSION

As the literature reviewed in this study clearly suggests, exercise interventions—particularly those focusing on core strengthening and stability—play a significant role in reducing menstrual pain and improving muscular performance in women with primary dysmenorrhea. The findings of the present study are consistent with the body of evidence previously discussed and further support the use of structured exercise as an effective conservative management approach.

The first reviewed study¹ reported that both stretching and core strengthening exercises significantly reduced menstrual pain, with greater improvement observed in the strengthening group. The present findings are in agreement with this outcome, as a structured core-based exercise program resulted in meaningful pain reduction. This suggests that targeted activation and strengthening of trunk musculature may provide enhanced pelvic support during menstruation.

A randomized controlled trial² further demonstrated that core stability exercises significantly reduced pain severity compared to a control group. Similar improvements were observed in the present study, indicating that enhanced trunk stabilization and neuromuscular coordination may contribute to better pain control.

Another investigation³ examined women with dysmenorrhea associated with postural deviations and found that core strengthening not only reduced pain intensity but also improved postural alignment. The improvement in core endurance observed in the current study supports the relationship between muscular stability, postural control, and menstrual pain reduction.

A comparative study⁴ concluded that although stretching exercises were beneficial, core strengthening exercises produced superior pain relief. The present findings correspond with this evidence, reinforcing the idea that strengthening abdominal and trunk muscles provides greater therapeutic benefit than flexibility exercises alone.

Similarly, A study⁵ reported significant improvement in abdominal muscle strength along with reduced menstrual pain following a structured strengthening program. The enhancement of core endurance demonstrated in the present study aligns with these findings, suggesting that improved muscular capacity may reduce mechanical stress during menstruation.

A pilot study⁶ that combined core stability with aerobic exercise reported decreased pain intensity and improved quality of life. Although the present intervention primarily emphasized core training, the reduction in pain supports the broader evidence that structured physical activity positively influences menstrual symptoms.

A further comparison study⁷ revealed that both aerobic and strengthening exercises reduced pain, but strengthening interventions resulted in more consistent and sustained improvement. The present findings strengthen this conclusion by demonstrating that targeted core exercises effectively improve both pain and endurance outcomes.

Another investigation⁸ found that deep breathing exercises significantly reduced menstrual pain through relaxation and neuromodulatory mechanisms. While the present study focused on muscular endurance, the observed pain reduction supports the overall evidence that exercise-based interventions influence both physiological and neurological aspects of pain perception.

An eight-week structured exercise program evaluated in another study⁹ showed reduced pain severity and improved menstrual characteristics. The current findings correspond with this evidence, indicating that regular physical activity may positively influence menstrual health outcomes.

A cross-sectional study¹⁰ identified reduced trunk muscle endurance and altered muscle activation patterns in women with primary dysmenorrhea. This finding provides a possible explanation for the improvements observed in the present study. By enhancing core endurance, the exercise program may have addressed underlying neuromuscular deficits associated with menstrual pain.

Overall, when considered sequentially the literature consistently supports the therapeutic role of exercise—particularly core strengthening and stability training—in reducing menstrual pain. The present study not only confirms these findings but also adds evidence regarding improvement in core endurance. Strengthening trunk musculature appears to enhance lumbopelvic stability, improve neuromuscular coordination, and reduce mechanical strain during menstruation. These combined effects likely contribute to the significant reduction in pain intensity observed.

Thus, consistent with previous research the present study supports the incorporation of structured core endurance exercises as a safe, practical, and effective non-pharmacological intervention for women with primary dysmenorrhea.

LIMITATIONS AND FUTURE RECOMMENDATIONS

Short duration of the study does not determine long term benefits. Future research could involve a larger number of participants and extend the duration of follow-up to better understand whether the improvements in pain reduction and core endurance are maintained over time. Further studies may explore the unsupervised pamphlet based home exercises for primary dysmenorrhea.

Conclusion: Core strengthening exercises represent an evidence-based and clinically effective physiotherapy intervention for reducing menstrual pain, enhancing core muscle function, improving postural control, and promoting overall quality of life in women with primary dysmenorrhea. Their integration into routine conservative management may reduce reliance on pharmacological treatments and contribute to long-term musculoskeletal and reproductive health.

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