

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 | MULTIDIMENSIONAL TREATMENT OF ENDOMETRIOSIS – THE ROLE OF NUTRITIONAL, PHYSIOTHERAPEUTIC AND PSYCHOLOGICAL INTERVENTIONS |
|---------------|--|
| DOI | https://doi.org/10.31435/ijitss.3(47).2025.3871 |
| RECEIVED | 06 August 2025 |
| ACCEPTED | 20 September 2025 |

© 0

30 September 2025

The article is licensed under a Creative Commons Attribution 4.0 International License.

© The author(s) 2025.

PUBLISHED

This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

MULTIDIMENSIONAL TREATMENT OF ENDOMETRIOSIS – THE ROLE OF NUTRITIONAL, PHYSIOTHERAPEUTIC AND PSYCHOLOGICAL INTERVENTIONS

Barbara Teresińska (Corresponding Author, Email: b.teresinskal@gmail.com)

Medical University of Lublin, Lublin, Poland

ORCID ID: 0000-0002-1101-3566

Michał Lenart

University Clinical Hospital No. 1 in Lublin, Lublin, Poland

ORCID ID: 0009-0006-5103-7251

Wojciech Gaska

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOZ in Lublin, Aleja Kraśnicka 100, 20-718 Lublin, Poland

ORCID ID: 0009-0005-7621-3533

Ignacy Rożek

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOZ in Lublin, Aleja Kraśnicka 100, 20-718 Lublin, Poland

ORCID ID: 0009-0005-5731-6983

Izabela Lekan

St. John Paul II Provincial Hospital in Siedlce, Mazovia Province, Siedlce, Poland ORCID ID: 0009-0000-5079-9795

Joanna Mazurek

1st Military Clinical Hospital with Polyclinic SPZOZ in Lublin, Poland ORCID ID: 0009-0005-0300-7798

Agnieszka Brzezińska

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOZ in Lublin, Aleja Kraśnicka 100, 20-718 Lublin, Poland

ORCID ID: 0000-0001-5730-8813

Weronika Tuszyńska

University Clinical Center of the Medical University of Warsaw, Banacha 1a Street, 02-097 Warsaw, Poland ORCID ID: 0000-0002-2395-6748

Alicja Sodolska

Ophthalmology s.c. Primary Care Clinic, Mickiewicza Street 28, Lublin, Poland ORCID ID: 0009-0008-3689-7004

Barbara Madoń

Medical University of Lublin, Lublin, Poland ORCID ID: 0000-0003-1054-6405

ABSTRACT

Endometriosis is a chronic, progressive gynecological disease characterized by the presence of active endometrial tissue outside the uterine cavity. Endometriosis impacts around 10% of women in their reproductive years, often leading to persistent pain, cycle disturbances, and challenges with conception. Conventional management, which includes medication and surgery, is often insufficient due to high recurrence rates and suboptimal outcomes, prompting increased focus on complementary treatment strategies.

The main aim of this work is to analyze the role of three key areas of supportive therapy: diet, physiotherapy and psychotherapy in relieving the symptoms of endometriosis and improving the quality of life of patients. This is a review-based study that analyzes scientific sources from 1997 to 2025. Analysis of current studies highlights the potential of an anti-inflammatory diet, regular pelvic-focused physiotherapy, and psychotherapy as effective complementary strategies alongside conventional treatment. An integrated therapeutic approach, taking into account the somatic and psychological needs of patients, seems to be crucial in the effective management of endometriosis.

KEYWORDS

Policy development, School Management, Indiscipline, Leadership, Challenges and Strategies

CITATION

Barbara Teresińska, Michał Lenart, Wojciech Gąska, Ignacy Rożek, Izabela Lekan, Joanna Mazurek, Agnieszka Brzezińska, Weronika Tuszyńska, Alicja Sodolska, Barbara Madoń. (2025) *Multidimensional Treatment of Endometriosis – The Role of Nutritional, Physiotherapeutic and Psychological Interventions.* International Journal of Innovative Technologies in Social Science. 3(47). doi: 10.31435/ijitss.3(47).2025.3871

COPYRIGHT

© The author(s) 2025. This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

Introduction

Endometriosis is one of the most common chronic gynecological diseases that affects women mainly of reproductive age. The condition involves ectopic growth of the endometrial lining in locations such as the peritoneum, ovaries, bowel, or bladder. This disease leads to chronic inflammation, pain, adhesions and infertility, which significantly affects the quality of life of patients. Even with well-established pharmacological and surgical treatment options, symptom control remains incomplete in numerous cases, and recurrence is common [1-5].

For this reason, in recent years there has been a growing interest in a holistic approach, in which, in addition to conventional treatment, supportive treatment plays an increasingly important role. They include, above all, a well-balanced anti-inflammatory diet tailored to individual needs, physiotherapy targeting pelvic pain, and psychotherapy to assist with psychological adaptation and emotional resilience [6-41].

The objective of this study is to examine existing research on the role of these three supportive treatment approaches in managing endometriosis and improving patients' quality of life. Both research data and practical therapeutic recommendations will be analyzed.

Methodology

This review is based on a narrative analysis of scientific publications concerning supportive treatment strategies for endometriosis. The literature search was conducted using databases such as PubMed, Scopus, and Web of Science, covering the period from 1997 to 2025. Keywords included "endometriosis," "supportive care," "diet," "nutrition," "physiotherapy," "pelvic floor therapy," "psychotherapy," "cognitive-behavioral therapy," and "quality of life." Both randomized controlled trials and observational studies, as well as systematic reviews and meta-analyses, were included. Only studies published in English and peer-reviewed journals were considered. Articles were evaluated for methodological quality, clinical relevance, and potential contribution to the understanding of supportive interventions in endometriosis management. The analysis focused on the effects of diet, physiotherapy, and psychotherapy on symptom control, fertility outcomes, and quality of life.

Knowledge status

Diet

There is a steadily increasing recognition in the scientific and medical community of the significant role that nutrition can play in shaping both the development and the clinical course of endometriosis. Although dietary interventions alone cannot be regarded as a cure for this chronic gynecological disease, a growing body of research indicates that specific nutritional strategies may have a meaningful impact on the severity of symptoms, the progression of lesions, and the overall well-being of affected women. The primary mechanisms through which diet appears to exert its influence include the modulation of systemic and local inflammatory responses, the regulation of hormonal activity, the mitigation of oxidative stress, and the strengthening of general health status and resilience [6-31].

In a comprehensive review, Parazzini et al. emphasized that women living with endometriosis may benefit from a dietary approach that prioritizes the consumption of anti-inflammatory and antioxidant-rich foods. Such a diet would ideally emphasize omega-3 fatty acid sources—particularly oily fish like salmon, mackerel, or sardines—alongside plant-based fiber from leafy green vegetables, whole grains, legumes, berries, nuts, and seeds. The incorporation of healthy fats, such as those found in olive oil, and the inclusion of natural anti-inflammatory spices like turmeric, were also highlighted as potentially beneficial. In contrast, the same review stressed the importance of avoiding dietary components that could exacerbate inflammation, including excessive red meat, trans fats, and heavily processed foods. Despite these promising recommendations, the authors acknowledged a considerable degree of inconsistency across available studies, underscoring the urgent need for larger, well-designed trials to clarify the true scope of diet's influence in the prevention and management of endometriosis [6].

The role of antioxidants has been further explored by Mier-Cabrera et al., who demonstrated that women following a diet specifically enriched in antioxidant compounds over a four-month period experienced measurable biochemical improvements. These included increased plasma levels of essential vitamins A, C, and E, accompanied by a marked reduction in lipid peroxidation, a key marker of oxidative stress. Such findings suggest that oxidative stress is a significant pathophysiological factor in endometriosis and that antioxidant-rich nutrition could serve as a supportive therapeutic tool, contributing not only to the reduction of pelvic pain but also to improved reproductive outcomes [7]. Santanam et al. further corroborated this by showing that antioxidant supplementation may enhance fertility potential in women with endometriosis, likely through improved regulation of the reproductive microenvironment and a reduction in oxidative imbalance [8].

Clinical evidence also demonstrates that certain dietary components may aggravate symptoms, intensifying abdominal pain, bloating, and inflammatory processes. Consequently, many patients report symptomatic relief after eliminating gluten-containing products or following a low-FODMAP nutritional plan, which is often employed to reduce gastrointestinal discomfort in individuals with irritable bowel syndrome (IBS). Several studies have explored this overlap, with Bertin et al. and Moore et al. reporting that women suffering from both endometriosis and IBS-like symptoms frequently experienced substantial relief from abdominal pain, bloating, and altered bowel habits when adopting a low-FODMAP diet. Remarkably, Moore et al. found that 72% of women with both conditions reported more than 50% improvement in bowel symptoms, compared to only 49% improvement among patients with IBS alone [9, 11]. In a prospective study, Keukens et al. similarly confirmed that this diet not only alleviated bowel-related discomfort and chronic pelvic pain but also led to significant improvements in quality of life across multiple domains, with most participants perceiving the regimen as both feasible and beneficial [12]. Although these outcomes strongly suggest that a low-FODMAP diet may represent a valuable, non-pharmacological intervention for endometriosis, particularly in those with comorbid IBS, more rigorous long-term research is required to establish its safety and lasting effectiveness [9-12].

Another notable dietary approach is gluten elimination. In a longitudinal study, Marziali et al. investigated the effects of a gluten-free diet in women experiencing chronic pelvic pain linked to endometriosis over a 12-month period. Among the 207 participants, an impressive 75% reported marked reductions in pain-related symptoms, including dysmenorrhea, dyspareunia, and non-menstrual pelvic pain. Moreover, patients documented improvements in multiple facets of their quality of life, encompassing physical activity levels, vitality, mental well-being, and social functioning. Importantly, not a single participant experienced worsening of symptoms, which underscores the potential therapeutic relevance of gluten-free nutrition in selected cases [10]. Conversely, van Haaps et al. provided a more critical appraisal, warning that gluten-free diets should not be generalized to all patients with endometriosis. Their review stressed that while gluten elimination is

essential in conditions such as celiac disease and non-celiac wheat sensitivity, there is insufficient high-quality evidence to support its widespread adoption in endometriosis management. Furthermore, they noted that unnecessary long-term exclusion of gluten may contribute to nutritional imbalances and micronutrient deficiencies. For these reasons, the authors advised against recommending gluten elimination as a standard therapeutic intervention for women with endometriosis in the absence of confirmed gluten sensitivity [17].

Beyond gluten and FODMAP-related strategies, dairy products have also been investigated in relation to endometriosis risk. Nodler et al. observed that women who consumed higher amounts of dairy products such as yogurt and ice cream during adolescence were significantly less likely to develop laparoscopically confirmed endometriosis later in life [18]. A 2021 meta-analysis by Qi et al. further supported this protective association, demonstrating that higher intake of total dairy, particularly cheese and high-fat dairy products, correlated with a reduced risk of endometriosis, although a high consumption of butter appeared to increase the risk [19]. These findings were echoed in a prospective cohort study by Harris et al., which revealed that women with greater consumption of low-fat dairy products and higher serum vitamin D levels had a lower likelihood of developing the disease [20]. A systematic review conducted by Arab et al. added further weight to these observations, emphasizing that dairy intake was inversely associated with endometriosis risk, while red meat and unhealthy dietary fats remained consistent risk factors [21]. Collectively, this evidence suggests that certain dairy products, particularly yogurt, cheese, and low-fat options, may exert a protective effect against endometriosis through their nutrient composition and potential anti-inflammatory properties.

Because endometriosis is strongly associated with immune dysregulation, chronic oxidative stress, and potential micronutrient deficiencies, dietary supplements are increasingly being considered as supportive measures. Vitamin D, for instance, has been widely studied for its immunomodulatory and anti-inflammatory roles. Research indicates that adequate vitamin D status is linked to a reduced risk of developing endometriosis and to improvements in pain symptoms among affected women [22-24]. A systematic review by Iris Wenyu Zhou et al. even found that vitamin D supplementation led to significant reductions in dysmenorrhea severity in women with endometriosis [24]. Mechanistically, vitamin D may suppress the proliferation of ectopic endometrial cells through the regulation of signaling pathways associated with cellular growth and immune activity [23].

Magnesium, another essential micronutrient, is also believed to play an important role in symptom management. Its natural muscle relaxant effects can help mitigate menstrual cramps and pelvic pain, while its anti-inflammatory properties may further alleviate disease-related discomfort. Higher dietary magnesium intake has been inversely correlated with endometriosis risk, and adequate magnesium levels are critical for maintaining healthy sleep patterns and emotional balance—two areas frequently impaired in women with chronic pelvic pain [25-27].

Finally, recent attention has focused on the role of probiotics in regulating the gut–immune axis. Certain strains, particularly Lactobacillus gasseri, have been shown to inhibit the progression of endometriotic lesions in experimental models, potentially through modulation of gut microbiota and suppression of inflammatory cascades. Clinical trials are currently underway to evaluate the effects of multi-strain probiotics on gut microbiome composition and symptom control in endometriosis patients [28-31]. If confirmed, such findings may open new therapeutic avenues centered on microbiota-targeted strategies.

Physiotherapy

Physiotherapy has increasingly been recognized as an essential non-pharmacological and complementary therapeutic strategy in the multidisciplinary management of endometriosis. While pharmacological treatments and surgical interventions remain the cornerstone of conventional care, many women continue to suffer from persistent pain and functional limitations despite undergoing these therapies. One of the most burdensome manifestations of endometriosis is chronic pelvic pain, which often persists even after the removal of lesions or the administration of hormonal therapy. This type of pain is complex and multifactorial, typically associated with increased muscle tension, postural abnormalities, the presence of myofascial trigger points, and a range of comorbid conditions such as dyspareunia, urinary disturbances, and bowel dysfunction. Physiotherapy addresses these musculoskeletal and neuromuscular dysfunctions with the aim of reducing pain, restoring pelvic floor balance, improving mobility and function, and ultimately enhancing the overall quality of life of affected women. It also plays a supportive role in complementing and prolonging the effects of surgical and pharmacological treatment [32-37].

Several clinical studies and therapeutic reports have shown that targeted pelvic floor muscle physiotherapy (PEM) can yield significant improvements in urinary, bowel, and sexual function, particularly

in women with deep infiltrating endometriosis (DIE). The range of physiotherapeutic techniques used in this context is broad and includes manual therapy, biofeedback, and exercises guided by transperineal ultrasound. These interventions not only provide direct pain relief but also contribute to improved muscular coordination and relaxation, reduction of dyspareunia, and alleviation of pelvic floor hypertonicity, which is often responsible for pain persistence [33, 37].

Wójcik et al. highlight the importance of manual therapy techniques—such as myofascial release, trigger point therapy, and visceral manipulation—in targeting localized tissue dysfunctions. These methods are particularly effective in reducing excessive tension in the pelvic floor muscles and connective tissues, mitigating referred pain, and correcting posture-related imbalances. Since myofascial pain syndromes frequently coexist with endometriosis, manual therapy has the potential to significantly improve daily functioning and symptom control in this patient population [32]. Similarly, Tennfjord et al. stress the beneficial role of regular physical activity, pointing out that movement and exercise can reduce pain intensity by modulating systemic inflammation, stimulating circulation, and enhancing endorphin release. Low-impact aerobic activities such as swimming, cycling, and walking, as well as stretching and mobility-centered routines like yoga or Pilates, are particularly recommended, as they support musculoskeletal flexibility and stress reduction without exacerbating pain symptoms [36].

Another valuable tool in physiotherapy is the use of biofeedback techniques, which may include ultrasound-assisted pelvic floor training. By visualizing muscle activity in real time, women can learn to better control and coordinate their pelvic floor, resulting in improved treatment outcomes. Biofeedback empowers patients by enabling self-awareness and active participation in the therapeutic process, which is crucial for long-term symptom management [37].

França et al. also emphasize that physiotherapists' contribution extends beyond purely physical interventions. They play an important role in patient education, particularly in the field of pain neuroscience, helping women understand the mechanisms of chronic pain and the impact of central sensitization, which often amplifies the perception of pelvic discomfort. Furthermore, physiotherapists provide lifestyle counseling aimed at improving posture, reducing stress, and promoting healthier movement patterns. Addressing psychological stress through body-oriented therapy complements other psychotherapeutic approaches, ensuring that the emotional and physical dimensions of pain are treated in parallel [34, 35].

Overall, physiotherapy in endometriosis represents a highly valuable component of a holistic treatment plan. By combining pelvic floor rehabilitation, manual therapy, therapeutic exercise, biofeedback, and patient education, physiotherapy not only alleviates pain but also enhances daily functioning, restores self-efficacy, and improves the overall quality of life. Its tailored approach allows for the adaptation of therapeutic programs to the individual needs of each patient, making it a flexible and patient-centered intervention. As ongoing research continues to provide stronger evidence for its efficacy, physiotherapy is expected to become an increasingly important standard element of endometriosis management, bridging the gap between conventional medical treatment and supportive care [32-37].

Psychotherapy

Psychotherapy has gained increasing recognition as an important and effective component of the multidisciplinary management of endometriosis. While surgical and pharmacological treatments are aimed at reducing or removing lesions and controlling hormonal influences, they do not fully address the significant psychological and emotional burden of the disease. Many women living with endometriosis experience chronic pelvic pain, infertility-related stress, anxiety, depression, fatigue, and feelings of social or professional limitation, all of which may severely diminish quality of life. Psychotherapy offers a complementary therapeutic pathway that addresses these often-overlooked aspects by focusing on psychological resilience, emotional regulation, and improved coping strategies. A wide range of psychotherapeutic interventions—including cognitive-behavioral therapy (CBT), somatosensory stimulation, mindfulness-based interventions, and structured self-care counseling—has shown encouraging results in mitigating pain intensity, reducing distress, and enhancing both mental health and functional well-being in women with endometriosis [38-44].

High-quality clinical trials provide strong evidence supporting the value of psychotherapy in this population. Randomized controlled trials conducted by Meissner et al. and Beissner et al. demonstrated that psychotherapy, when combined with somatosensory stimulation methods such as acupuncture point stimulation, produced significant reductions in global pain, pelvic pain, and dyschezia. Importantly, these interventions also led to notable improvements in physical and mental aspects of quality of life. A particularly compelling finding was the durability of these benefits, which persisted for up to 24 months following

treatment, suggesting long-term therapeutic potential [38, 40]. Neuroimaging data provided additional insight into the mechanisms underlying these improvements. Structural and functional brain changes were observed, especially within the anterior hippocampus, an area associated with pain processing and modulation. These findings support the hypothesis that psychotherapeutic interventions do not merely provide symptomatic relief but may also induce measurable neurobiological changes that help regulate pain perception [40].

A systematic review by Evans et al. broadened the perspective by evaluating a variety of psychological and mind-body approaches. The review included interventions such as cognitive-behavioral therapy, relaxation training, mindfulness meditation, and yoga-based programs. Although the studies were heterogeneous and often preliminary in design, the evidence collectively pointed toward consistent benefits, including reductions in anxiety, depression, stress, fatigue, and even improvements in pain perception. The integrative nature of these approaches suggests that combining mental and physical elements—such as breathing exercises, relaxation, and cognitive reframing—may be particularly powerful in addressing the multifactorial burden of endometriosis [39].

Qualitative research has also provided valuable insight into the lived experiences of women undergoing psychotherapy. Limmer et al. highlighted that psychotherapeutic interventions combined with somatosensory stimulation were described by patients as transformative. Women reported a sense of empowerment, greater hope, and a deeper understanding of their condition. Many viewed the therapy as a "turning point" that enabled them to develop effective coping strategies, improve their psychological resilience, and even experience personal growth despite the chronic nature of their illness [43]. Similarly, studies by Farshi et al. and Dowding et al. documented that counseling and psychological support were effective in alleviating symptoms of depression and anxiety in women with endometriosis. These findings underscore the importance of integrating psychosocial care into routine gynecological treatment, especially given the strong link between mental health and the perception of chronic pain [41, 44].

In addition, Wischmann and Ditzen emphasized the importance of empathetic and patient-centered communication between healthcare providers and women with endometriosis. Their work highlighted that supportive communication, coupled with accessible psychological counseling, not only improves patient satisfaction but also strengthens adherence to treatment plans. They advocate for counseling models inspired by practices used in managing other chronic conditions, in which continuous psychosocial support is considered as essential as pharmacological treatment. Such approaches are particularly relevant for endometriosis, a disease characterized by high recurrence rates, chronic pain, and the need for long-term adaptation [42].

Taken together, these findings strongly affirm the value of psychotherapy as a complementary intervention for women with endometriosis. Beyond reducing pain perception and improving coping abilities, psychotherapy plays a central role in addressing the psychological suffering that often accompanies the disease. By fostering resilience, reducing emotional distress, and providing tools for long-term self-management, psychotherapeutic interventions contribute substantially to both the mental and physical dimensions of endometriosis care. Ultimately, the integration of psychological support into standard treatment frameworks represents a crucial step toward a holistic, patient-centered approach that recognizes the complexity of endometriosis and seeks to improve not only clinical outcomes but also the overall quality of life of affected women [38-44].

Discussion

The findings of this review highlight that supportive interventions—dietary modifications, physiotherapy, and psychotherapy—offer valuable benefits for women with endometriosis when used alongside conventional treatment. An anti-inflammatory, antioxidant-rich diet shows promise in reducing systemic inflammation, oxidative stress, and gastrointestinal comorbidities, though results across studies remain inconsistent and further large-scale trials are needed. Physiotherapy, particularly pelvic floor rehabilitation and manual therapy, provides effective non-pharmacological relief of chronic pelvic pain and functional disturbances, while also empowering patients through education and self-management strategies. Psychotherapy addresses the psychosocial burden of endometriosis, with evidence supporting CBT, mindfulness, and somatosensory stimulation in reducing pain perception and improving coping skills.

Nevertheless, the current body of literature presents several limitations. Many studies are based on small sample sizes, heterogeneous patient populations, and short follow-up periods. Furthermore, the absence of standardized protocols for dietary interventions or physiotherapy programs makes it difficult to establish

universal recommendations. Future research should prioritize high-quality randomized controlled trials with long-term follow-up, as well as interdisciplinary approaches that integrate both somatic and psychological care.

Despite these limitations, the available evidence supports the clinical relevance of complementary therapies in improving symptom control and quality of life in women with endometriosis. Incorporating these strategies into routine care, in collaboration with gynecologists, physiotherapists, and psychologists, represents an important step toward a more holistic and patient-centered management of this chronic disease.

Summary and Conclusions

Endometriosis is a complex, multifactorial, and chronic gynecological disorder that significantly affects the physical, emotional, and social lives of women worldwide. Because of its heterogeneity, recurrent nature, and the variety of symptoms it generates, effective management almost always requires a multidisciplinary treatment strategy rather than reliance on a single therapeutic modality. Conventional approaches, primarily pharmacological therapy based on hormonal suppression and surgical removal of endometriotic lesions, continue to serve as the cornerstone of standard medical care, yet these methods are often associated with limited long-term effectiveness, frequent recurrence of pain and other symptoms, and in some cases adverse effects that negatively impact the patient's quality of life. Consequently, in recent years, there has been increasing recognition of the need for holistic and supportive treatment strategies that go beyond symptom suppression and instead address the broader physical, metabolic, and psychological dimensions of the disease. Within this context, nutrition, physiotherapy, and psychotherapy emerge as particularly valuable complementary approaches, each targeting distinct but interconnected aspects of endometriosis pathophysiology and patient well-being.

Nutritional strategies are among the most extensively studied supportive methods, as growing evidence suggests that diet can influence the course of endometriosis by modulating systemic inflammation, reducing oxidative stress, and affecting hormonal activity. Diets rich in anti-inflammatory and antioxidant compounds such as omega-3 fatty acids from fatty fish, fiber from whole grains and legumes, polyphenols from berries and leafy greens, and healthy fats from olive oil and nuts have demonstrated potential to reduce pelvic pain, alleviate bloating, and improve overall health status, while anti-inflammatory spices including turmeric may further contribute to symptom control. Conversely, a high intake of red meat, trans fats, and highly processed foods appears to exacerbate inflammation and worsen disease outcomes. Special dietary patterns have also gained attention, with low-FODMAP diets shown to alleviate gastrointestinal symptoms, particularly in women with coexisting irritable bowel syndrome, and gluten-free diets providing pain relief in some patients, though the scientific evidence remains mixed. Beyond general dietary modifications, certain micronutrients and supplements such as vitamin D, magnesium, and probiotics have demonstrated promising effects on pain modulation, immune function, and gut microbiota balance. Collectively, these nutritional strategies not only support symptom management but may also influence disease mechanisms, positioning diet as an important component of holistic endometriosis care.

Physiotherapy provides another essential dimension of supportive management, particularly in addressing musculoskeletal and neuromuscular dysfunctions often associated with endometriosis. Chronic pelvic pain, one of the most debilitating symptoms of the condition, is frequently linked to pelvic floor muscle hypertonicity, postural abnormalities, and myofascial trigger points, and targeted physiotherapeutic interventions such as pelvic floor rehabilitation, manual therapy, myofascial release techniques, and biofeedback have been shown to significantly reduce pain intensity and improve function. These methods also enhance urinary, bowel, and sexual function, particularly in women with deep infiltrating endometriosis. Regular physical activity, especially low-impact aerobic exercise and mobility-focused routines, further contributes to symptom control by improving circulation, reducing systemic inflammation, and stimulating endorphin release. In addition, physiotherapists play an educational role by providing information about pain neuroscience and lifestyle modifications, which empowers women with self-management strategies and helps to mitigate the psychological burden of chronic illness. By integrating musculoskeletal treatment with functional rehabilitation and patient education, physiotherapy offers a comprehensive, non-pharmacological pathway for long-term symptom relief.

Psychotherapy, in turn, addresses the psychological and emotional consequences of living with a chronic, painful condition such as endometriosis. Many women suffer from anxiety, depression, fatigue, and reduced quality of life due to both the physical burden of the disease and the uncertainty surrounding its progression, and psychotherapeutic interventions including cognitive-behavioral therapy, mindfulness-based approaches, somatosensory stimulation, and structured self-care counseling have demonstrated effectiveness

in alleviating psychological distress and reducing pain perception. Randomized controlled trials have shown that combining psychotherapy with somatosensory stimulation can significantly reduce global pain, pelvic pain, and associated gastrointestinal symptoms, with benefits persisting for up to two years, while neuroimaging studies have revealed changes in brain structures involved in pain modulation, providing biological evidence of psychotherapy's role in altering pain perception pathways. Beyond measurable clinical outcomes, qualitative research highlights the empowering and transformative nature of psychotherapy, as women report increased resilience, improved coping strategies, and a sense of personal growth. The inclusion of psychological care further underscores the importance of empathetic communication between healthcare providers and patients, which enhances treatment adherence and satisfaction.

Altogether, an integrated and patient-centered therapeutic framework that combines conventional medical treatment with supportive strategies such as diet, physiotherapy, and psychotherapy offers a more comprehensive and sustainable solution for managing endometriosis. Each modality targets distinct aspects of the disease: nutrition supports systemic balance and reduces inflammation, physiotherapy addresses musculoskeletal dysfunction and chronic pain, and psychotherapy helps manage psychological distress while enhancing coping capacity. When tailored to the individual needs of the patient, these complementary approaches not only improve symptom control but also foster empowerment, resilience, and active participation in self-care. Future research should focus on conducting high-quality randomized controlled trials with larger populations and longer follow-up periods to confirm the efficacy of specific interventions and to establish standardized, evidence-based protocols. Despite current limitations in the literature, the existing body of evidence strongly supports the integration of dietary modifications, physiotherapeutic techniques, and psychotherapeutic interventions as valuable components of holistic endometriosis care, and by embracing a multidisciplinary and individualized model, healthcare providers can significantly improve both the physical and emotional outcomes for women living with this chronic and often debilitating disease.

Disclosure:

Authors contribution:

Conceptualization: Barbara Teresińska, Michał Lenart, Barbara Madoń;

Methodology: Joanna Mazurek, Wojciech Gąska; Software: Michał Lenart, Barbara Teresińska;

Check: Agnieszka Brzezińska, Izabela Lekan, Ignacy Rożek;

Formal Analysis: Barbara Teresińska, Alicja Sodolska, Weronika Tuszyńska;

Investigation: Ignacy Rożek, Wojciech Gąska; Resources: Weronika Tuszyńska, Izabela Lekan; Data Curation: Ignacy Rożek, Agnieszka Brzezińska;

Writing – Original Draft Preparation: Barbara Teresińska, Michał Lenart;

Writing – Review and Editing: Alicja Sodolska, Joanna Mazurek, Agnieszka Brzezińska;

Visualization: Barbara Teresińska, Barbara Madoń;

Supervision: Barbara Teresińska, Barbara Madoń, Izabela Lekan;

Project Administration: Barbara Teresińska, Michał Lenart, Joanna Mazurek;

Funding Acquisition: Not applicable.

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

Funding statement: This study did not obtain any particular financial support from public, commercial, or nonprofit funding organisations.

Institutional review board statement Not applicable.

Informed consent statement Not applicable.

Data availability statement Not applicable.

Acknowledgments: Not applicable.

Conflict of interest statement: The authors declare no conflict of interest.

REFERENCES

- 1. Eskenazi, B., & Warner, M. L. (1997). Epidemiology of endometriosis. *Obstetrics and Gynecology Clinics of North America*, 24(2), 235–258. https://doi.org/10.1016/s0889-8545(05)70302-8
- 2. Viganò, P., Parazzini, F., Somigliana, E., & Vercellini, P. (2004). Endometriosis: Epidemiology and aetiological factors. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 18(2), 177–200. https://doi.org/10.1016/j.bpobgyn.2004.01.007
- 3. Parasar, P., Ozcan, P., & Terry, K. L. (2017). Endometriosis: Epidemiology, diagnosis and clinical management. *Current Obstetrics and Gynecology Reports*, 6(1), 34–41. https://doi.org/10.1007/s13669-017-0187-1
- 4. Taylor, H. S., Kotlyar, A. M., & Flores, V. A. (2021). Endometriosis is a chronic systemic disease: Clinical challenges and novel innovations. *The Lancet*, 397(10276), 839–852. https://doi.org/10.1016/S0140-6736(21)00389-5
- 5. Wang, P.-H., Yang, S.-T., Chang, W.-H., Liu, C.-H., Lee, F.-K., & Lee, W.-L. (2022). Endometriosis: Part I. Basic concept. *Taiwanese Journal of Obstetrics and Gynecology*, 61(6), 927–934. https://doi.org/10.1016/j.tjog.2022.08.002
- 6. Parazzini, F., Viganò, P., Candiani, M., & Fedele, L. (2013). Diet and endometriosis risk: A literature review. *Reproductive Biomedicine Online*, 26(4), 323–336. https://doi.org/10.1016/j.rbmo.2012.12.011
- 7. Mier-Cabrera, J., Aburto-Soto, T., Burrola-Méndez, S., Jiménez-Zamudio, L., Tolentino, M. C., Casanueva, E., & Hernández-Guerrero, C. (2009). Women with endometriosis improved their peripheral antioxidant markers after the application of a high antioxidant diet. *Reproductive Biology and Endocrinology*, 7, 54. https://doi.org/10.1186/1477-7827-7-54
- 8. Santanam, N., Zoneraich, N., & Parthasarathy, S. (2017). Myeloperoxidase as a potential target in women with endometriosis undergoing IVF. *Reproductive Sciences*, 24(4), 619–626. https://doi.org/10.1177/1933719116667225
- 9. Bertin, L., Zanconato, M., Crepaldi, M., Marasco, G., Cremon, C., Barbara, G., Barberio, B., Zingone, F., & Savarino, E. V. (2024). The role of the FODMAP diet in IBS. *Nutrients*, 16(3), 370. https://doi.org/10.3390/nu16030370
- 10. Marziali, M., Venza, M., Lazzaro, S., Lazzaro, A., Micossi, C., & Stolfi, V. M. (2012). Gluten-free diet: A new strategy for management of painful endometriosis-related symptoms? *Minerva Chirurgica*, 67(6), 499–504.
- 11. Moore, J. S., Gibson, P. R., Perry, R. E., & Burgell, R. E. (2017). Endometriosis in patients with irritable bowel syndrome: Specific symptomatic and demographic profile, and response to the low FODMAP diet. *The Australian & New Zealand Journal of Obstetrics & Gynaecology*, 57(2), 201–205. https://doi.org/10.1111/ajo.12594
- 12. Keukens, A., Veth, V. B., van de Kar, M. M., et al. (2025). Effects of a low-FODMAP diet on patients with endometriosis: A prospective cohort study. *BMC Women's Health*, 25, 174. https://doi.org/10.1186/s12905-025-03715-1
- 13. Hansen, S. O., & Knudsen, U. B. (2013). Endometriosis, dysmenorrhoea and diet. *European Journal of Obstetrics, Gynecology, and Reproductive Biology, 169*(2), 162–171. https://doi.org/10.1016/j.ejogrb.2013.03.028
- 14. Osmanlıoğlu, Ş., & Sanlier, N. (2021). The relationship between endometriosis and diet. *Human Fertility, 26*(3), 649–664. https://doi.org/10.1080/14647273.2021.1995900
- 15. Nirgianakis, K., Egger, K., Kalaitzopoulos, D. R., et al. (2022). Effectiveness of dietary interventions in the treatment of endometriosis: A systematic review. *Reproductive Sciences*, 29, 26–42. https://doi.org/10.1007/s43032-020-00418-w
- 16. Mazza, E., Troiano, E., Mazza, S., Ferro, Y., Abbinante, A., Agneta, M. T., Montalcini, T., & Pujia, A. (2023). The impact of endometriosis on dietary choices and activities of everyday life: A cross-sectional study. *Frontiers in Nutrition*, 10, 1273976. https://doi.org/10.3389/fnut.2023.1273976
- 17. van Haaps, A. P., Brouns, F., Schreurs, A. M. F., Keszthelyi, D., Maas, J. W. M., & Mijatovic, V. (2024). A glutenfree diet for endometriosis patients lacks evidence to recommend it. *AJOG Global Reports*, 4(3), 100369. https://doi.org/10.1016/j.xagr.2024.100369
- 18. Nodler, J. L., Harris, H. R., Chavarro, J. E., Frazier, A. L., & Missmer, S. A. (2020). Dairy consumption during adolescence and endometriosis risk. *American Journal of Obstetrics and Gynecology*, 222(3), 257.e1–257.e16. https://doi.org/10.1016/j.ajog.2019.09.010
- 19. Qi, X., Yun, C., Sun, L., & Wang, Y. (2021). Relationship between dairy products intake and risk of endometriosis: A systematic review and dose-response meta-analysis of observational studies. *Frontiers in Nutrition, 8*, 701860. https://doi.org/10.3389/fnut.2021.701860
- 20. Harris, H. R., Chavarro, J. E., Malspeis, S., Willett, W. C., & Missmer, S. A. (2013). Dairy-food, calcium, magnesium, and vitamin D intake and endometriosis: A prospective cohort study. *American Journal of Epidemiology*, 177(5), 420–430. https://doi.org/10.1093/aje/kws247
- 21. Arab, A., Karimi, E., Vingrys, K., et al. (2022). Food groups and nutrients consumption and risk of endometriosis: A systematic review and meta-analysis of observational studies. *Nutrition Journal*, 21, 58. https://doi.org/10.1186/s12937-022-00812-x

- 22. Shrateh, O. N., Siam, H. A., Ashhab, Y. S., Sweity, R. R., & Naasan, M. (2024). The impact of vitamin D treatment on pregnancy rate among endometriosis patients: A systematic review and meta-analysis. *Annals of Medicine and Surgery*, 86(7), 4098–4111. https://doi.org/10.1097/MS9.000000000002174
- 23. Kahlon, B. K., Simon-Collins, M., Nylander, E., Segars, J., & Singh, B. (2023). A systematic review of vitamin D and endometriosis: Role in pathophysiology, diagnosis, treatment, and prevention. *F&S Reviews*, 4(1), 1–14. https://doi.org/10.1016/j.xfnr.2022.11.005
- 24. Zhou, I. W., Zhang, A. L., Tsang, M. S. M., & Xue, C. C. (2025). Vitamin D for primary dysmenorrhea and endometriosis-related pain: A systematic review of registered RCTs. *PLOS ONE*, 20(4), e0321393. https://doi.org/10.1371/journal.pone.0321393
- 25. Chacko, S. A., Song, Y., Nathan, L., Tinker, L., de Boer, I. H., Tylavsky, F., Wallace, R., & Liu, S. (2010). Relations of dietary magnesium intake to biomarkers of inflammation and endothelial dysfunction in an ethnically diverse cohort of postmenopausal women. *Diabetes Care*, 33(2), 304–310. https://doi.org/10.2337/dc09-1402
- 26. D'Angelo, E. K., Singer, H. A., & Rembold, C. M. (1992). Magnesium relaxes arterial smooth muscle by decreasing intracellular Ca²⁺ without changing intracellular Mg²⁺. *The Journal of Clinical Investigation*, 89(6), 1988–1994. https://doi.org/10.1172/JCI115807
- 27. Qin, R., Tian, G., Liu, J., & Cao, L. (2022). The gut microbiota and endometriosis: From pathogenesis to diagnosis and treatment. *Frontiers in Cellular and Infection Microbiology*, 12, 1069557. https://doi.org/10.3389/fcimb.2022.1069557
- 28. Jiang, I., Yong, P. J., Allaire, C., & Bedaiwy, M. A. (2021). Intricate connections between the microbiota and endometriosis. *International Journal of Molecular Sciences*, 22(11), 5644. https://doi.org/10.3390/ijms22115644
- 29. Xholli, A., Cremonini, F., Perugi, I., Londero, A. P., & Cagnacci, A. (2023). Gut microbiota and endometriosis: Exploring the relationship and therapeutic implications. *Pharmaceuticals*, 16(12), 1696. https://doi.org/10.3390/ph16121696
- 30. Wójcik, M., Szczepaniak, R., & Placek, K. (2022). Physiotherapy management in endometriosis. *International Journal of Environmental Research and Public Health*, 19(23), 16148. https://doi.org/10.3390/ijerph192316148
- 31. Del Forno, S., Cocchi, L., Arena, A., Pellizzone, V., Lenzi, J., Raffone, A., Borghese, G., Paradisi, R., Youssef, A., Casadio, P., Raimondo, D., & Seracchioli, R. (2023). Effects of pelvic floor muscle physiotherapy on urinary, bowel, and sexual functions in women with deep infiltrating endometriosis: A randomized controlled trial. *Medicina*, 60(1), 67. https://doi.org/10.3390/medicina60010067
- 32. França, P. R. C., Lontra, A. C. P., & Fernandes, P. D. (2022). Endometriosis: A disease with few direct treatment options. *Molecules*, 27(13), 4034. https://doi.org/10.3390/molecules27134034
- 33. Frawley, H., & Peterson, K. (Eds.). (n.d.). *Endometriosis*. In *The Continuous Textbook of Women's Medicine Series Gynecology Module, Volume 3*. Global Library of Women's Medicine. https://doi.org/10.3843/GLOWM.418263
- 34. Tennfjord, M. K., Gabrielsen, R., & Tellum, T. (2021). Effect of physical activity and exercise on endometriosis-associated symptoms: A systematic review. *BMC Women's Health*, 21(1), 355. https://doi.org/10.1186/s12905-021-01500-4
- 35. Del Forno, S., Arena, A., Alessandrini, M., Pellizzone, V., Lenzi, J., Raimondo, D., et al. (2020). Transperineal ultrasound visual feedback assisted pelvic floor muscle physiotherapy in women with deep infiltrating endometriosis and dyspareunia: A pilot study. *Journal of Sex & Marital Therapy*, 46(7), 603–611. https://doi.org/10.1080/0092623X.2020.1765057
- 36. Meissner, K., Schweizer-Arau, A., Limmer, A., Preibisch, C., Popovici, R. M., Lange, I., de Oriol, B., & Beissner, F. (2016). Psychotherapy with somatosensory stimulation for endometriosis-associated pain: A randomized controlled trial. *Obstetrics and Gynecology*, 128(5), 1134–1142. https://doi.org/10.1097/AOG.0000000000001691
- 37. Evans, S., Fernandez, S., Olive, L., Payne, L. A., & Mikocka-Walus, A. (2019). Psychological and mind-body interventions for endometriosis: A systematic review. *Journal of Psychosomatic Research*, 124, 109756. https://doi.org/10.1016/j.jpsychores.2019.109756
- 38. Beissner, F., Preibisch, C., Schweizer-Arau, A., Popovici, R. M., & Meissner, K. (2018). Psychotherapy with somatosensory stimulation for endometriosis-associated pain: The role of the anterior hippocampus. *Biological Psychiatry*, 84(10), 734–742. https://doi.org/10.1016/j.biopsych.2017.01.006
- 39. Farshi, N., Hasanpour, S., Mirghafourvand, M., et al. (2020). Effect of self-care counselling on depression and anxiety in women with endometriosis: A randomized controlled trial. *BMC Psychiatry*, 20, 391. https://doi.org/10.1186/s12888-020-02795-7
- 40. Wischmann, T., & Ditzen, B. (2024). Endometriosis: Patient–doctor communication and psychological counselling. *Archives of Gynecology and Obstetrics*, 309, 599–610. https://doi.org/10.1007/s00404-023-07292-2
- 41. Limmer, A., Weber, A., Olliges, E., et al. (2024). Psychotherapy with somatosensory stimulation as a complementary treatment for women with endometriosis-associated pain: A qualitative study. *BMC Complementary Medicine and Therapies*, 24, 426. https://doi.org/10.1186/s12906-024-04731-8
- 42. Dowding, C., Mikocka-Walus, A., Skvarc, D., O'Shea, M., Olive, L., & Evans, S. (2024). Learning to cope with the reality of endometriosis: A mixed-methods analysis of psychological therapy in women with endometriosis. *British Journal of Health Psychology*, 29, 644–661. https://doi.org/10.1111/bjhp.12718