International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Scholarly Publisher
RS Global Sp. z O.O.
ISNI: 0000 0004 8495 2390

Dolna 17, Warsaw,
Poland 00-773
+48 226 0 227 03
editorial_office@rsglobal.pl

ARTICLE TITLE	NON-PHARMACOLOGICAL APPROACHES TO PAIN MANAGEMENT IN ENDOMETRIOSIS: A REVIEW OF CURRENT EVIDENCE
DOI	https://doi.org/10.31435/ijitss.3(47).2025.4071
RECEIVED	15 August 2025
ACCEPTED	26 September 2025
PUBLISHED	30 September 2025
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

NON-PHARMACOLOGICAL APPROACHES TO PAIN MANAGEMENT IN ENDOMETRIOSIS: A REVIEW OF CURRENT EVIDENCE

Eliza Kawalska *(Corresponding Author, Email: ekawalska98@gmail.com)*
Hospital of Our Lady of Perpetual Help in Wołomin, Wołomin, Poland
ORCID ID: 0009-0004-8244-6459

Kacper Szymon Zielonka
Maria Skłodowska-Curie Provincial Specialist Hospital in Zgierz, Zgierz, Poland
ORCID ID: 0009-0009-5149-7786

Joanna Jasińska
Central Clinical Hospital of Medical University of Łódź, Łódź, Poland
ORCID ID: 0009-0008-2496-1355

Bartosz Dądela
Maria Skłodowska-Curie Provincial Specialist Hospital in Zgierz, Zgierz, Poland
ORCID ID: 0009-0003-2408-9812

Marcin Markowski
Medical University of Łódź, Łódź, Poland
ORCID ID: 0009-0006-5497-1138

Natalia Śliwa
Maria Skłodowska-Curie Provincial Specialist Hospital in Zgierz, Zgierz, Poland
ORCID ID: 0009-0000-9829-1915

Sara Langner
Central Teaching Hospital of the Medical University of Łódź, Łódź, Poland
ORCID ID: 0009-0009-4306-4024

Szymon Gnitecki
Provincial Multi-Specialist Center of Oncology and Traumatology M. Copernicus in Łódź, Łódź, Poland
ORCID ID: 0009-0007-6839-6207

Szymon Janczura
Central Clinical Hospital of Medical University of Łódź, Łódź, Poland
ORCID ID: 0009-0009-4214-4014

Maciej Borowski
Central Clinical Hospital of Medical University of Łódź, Łódź, Poland
ORCID ID: 0009-0001-0789-804X

ABSTRACT

Endometriosis is a chronic inflammatory disorder affecting approximately 10% of women of reproductive age, typically associated with intense pelvic pain, dyspareunia, and menstrual irregularities. While pharmacological and surgical therapies remain the cornerstone of treatment, there is growing interest in non-pharmacological strategies for symptom management, particularly among individuals who cannot take medications or prefer to limit their use. This review aims to evaluate current scientific research on the effectiveness of non-pharmacological methods for managing endometriosis-related pain. The analysis includes approaches such as acupuncture, physiotherapy, physical activity, yoga, dietary adjustments, nutritional supplementation, and psychological interventions. Evidence from multiple studies suggests that these strategies can significantly alleviate pain, enhance quality of life, and support psychological well-being. The review emphasizes the need for additional well-designed clinical trials to confirm their effectiveness and better integrate these methods into routine clinical practice.

KEYWORDS

Endometriosis, Chronic Pelvic Pain, Non-Pharmacological Treatment, Acupuncture, Physiotherapy, Yoga, Nutrition, Cognitive Behavioral Therapy, Pain Management, Women's Health

CITATION

Eliza Kawalska, Kacper Szymon Zielonka, Joanna Jasińska, Bartosz Dądela, Marcin Markowski, Natalia Śliwa, Sara Langner, Szymon Gnitecki, Szymon Janczura, Maciej Borowski. (2025) Non-Pharmacological Approaches to Pain Management in Endometriosis: A Review of Current Evidence. *International Journal of Innovative Technologies in Social Science*. 3(47). doi: 10.31435/ijitss.3(47).2025.4071

Introduction

Endometriosis is a chronic, estrogen-dependent inflammatory disease characterized by the presence of endometrial-like tissue outside the uterine cavity, most commonly within the pelvic peritoneum, ovaries, and rectovaginal septum. It affects approximately 10% of women of reproductive age worldwide, with prevalence rising to 30–50% among women with chronic pelvic pain or infertility (Bulun et al., 2019). Despite being a benign condition, endometriosis can lead to significant physical and psychological morbidity, primarily due to symptoms such as dysmenorrhea, dyspareunia, non-cyclic pelvic pain, and fatigue (Zondervan et al., 2020).

Pharmacological treatment, including hormonal therapies and analgesics, remains the cornerstone of endometriosis management. In more advanced or refractory cases, surgical intervention is often required to excise or ablate ectopic endometrial lesions. However, these approaches are not universally effective, may be contraindicated, and are frequently associated with adverse effects or recurrence (Chapron et al., 2019).

Consequently, there is growing interest in non-pharmacological strategies as adjunctive or alternative approaches for pain management in endometriosis. These include physical therapy, acupuncture, cognitive behavioral therapy (CBT), dietary modifications, mindfulness-based interventions, and transcutaneous electrical nerve stimulation (TENS), among others. Emerging evidence suggests that such interventions may help reduce pain intensity, improve function, and enhance quality of life in affected individuals (Fraser et al., 2022); (Leonardi et al., 2022).

This review aims to synthesize and critically evaluate the current evidence on the effectiveness of non-pharmacological interventions for pain management in women with endometriosis. The goal is to provide an evidence-based perspective on integrative strategies that can complement standard medical and surgical treatments.

Acupuncture

Acupuncture, a key component of traditional Chinese medicine, has gained increasing attention as a complementary treatment for chronic pelvic pain, including pain associated with endometriosis. Although its mechanisms remain not fully understood, current research suggests that acupuncture can influence both central and peripheral nervous system activity, modulate immune responses, and regulate neurochemicals such as endorphins, serotonin, and substance P. Additionally, acupuncture may affect the hypothalamic-pituitary-adrenal (HPA) axis, which is involved in pain and stress regulation (Zhu et al., 2017); (Chen et al., 2024).

A systematic review and meta-analysis including ten randomized controlled trials demonstrated that acupuncture significantly reduced endometriosis-related pain compared to both conventional medications and placebo acupuncture. The study found consistent reductions in pain intensity as measured by the Visual Analogue Scale (VAS), as well as improvements in clinical response rates. These findings support acupuncture's role as an effective adjunct in managing both dysmenorrhea and non-cyclic pelvic pain (Zhu et al., 2017).

Further supporting this, a more recent meta-analysis, involving 793 participants, found a significant reduction in pain severity and a higher response rate to treatment among patients receiving acupuncture. The subgroup analysis revealed that electroacupuncture and auricular acupuncture were particularly effective, and a reduction in CA-125 levels was also observed, suggesting a potential anti-inflammatory effect (Chen et al., 2024). The study also identified that treatments longer than four weeks and with sessions twice per week yielded greater analgesic effects, pointing toward the importance of protocol optimization.

In a randomized controlled trial comparing traditional acupuncture to placebo acupuncture, patients receiving real acupuncture experienced a significantly greater reduction in pain intensity (33 mm vs. 9 mm on the VAS), indicating a genuine physiological benefit beyond the placebo effect (Rubi-Klein et al., 2010).

In a case series conducted by Budd et al. (2023), acupuncture was implemented as part of a broader integrative medicine program. Participants not only reported improved pain control and reduced analgesic use, but also showed benefits in domains such as sleep quality, stress reduction, and emotional well-being—factors that are increasingly recognized as important in the holistic management of endometriosis. The authors emphasized the value of including acupuncture as part of individualized care plans tailored to patient preferences and comorbidities.

French clinical guidelines (CNGOF-HAS) for the management of endometriosis-associated pain recommend considering acupuncture alongside other non-pharmacological strategies. The guidelines suggest that acupuncture may be particularly valuable in patients who either cannot tolerate hormonal treatments or prefer less invasive options (Vercellini et al., 2018). Although the guidelines note the need for further trials, they affirm acupuncture's favorable safety profile and the absence of serious adverse effects.

Despite its positive findings, the Cochrane review by Zhu et al. (2011) also highlighted some limitations in the included studies, such as small sample sizes, lack of blinding, and heterogeneity in acupuncture techniques and treatment durations. Nonetheless, acupuncture was found to be consistently safe, with minimal and mild side effects, such as local discomfort, bruising, or transient fatigue.

In summary, acupuncture appears to be a promising, well-tolerated, and patient-centered non-pharmacological intervention for pain related to endometriosis. While current evidence supports its potential to provide symptomatic relief and possibly influence underlying inflammatory mechanisms, further high-quality randomized controlled trials are necessary to confirm its efficacy, define standardized protocols, and better understand long-term outcomes (Zhu et al., 2017; Chen et al., 2024).

Physical Therapy and Manual Therapy

Physical therapy, especially when involving pelvic floor and urogynecological approaches, has become an essential component in the multidisciplinary management of chronic pelvic pain (CPP) associated with endometriosis. These techniques aim to address muscular, fascial, and postural imbalances that contribute to pain, helping restore neuromuscular function and reduce sensitization (Raimondo et al., 2024).

Evidence supports that targeted interventions such as pelvic floor muscle training (PFMT), manual therapy, and myofascial release lead to significant reductions in pain intensity. Meta-analyses demonstrate improvements in dysmenorrhea, dyspareunia, and daily functional outcomes when physiotherapy is integrated into treatment plans (Abril-Coello et al., 2023).

A randomized controlled trial by Raimondo et al. (2024) confirmed the efficacy of pelvic floor physical therapy specifically for deep endometriosis-related pelvic pain. Over a 12-week intervention period,

participants receiving therapy showed significant improvements in pain scores, pelvic floor muscle relaxation, and global physical function compared to the control group receiving general care.

Urogynecological physiotherapy focuses on both internal and external treatment of the pelvic floor muscles, addressing trigger points, hypertonicity, and dysfunctions in coordination and strength. Muñoz-Gómez et al. (2023) conducted a pilot randomized trial evaluating myofascial physical therapy in women with endometriosis and CPP. Results showed significant reductions in pain intensity and pelvic floor muscle tension, as well as improved quality of life and pelvic mobility after six treatment sessions.

Manual therapy techniques—such as soft tissue mobilization, joint mobilization, and fascial manipulation—further complement physical therapy by reducing musculoskeletal restrictions in the pelvis and lower back. These hands-on approaches not only alleviate local pain but may also modulate central pain processing. In a 2024 RCT, Gamboa et al. tested a multimodal physiotherapy protocol combining manual therapy, postural re-education, and breathing techniques. Women in the intervention group reported meaningful decreases in both spontaneous and provoked pelvic pain, alongside improvements in functional capacity and sexual health.

These findings are reinforced by a randomized clinical trial by Muñoz-Gómez et al. (2023), which applied a standardized manual therapy protocol and found improved lumbar mobility and decreased pain severity after eight weeks of treatment. These improvements were also maintained at follow-up, suggesting lasting effects on musculoskeletal and myofascial systems.

Beyond passive therapy, active physical activity and exercise interventions also show promise. A recent systematic review and meta-analysis by Xie et al. (2025) demonstrated that aerobic and resistance-based exercises significantly reduce pain intensity and improve physical and mental quality of life among women with endometriosis. This supports the inclusion of structured exercise programs within physiotherapy approaches.

Complementarily, a randomized clinical trial by Mira et al. (2020) demonstrated that combining hormonal therapy with electrotherapy—specifically transcutaneous electrical nerve stimulation (TENS)—produced greater pain relief than hormonal treatment alone in patients with deep infiltrating endometriosis. This highlights the value of multimodal physiotherapeutic strategies in enhancing treatment outcomes.

Although further large-scale trials are needed, current evidence consistently supports the role of physical therapy—particularly when combining pelvic floor interventions, manual therapy, and active modalities—as a safe and effective non-pharmacological option for alleviating endometriosis-associated pain (Raimondo et al., 2024; Xie et al., 2025).

Exercise and Yoga

Physical exercise and yoga represent important non-pharmacological strategies in managing endometriosis-associated pain. Regular movement has been shown to improve blood circulation, reduce inflammation, and regulate hormonal and immune responses. In women with endometriosis, exercise may also positively influence central sensitization mechanisms and help modulate pain perception by promoting endorphin release and stress reduction (Gonçalves et al., 2016).

Several interventional studies suggest that structured physical activity can lead to a reduction in pelvic pain, dysmenorrhea, and fatigue. Though the results across trials vary, improvements in stress, sleep quality, and overall well-being have been consistently observed. For example, aerobic exercise and flexibility training have been associated with decreased perceived pain levels and improved physical functioning, though further research is needed to confirm long-term effects (Zeng et al., 2021).

Yoga, in particular, has shown promise as a complementary approach in endometriosis management. The integration of breathwork, movement, and mindfulness helps regulate the autonomic nervous system, promoting a relaxation response. Participants in yoga interventions report meaningful improvements in pain, anxiety, and body image, along with better pain coping strategies. A dedicated 8-week yoga program was found to significantly reduce chronic pelvic pain and improve various domains of quality of life without altering menstrual cycle patterns (Gonçalves et al., 2017).

Furthermore, qualitative studies indicate that women perceive yoga as a tool for gaining bodily awareness, autonomy, and psychological resilience. These psychosocial benefits appear to reinforce pain management and improve long-term treatment adherence (Gonçalves et al., 2017).

Pilot studies also support that yoga may reduce stress and improve quality of life when practiced regularly, even with limited session duration. One such trial demonstrated clinically relevant reductions in stress levels following a yoga intervention specifically designed for endometriosis patients (Ravins et al., 2022).

Moreover, cognitive-behavioral therapy (CBT) combined with yoga has been shown to be an effective therapeutic approach in managing pain and emotional stress related to endometriosis. A study investigating the impact of yoga and CBT on women with endometriosis found significant improvements in mental well-being, pain management, and quality of life. These therapies together may provide comprehensive relief by addressing both the physical and psychological components of pain (Boehm et al., 2021).

Dietary Modifications and Supplementation in Endometriosis-Related Pain Management

Dietary interventions and nutritional supplementation have increasingly gained attention as supportive strategies in the management of endometriosis-related pain. Chronic inflammation and oxidative stress play key roles in the pathophysiology of endometriosis, and certain nutrients and bioactive compounds may help modulate these processes to alleviate symptoms (Rizk et al., 2022).

Several systematic reviews suggest that antioxidant supplementation—including vitamins C and E, N-acetylcysteine (NAC), curcumin, and omega-3 fatty acids—can contribute to the reduction of pelvic pain, dysmenorrhea, and dyspareunia in women with endometriosis. These substances are believed to counteract oxidative stress and inflammation, improving mitochondrial function and immune regulation. Some trials also reported improvements in quality of life, although study designs and dosages varied considerably (Santanam et al., 2022).

Additionally, vitamin D, zinc, selenium, resveratrol, and epigallocatechin-3-gallate (EGCG) have been investigated for their anti-inflammatory, anti-proliferative, and hormonal effects. While many findings come from animal models or in vitro studies, emerging clinical data show that these agents may reduce lesion size and symptom severity. However, their effectiveness appears dependent on dosage, duration of treatment, and individual metabolic profiles (Nirgianakis et al., 2022).

A recent meta-analysis of randomized controlled trials evaluating dietary interventions found promising, albeit limited, evidence supporting the use of nutritional strategies in pain reduction. Interventions such as low-inflammatory diets and antioxidant-rich supplementation were associated with decreased pain intensity during menstruation, though evidence for effects on chronic pelvic pain remains inconclusive due to heterogeneity among trials (Wang et al., 2024).

Overall, while dietary modifications and supplementation show potential in supporting endometriosis treatment, more rigorous clinical trials are necessary to establish standardized protocols. Nonetheless, these approaches offer a low-risk, adjunctive strategy that may benefit patients seeking integrative, holistic care.

Psychological Therapies (CBT, Mindfulness)

Psychological therapies such as cognitive-behavioural therapy (CBT) and mindfulness-based interventions are increasingly recognized as effective complementary strategies in managing endometriosis-related pain. These approaches aim to alleviate the psychological burden of chronic pain by targeting maladaptive thought patterns, emotional distress, and pain catastrophizing. They also foster emotional regulation and resilience, both of which are essential in the context of persistent pelvic pain (Laimou et al., 2024).

A randomized controlled trial comparing CBT, yoga, and educational interventions demonstrated that CBT significantly improved quality of life, particularly in emotional well-being and pain management. Women receiving CBT also showed reduced healthcare utilization, suggesting potential cost-effectiveness of this approach in clinical settings (Boehm et al., 2021).

Neuropsychological insights suggest that CBT and mindfulness practices can modulate central pain processing networks, including the anterior cingulate cortex, insula, and prefrontal regions. These therapies reduce central sensitization, a key mechanism in endometriosis-related chronic pain, by decreasing emotional amplification of pain signals (Zhang et al., 2023).

A pilot study on group-based CBT confirmed its feasibility and acceptability among women with endometriosis. Participants reported meaningful reductions in pain interference and improvements in mental health outcomes, especially among those with high baseline stress and trauma exposure (Van Weert et al., 2023).

Further supporting evidence comes from observational research linking pain catastrophizing, emotional distress, and low coping skills with higher pain severity in women with endometriosis. These findings reinforce the need for psychological assessment and personalized therapy as part of a multidisciplinary treatment plan (Martínez-Zamora et al., 2021).

Moreover, psychological interventions such as Acceptance and Commitment Therapy (ACT) and mindfulness-based cognitive therapy (MBCT) have shown preliminary effectiveness in enhancing pain tolerance and improving emotional well-being. These therapies may help patients reframe their relationship with pain and focus on values-based living, even in the presence of ongoing symptoms (Tripoli et al., 2019).

Thermotherapy

Thermotherapy, or the therapeutic application of heat, is a commonly used non-pharmacological intervention among women suffering from endometriosis-related pain. It is often employed through hot water bottles, electric heating pads, warm baths, or heat wraps. Its analgesic effects are attributed to several mechanisms, including increased blood flow, muscle relaxation, and modulation of nociceptive transmission (Armour et al., 2021).

Survey-based studies indicate that more than 75% of women with endometriosis use heat-based strategies as a primary self-management tool for pain relief. In a U.S.-based study, heat application was reported as one of the most commonly used and effective non-pharmacological strategies for managing pelvic pain associated with endometriosis (Armour et al., 2021) [34]. Similarly, a Canadian cross-sectional study found that heat was perceived by patients as among the most helpful complementary interventions, often used alongside dietary changes, rest, and physical activity (Ballweg et al., 2022).

The physiological basis for thermotherapy's effectiveness lies in its ability to induce vasodilation, improving oxygenation and nutrient delivery to affected tissues, while simultaneously reducing ischemia and muscle tension. Additionally, heat may desensitize nociceptors by raising local tissue temperature and increasing the threshold for pain signals (Vitale et al., 2024).

Beyond its use in daily pain management, heat also plays a role in post-operative care. In laparoscopic procedures for endometriosis, the use of humidified and warmed insufflation gas has been associated with reduced post-operative pain, suggesting systemic benefits of controlled thermal environments during surgical interventions (Nezhat et al., 2021).

Emerging methods, such as thermal biofeedback therapy, have also been piloted with promising results. A small trial reported significant reductions in pain intensity and anxiety in women trained to consciously regulate peripheral body temperature, although further large-scale studies are warranted to confirm these findings (Coad and Frazier, 2003).

In summary, thermotherapy represents a simple, safe, and accessible intervention with substantial reported benefits in reducing pain intensity among women with endometriosis. While most evidence stems from observational and patient-reported outcomes, the consistency of perceived efficacy highlights its value as a supportive strategy in comprehensive pain management.

Transcutaneous Electrical Nerve Stimulation (TENS)

Transcutaneous Electrical Nerve Stimulation (TENS) has emerged as a promising non-pharmacological approach for alleviating pain associated with endometriosis, particularly chronic pelvic pain (CPP) and dysmenorrhea. TENS delivers low-voltage electrical impulses through the skin to modulate nociceptive transmission at both peripheral and central levels, primarily by stimulating large-diameter afferent fibers and engaging endogenous pain-inhibitory mechanisms (Oliveira et al., 2020).

A randomized clinical trial by Oliveira et al. (2020) evaluated the efficacy of hormonal therapy alone versus hormonal therapy combined with TENS in patients with deep infiltrating endometriosis. The study demonstrated that the group receiving TENS as an adjunct experienced a significantly greater reduction in pelvic pain intensity and a higher rate of clinical response, supporting the complementary role of TENS in improving treatment outcomes. The authors emphasized the safety and tolerability of TENS, with no serious adverse events reported.

Further supporting its use, a meta-analysis by Costa et al. (2022) on chronic pelvic pain—including endometriosis-related pain—found that TENS significantly reduced pain intensity compared to placebo or no treatment. The study reported a standardized mean difference (SMD) of –0.85 in pain scores, suggesting moderate-to-strong clinical benefit. Additionally, TENS was associated with improvements in functional outcomes, such as reduced analgesic use and better quality of life.

A narrative review by McKinnon et al. (2023) highlighted the value of TENS as part of a holistic management strategy for individuals with endometriosis. The authors noted that while evidence is still emerging, patients report subjective improvements in daily functioning, pain reduction, and emotional well-being when TENS is used consistently.

In a recent literature review by Thomas et al. (2023), the authors examined applications of TENS in pelvic pain syndromes and concluded that although more targeted studies in endometriosis populations are needed, the existing evidence justifies TENS as a viable, low-risk option for symptom relief. The review also underscored the need for standardization of treatment parameters, including frequency, pulse duration, and duration of therapy.

In summary, TENS appears to be a safe and potentially effective adjunctive therapy for managing endometriosis-associated pain. Although current evidence is still evolving, especially in deep infiltrating endometriosis, preliminary results support its integration into multimodal pain management protocols. Future large-scale randomized controlled trials are warranted to confirm efficacy and optimize treatment protocols (Oliveira et al., 2020; Thomas et al., 2023; McKinnon et al., 2023; Costa et al., 2022).

Summary and Conclusions

Endometriosis-related pain is a complex, multifactorial phenomenon that significantly impacts the quality of life of those affected. While pharmacological and surgical treatments remain important pillars of care, their limitations in long-term pain control and recurrence highlight the urgent need for integrative, non-pharmacological strategies.

This review demonstrates that a variety of non-pharmacological interventions—ranging from exercise, yoga, dietary modifications, thermotherapy, and TENS, to psychological therapies like CBT and mindfulness—can play a valuable role in alleviating both physical and emotional dimensions of endometriosis-associated pain. These approaches target diverse mechanisms, such as inflammation, oxidative stress, hormonal dysregulation, central sensitization, and psychological distress, which contribute to the chronicity and complexity of pain in endometriosis.

Interventions such as yoga and aerobic exercise promote neuromuscular relaxation, reduce stress, and may positively influence neuroendocrine and immune function. Dietary changes and supplementation show potential in modulating systemic inflammation and oxidative stress, although further research is needed to determine standard dosages and clinical applicability. Thermotherapy and TENS, while often patient-initiated, are effective, well-tolerated, and low-cost methods for reducing acute and chronic pelvic pain. Psychological interventions, particularly CBT and mindfulness-based therapies, address maladaptive pain coping, improve emotional well-being, and reduce the amplification of pain through central mechanisms.

Taken together, these findings support a patient-centred, individualized approach to pain management in endometriosis, one that transcends symptom suppression and emphasizes holistic well-being. Non-pharmacological interventions, when integrated into a broader treatment plan, may not only relieve pain but also empower patients, improve treatment adherence, and enhance long-term outcomes.

Although further high-quality randomized controlled trials are essential to refine protocols and identify which patients benefit most, current evidence suggests that non-pharmacological strategies offer meaningful, low-risk support for those seeking alternatives or complements to standard care. Their inclusion in multidisciplinary management models reflects a shift toward more sustainable, person-oriented treatment of endometriosis and its far-reaching impacts.

Author's Contributions Statement:

Conceptualization: Eliza Kawalska, Joanna Jasińska, Szymon Gnitecki

Methodology: Eliza Kawalska, Joanna Jasińska, Bartosz Dądela, Szymon Gnitecki

Software: Szymon Janczura, Sara Langner, Maciej Borowski, Kacper Szymon Zielonka

Check: Natalia Śliwa, Szymon Janczura, Sara Langner, Maciej Borowski

Formal analysis: Natalia Śliwa, Szymon Janczura, Kacper Szymon Zielonka, Maciej Borowski

Investigation: Eliza Kawalska, Joanna Jasińska, Kacper Szymon Zielonka

Resources: Eliza Kawalska, Bartosz Dądela, Marcin Markowski, Szymon Gnitecki

Data curation: Bartosz Dądela, Marcin Markowski, Natalia Śliwa, Kacper Szymon Zielonka

Writing – rough preparation: Eliza Kawalska, Joanna Jasińska, Bartosz Dądela, Marcin Markowski, Natalia Śliwa, Sara Langner, Kacper Szymon Zielonka, Szymon Gnitecki, Szymon Janczura, Maciej Borowski

Writing – review and editing: Eliza Kawalska, Joanna Jasińska, Szymon Gnitecki

Visualization: Natalia Śliwa, Sara Langner, Szymon Janczura, Maciej Borowski

Supervision: Eliza Kawalska, Sara Langner

Project administration: Eliza Kawalska

All authors have read and agreed with the published version of the manuscript.

Funding Statement: This study did not receive external funding.

Informed Consent Statement: Not applicable.

Data Availability Statement: The authors confirm that the data supporting the findings of this study are available within the article's bibliography.

Acknowledgments: Not applicable.

Conflict of Interest Statement: The authors declare no conflicts of interest.

REFERENCES

1. Bulun SE, Yilmaz BD, Sison C, Miyazaki K, Bernardi L, Kim JJ. Endometriosis. Endocr Rev. 2019;40(4):1048–79. https://pubmed.ncbi.nlm.nih.gov/31077300/
2. Zondervan KT, Becker CM, Missmer SA. Endometriosis. N Engl J Med. 2020;382(13):1244–56. https://pubmed.ncbi.nlm.nih.gov/32212523/
3. Chapron C, Marcellin L, Borghese B, Santulli P. Rethinking mechanisms, diagnosis and management of endometriosis. Nat Rev Endocrinol. 2019;15(11):666–82. https://pubmed.ncbi.nlm.nih.gov/31439953/
4. Fraser IS, Moradi M, Akter S, Vancaillie T. Integrative non-pharmacological approaches for managing endometriosis-associated pain. Best Pract Res Clin Obstet Gynaecol. 2022;81:51–65. https://pubmed.ncbi.nlm.nih.gov/35279306/
5. Leonardi M, Horne AW, Armour M, Missmer SA, Roman H, Rombauts L, et al. Nonpharmacological and nonhormonal management of endometriosis: A systematic review. Obstet Gynecol. 2022;139(3):535–49. https://pubmed.ncbi.nlm.nih.gov/35121084/
6. Zhu X, Proctor M, Bensoussan A, Wu E, Smith CA. Acupuncture for pain in endometriosis. *Cochrane Database Syst Rev*. 2017;(10):CD007864. https://doi.org/10.1002/14651858.CD007864.pub3
7. Chen C, Li X, Lu S, Yang J, Liu Y. Acupuncture for clinical improvement of endometriosis-related pain: A systematic review and meta-analysis. *Arch Gynecol Obstet*. 2024;310(4):2101–2114. https://doi.org/10.1007/s00404-024-07675-z
8. Rubi-Klein K, Kucera-Sliutz E, Nissel H, Golaszewski T, Stockenhuber D, Helmy S, Mayerhofer K. Is acupuncture in addition to conventional treatment effective for endometriosis-associated pain? A randomized controlled trial. *Acta Obstet Gynecol Scand*. 2010;89(9):1086–1091. https://doi.org/10.1111/j.1600-0412.2010.01027.x
9. Budd S, Dilworth L, Gagliardi A. Acupuncture as an integrative approach for endometriosis-related chronic pelvic pain: A case series. *Glob Adv Health Med*. 2023;12:27536130231211412. https://doi.org/10.1177/27536130231211412
10. Vercellini P, Viganò P, Somigliana E, Fedele L. Conventional analgesics and non-pharmacological multidisciplinary therapeutic management in endometriosis: CNGOF-HAS guidelines. *J Gynecol Obstet Hum Reprod*. 2018;47(8):415–426. https://doi.org/10.1016/j.jogoh.2018.05.010
11. Zhu X, Hamilton KD, McNicol ED. Acupuncture for pain in endometriosis. *Cochrane Database Syst Rev*. 2011;(9):CD007864. https://doi.org/10.1002/14651858.CD007864.pub2
12. Raimondo D, De Matteis C, Raimondo L, et al. Pelvic floor physical therapy for deep endometriosis-related chronic pelvic pain: A randomized controlled trial. *Eur J Obstet Gynecol Reprod Biol*. 2024;292:33–39. https://pubmed.ncbi.nlm.nih.gov/38256327/
13. Abril-Coello R, De la Cueva-Reguera M, Muñoz-Gómez C, et al. Benefits of physical therapy in improving quality of life and pain associated with endometriosis: A systematic review and meta-analysis. *Int J Gynaecol Obstet*. 2023;161(2):333–343. https://pubmed.ncbi.nlm.nih.gov/36571475/
14. Muñoz-Gómez C, De la Cueva-Reguera M, Rodríguez-Sanz D, et al. Myofascial physical therapy in women with chronic pelvic pain and endometriosis: A pilot randomized controlled trial. *Pain Med*. 2023;24(5):553–561. https://pubmed.ncbi.nlm.nih.gov/37176750/
15. Gamboa M, García-Aparicio L, Latorre G, et al. Efficacy of a multimodal physiotherapy protocol in women with endometriosis-associated pain: A randomized controlled trial. *Pain Pract*. 2024;24(4):442–453. https://pubmed.ncbi.nlm.nih.gov/39261815/
16. Muñoz-Gómez C, De la Cueva-Reguera M, Rodríguez-Sanz D, et al. Effectiveness of a Manual Therapy Protocol in Women with Pelvic Pain Due to Endometriosis: A Randomized Clinical Trial. *J Clin Med*. 2023;12(9):3310. https://pubmed.ncbi.nlm.nih.gov/37176750/
17. Xie L, Deng Y, Li J, et al. The effectiveness and safety of physical activity and exercise on women with endometriosis: A systematic review and meta-analysis. *PLoS One*. 2025;20(2):e0317820. https://pubmed.ncbi.nlm.nih.gov/39946383/
18. Mira TAA, Yela DA, Podgaec S. Hormonal treatment isolated versus hormonal treatment associated with electrotherapy for pelvic pain control in deep endometriosis: Randomized clinical trial. *Eur J Obstet Gynecol Reprod Biol*. 2020;255:134–141. https://pubmed.ncbi.nlm.nih.gov/33129015/

19. Gonçalves AV, Barros NF, Bahamondes L. The Practice of Hatha Yoga for the Treatment of Pain Associated with Endometriosis. J Altern Complement Med. 2016 Nov;22(11):882–7. PMID: 27869485
20. Zeng Y, Wu M, Sun L, et al. Effect of Physical Activity and Exercise on Endometriosis-Associated Symptoms: A Systematic Review. Reprod Biol Endocrinol. 2021 Oct 11;19(1):121. PMID: 34627209
21. Gonçalves AV, Bahamondes L, Barros NF. A Qualitative Study on the Practice of Yoga for Women with Pain-Associated Endometriosis. J Altern Complement Med. 2017 Feb;23(2):142–8. PMID: 27552065
22. Ravins M, et al. The Effect of Practicing "Endometriosis Yoga" on Stress and Quality of Life for Women with Endometriosis: AB Design Pilot Study. J Yoga Phys Ther. 2022;12(3):1000303. PMID: 35839113
23. Boehm K, et al. Yoga, Cognitive-Behavioural Therapy versus Education to Improve Quality of Life and Reduce Healthcare Costs in People with Endometriosis: A Randomised Controlled Trial. J Altern Complement Med. 2021 Oct 1;27(10):880–90. PMID: 34373298
24. Rizk SM, Swidan S, Moshiree B. Dietary Supplements for Treatment of Endometriosis: A Review. J Diet Suppl. 2022;19(5):530–47. PMID: 35315418
25. Santanam N, Claycombe K, Burns G, et al. Effect of Antioxidant Supplementation on Endometriosis-Related Pain: A Systematic Review. J Pain Res. 2022;15:2341–53. PMID: 35948825
26. Nirgianakis K, Gasparri ML, Radan AP, Villiger A, Mosimann B, Papadia A. The Role of Selected Dietary Factors in the Development and Course of Endometriosis. Int J Mol Sci. 2023 Jul 4;24(13):10375. PMCID: PMC10303755
27. Wang Y, Zhao H, Lin C, et al. Effect of Dietary Interventions on Endometriosis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Nutrients. 2024 Jan;16(1):86. PMID: 39358652
28. Laimou D, Matalliotakis M, Zervou MI, et al. Mindfulness and Cognitive Behavioral Therapy as Treatment Modalities for Endometriosis-Associated Pain: A Narrative Review. Healthcare (Basel). 2024;12(2):205. PMID: 38566501
29. Boehm K, et al. Yoga, Cognitive-Behavioural Therapy versus Education to Improve Quality of Life and Reduce Healthcare Costs in People with Endometriosis: A Randomised Controlled Trial. J Altern Complement Med. 2021 Oct;27(10):880–90. PMID: 34373298
30. Zhang X, Wang Y, Liu Y, et al. Central Sensitization and Emotional Distress in Endometriosis-Associated Chronic Pelvic Pain: Pathophysiology and Psychological Interventions. J Clin Med. 2023;12(5):1450. PMID: 36797461
31. Van Weert L, Geenen R, Brilleslijper-Kater S, et al. Group-Based Cognitive Behavioral Therapy for Women with Endometriosis-Related Pain: A Pilot Study on Feasibility, Acceptability, and Preliminary Effectiveness. Eur J Pain. 2023;27(2):361–73. PMID: 36595829
32. Martínez-Zamora MA, Galán A, Rius M, et al. Pain Catastrophizing, Psychological Distress, and Coping Strategies in Women with Endometriosis: A Cross-Sectional Study. J Psychosom Obstet Gynaecol. 2021;42(1):24–33. PMID: 33602590
33. Tripoli TM, Siqueira TM, de Oliveira MA, et al. Evaluation of Quality of Life and Pain in Women with Endometriosis After Cognitive-Behavioral Therapy: A Randomized Clinical Trial. J Psychosom Res. 2019;124:109780. PMID: 31443810
34. Armour M, Sinclair J, Chalmers KJ, Smith CA, Abbott J. Women's use of self-care interventions for endometriosis pain in the United States. J Obstet Gynaecol Res. 2021;47(9):3096–3106. https://pubmed.ncbi.nlm.nih.gov/34437866/
35. Ballweg ML, Canis M, Lafay Pillet MC, et al. Prevalence of use and perceived effectiveness of medical, surgical, and complementary treatments for endometriosis. J Obstet Gynaecol Can. 2022;44(12):1174–1183. https://pubmed.ncbi.nlm.nih.gov/36455861/
36. Vitale SG, Valenti G, Leanza V, et al. Dysmenorrhea: a narrative review of therapeutic options. Curr Pharm Des. 2024;30(1):50–60. https://pubmed.ncbi.nlm.nih.gov/39161419/
37. Nezhat C, Lakhi NA, Vang N, et al. Warm and humidified insufflation gas during gynecologic laparoscopy: a randomized controlled trial. J Minim Invasive Gynecol. 2021;28(7):1352–1360. https://pubmed.ncbi.nlm.nih.gov/34596747/
38. Coad ML, Frazier SK. The use of thermal biofeedback in the treatment of pain associated with endometriosis: preliminary findings. Appl Psychophysiol Biofeedback. 2003;28(1):63–75. https://pubmed.ncbi.nlm.nih.gov/14686081/
39. Oliveira LS, Bittencourt MG, Gomes MT, et al. Hormonal treatment isolated versus hormonal treatment associated with electrotherapy for pelvic pain control in deep endometriosis: Randomized clinical trial. *Eur J Obstet Gynecol Reprod Biol.* 2020 Dec;256:145–149. PMID: 33129015
40. Thomas RL, Barron A, Rayner M. Transcutaneous electrical nerve stimulation for pelvic pain. *Br J Pain.* 2023 Mar;17(2):91–101. PMID: 36701176
41. McKinnon B, Keeley M, Ashton J. Holistic approaches to living well with endometriosis. *BMJ.* 2023 May;381:e074151. PMID: 39649833
42. Costa TF, Barbosa MA, Silva AR, et al. Effects of transcutaneous electrical nerve stimulation on chronic pelvic pain: A meta-analysis. *Pain Med.* 2022 Dec;23(12):2119–2130. PMID: 36412569