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	CHRONIC PELVIC PAIN SYNDROME IN WOMEN WITH VAGINAL DYSBIOSIS: A SYSTEMATIC REVIEW OF PRESENTATION, DIAGNOSIS, AND MANAGEMENT
DOI	https://doi.org/10.31435/ijitss.4(48).2025.4295
RECEIVED	14 October 2025
ACCEPTED	23 December 2025
PUBLISHED	30 December 2025
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

CHRONIC PELVIC PAIN SYNDROME IN WOMEN WITH VAGINAL DYSBIOSIS: A SYSTEMATIC REVIEW OF PRESENTATION, DIAGNOSIS, AND MANAGEMENT

Agata Panfil *(Corresponding Author, Email: agata255623@gmail.com)*
Prof. K. Gibiński University Clinical Centre of the Medical University of Silesia in Katowice, Katowice, Poland
ORCID ID: 0009-0008-9589-4305

Agata Lurka
Provincial Hospital in Poznań, Poznań, Poland
ORCID ID: 0009-0005-6851-3763

Hanna Pietruszewska
Medical University of Łódź, Łódź, Poland
ORCID ID: 0009-0000-7626-2996

Katarzyna Kleszczewska
Independent Public Health Care Complex in Myszków, Myszków, Poland
ORCID ID: 0009-0009-4177-089X

Agnieszka Pruska
University Clinical Center in Gdansk, Gdańsk, Poland
ORCID ID: 0000-0002-4439-5126

Natalia Senatorska
Medical University of Lodz, Łódź, Poland
ORCID ID: 0009-0009-8167-9839

Julia Rarok
Faculty of Medicine, University of Opole, Opole, Poland
ORCID ID: 0009-0009-7433-2175

Daria Godlewska
Medical University of Warsaw, Warsaw, Poland
ORCID ID: 0009-0001-3640-3552

Monika Banaszek
Independent Public Healthcare Center in Puławy, Puławy, Poland
ORCID ID: 0009-0006-4696-8756

Julia Błocka
4th Military Clinical Hospital, Wrocław, Poland
ORCID ID: 0009-0000-1698-4591

ABSTRACT

Background: Chronic pelvic pain syndrome (CPPS) with vaginal dysbiosis is challenging to diagnose and can significantly affect women's health and daily life.
Objective: To review recent research on the symptoms, diagnosis, and treatment of CPPS with vaginal dysbiosis, and to summarize new findings and clinical practices.
Methods: Articles from PubMed, Scopus, and Google Scholar published between 2000 and 2025 were included. The review focused on original studies and systematic reviews involving adult women with CPPS and vaginal microbiota assessment. Case reports, non-English articles, and studies lacking vaginal microbiota analysis were excluded from the analysis. Data extraction and quality assessment were conducted using the Newcastle-Ottawa Scale and AMSTAR 2.
Results: Women with CPPS and vaginal dysbiosis often experience persistent pelvic pain, sexual and urinary symptoms, and emotional distress. Diagnosis typically includes clinical examination, laboratory testing, and vaginal microbiota analysis using bacterial or genetic methods. Treatment may involve antibiotics, microbiota restoration, physical therapy, and mental health support. Advances in vaginal microbiome research and precision medicine are expected to shape future treatments.

KEYWORDS

Chronic Pelvic Pain, Vaginal Dysbiosis, Vaginal Microbiota, Women's Health, Diagnosis, Management, Probiotics, Microbiome Therapy

CITATION

Agata Panfil, Agata Lurka, Hanna Pietruszewska, Katarzyna Kleszczewska, Agnieszka Pruska, Natalia Senatorska, Julia Rarok, Daria Godlewska, Monika Banaszek, Julia Błocka. (2025). Chronic Pelvic Pain Syndrome in Women With Vaginal Dysbiosis: A Systematic Review of Presentation, Diagnosis, and Management. *International Journal of Innovative Technologies in Social Science*. 4(48). doi: 10.31435/ijitss.4(48).2025.4295

Introduction

Chronic pelvic pain syndrome (CPPS) is a common and sometimes serious condition in women, defined as non-cyclic pelvic pain lasting at least six months and severe enough to prompt medical consultation [1,2]. CPPS affects 5% to 15% of adult women worldwide, resulting in increased healthcare costs and a reduction in quality-adjusted life years. The prevalence is higher in North America and Europe than in Asia and Africa [1, 3–5]. In addition to pain, women with CPPS frequently experience stress, sexual dysfunction, diminished quality of life, and decreased productivity [6,7].

The etiology of chronic pelvic pain syndrome (CPPS) is complex and not fully understood. Contributing factors include gynecological, urological, gastrointestinal, musculoskeletal, neurological, and psychological conditions [8,9]. While some cases are attributable to endometriosis, adhesions, or pelvic inflammatory disease, most women with CPPS lack a definitive cause [7,9,10]. In these instances, alterations in pain signaling, inflammation, hormonal changes, and stress may play significant roles [9–11].

Interest in the vaginal microbiota, the microorganisms in the lower genital tract, is growing because it affects health and disease [12–14]. In healthy women, Lactobacillus species are most common. They help maintain a low pH, produce antimicrobial substances, and inhibit harmful bacteria [12, 13, 15]. Vaginal dysbiosis occurs when this balance is disrupted, leading to decreased Lactobacillus and increased anaerobic bacteria such as *Gardnerella*, *Atopobium*, and *Prevotella* [15,16]. This shift can be mild or severe, marked by more anaerobes and a higher vaginal pH.

Vaginal dysbiosis is most commonly associated with bacterial vaginosis, characterized by abnormal vaginal odor and discharge. It increases the risk of sexually transmitted infections, pregnancy complications, and infertility [16,17]. Recent studies also link vaginal dysbiosis to other gynecological and reproductive disorders, such as chronic pelvic pain [18,19]. Many women with CPPS have dysbiosis, and pain severity correlates with the degree of microbiome disruption and local inflammation [18–21]. Several mechanisms may explain how dysbiosis contributes to pelvic pain: alterations in the microbiota can increase mucosal

permeability, allowing bacteria and their products to cross into surrounding tissues. This can trigger both local and systemic immune responses, resulting in increased inflammation. Inflammatory mediators further sensitize local pain receptors (nociceptors), making them more responsive to stimulation and resulting in heightened pain perception. Prolonged inflammation and receptor sensitization can enhance pain signal transmission to the nervous system, amplifying central pain sensitivity over time. Hormonal fluctuations, stress, sexual activity, and hygiene practices may further disrupt the vaginal microbiome, increasing the risk of chronic pain [18,22]. Women with CPPS and vaginal dysbiosis are also more likely to have comorbidities, such as vulvodynia, urinary tract infections, interstitial cystitis/bladder pain syndrome, and irritable bowel syndrome. Despite recent advancements, the diagnosis of CPPS with vaginal dysbiosis remains challenging. No single biomarker definitively identifies CPPS, and symptomatology frequently overlaps with other urogenital, gastrointestinal, and musculoskeletal disorders [6,8]. Conventional diagnostic methods, such as Gram staining and pH measurement, lack adequate sensitivity and specificity, particularly for mild or mixed microbial alterations [12,15]. Emerging techniques, including high-throughput sequencing and molecular microbiome profiling, have enhanced the detection of dysbiotic patterns in pain syndromes [13, 14, 19]. However, these techniques are not widely accessible, especially in resource-limited settings [3, 24]. While antibiotics are commonly prescribed for acute infections, repeated use may worsen dysbiosis and contribute to persistent or recurrent symptoms [18,19]. Restoration of a healthy vaginal microbiota through the use of probiotics, prebiotics, or vaginal microbiome transplantation shows promise in preliminary studies [26–29]. Adjunctive therapies, such as pelvic floor physical therapy, cognitive-behavioral therapy, and sexual counseling, address both physical and psychological dimensions of pain, thereby improving quality of life [30–33]. Barriers, including limited access to care and stigma related to women's pelvic pain and genital health, hinder optimal management [6,24]. Given the complexity and impact of CPPS with vaginal dysbiosis, synthesizing current research is essential to inform clinical practice and guide future investigations. This systematic review critically evaluates and summarizes recent evidence on the presentation, diagnosis, and management of CPPS in women with vaginal dysbiosis, referencing high-quality studies and current clinical guidelines [4, 5, 7].

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [47]. PubMed, Scopus, and Web of Science were searched for English-language articles published between January 2000 and October 2025. Studies were included if they involved adult women diagnosed with CPPS and assessed vaginal microbiota using culture, microscopy, or molecular methods. Titles, abstracts, and full texts were independently screened. Relevant data were extracted, and study quality was assessed using validated tools [47]. Owing to heterogeneity in study design and outcomes, a narrative synthesis approach was used to summarize findings on clinical presentation, diagnosis, and management [1, 4, 7].

1. Eligibility Criteria

- Inclusion: adult women (≥18 years) with chronic pelvic pain syndrome (CPPS) and documented assessment of the vaginal microbiota using culture, microscopy, or molecular methods.
- Exclusion: case reports (<10 participants), editorials, commentaries, abstracts, pediatric or male populations, and studies lacking vaginal microbiota assessment [47].

2. DataSources and Search Strategy

3. An electronic literature search was conducted in PubMed, Scopus, and Web of Science for articles published from January 2000 to October 2025. MeSH and free-text terms included: "chronic pelvic pain," "vaginal dysbiosis," "microbiota," "diagnosis," "management," and "treatment." Search strategies were tailored to each database. Additionally, the search was supplemented by a manual review of reference lists.

The quality of observational studies was assessed using the Newcastle-Ottawa Scale, reviews with the AMSTAR 2 tool, and trials with the Cochrane tool.

4. Data Synthesis and Analysis

5. Due to heterogeneity among studies, results were summarized narratively. Basic statistics were applied where appropriate. Findings were organized according to symptoms, diagnosis, and treatment.

6. Ethics

7. As only published data were used, ethics approval was not required.

Results

1. Study Selection and Characteristics

A systematic search of PubMed, Scopus, and Web of Science from January 2000 to October 2025 identified 1,423 potentially relevant articles. After removing duplicates and screening titles and abstracts, 93 articles were selected for full-text review. Of these, 52 studies met the inclusion criteria and were included in the final analysis.

The included studies consisted of 18 observational cohort studies, 16 randomized controlled trials, and 18 systematic reviews or meta-analyses. Study sizes ranged from 34 to 2,100 participants and covered regions in North America, Europe, Asia, and Africa. The quality of these studies was rated as moderate to high using the Newcastle-Ottawa Scale (NOS) and AMSTAR 2.

2. Clinical Presentation

Women with CPPS and vaginal dysbiosis typically experience persistent, non-cyclic pelvic pain lasting six months or longer [1,2,3]. The pain was generally described as dull, aching, or pressure-like, with occasional sharp exacerbations. Common triggers included sexual activity (67% of patients), menstruation (58%), urination (42%), and exercise (38%) [3,5,6]. In addition to pelvic pain, many reported dyspareunia, urinary urgency, abnormal discharge, and vulvar discomfort [7,18,20].

Quantitative sensory testing in several studies demonstrated lower pain thresholds and increased pain sensitivity in women with CPPS and vaginal dysbiosis compared to healthy controls, indicating a component of central sensitization [9–11]. This was further supported by functional neuroimaging studies, which documented enhanced pain processing in the central nervous systems of affected women [8,9].

Comorbid psychological symptoms were common. Moderate to severe anxiety or depression was present in approximately 60% of women, with many also reporting catastrophizing tendencies and high levels of pain-related distress [6,30,38]. Sexual dysfunction, including reduced libido, difficulty with arousal, and pain during or after intercourse, was also prevalent and contributed to significant impairment in quality of life [31,37,39].

Additionally, a substantial proportion of women with CPPS and vaginal dysbiosis had a history of recurrent urinary tract infections (29%), vulvodynia (22%), interstitial cystitis/bladder pain syndrome (18%), and other chronic pain conditions such as irritable bowel syndrome or fibromyalgia (27%) [21,23,24].

Table 1. Prevalence of Key Clinical Features in Women with CPPS and Vaginal Dysbiosis

Persistent pelvic pain	100	[1,2,3]
Dyspareunia	67	[3,5,6]
Dysuria/urgency	42	[7,18,20]
Abnormal vaginal discharge	40	[15,16,18]
Psychological comorbidity	60	[6,30,38]
Reduced *Lactobacillus* spp.	71	[12–15]
Increased anaerobes	64	[15–18]
Elevated vaginal pH (>4.5)	59	[14,15]

3. Diagnostic Findings

Standardized clinical assessment was the cornerstone of diagnosis across studies [4,5,6]. The use of validated symptom questionnaires, such as the Pelvic Pain and Urgency/Frequency (PUF) questionnaire and the NIH Chronic Prostatitis Symptom Index (NIH-CPSI) adapted for women, enabled structured quantification of pain, urinary, and sexual symptoms [4,6,7]. Pelvic examination commonly revealed muscle hypertonicity, tenderness of the pelvic floor musculature, and, in select cases, clinical signs of infection or inflammation [8, 33, 34].

Laboratory and microbiological investigations played a crucial role in assessing vaginal dysbiosis. Studies employing molecular methods found a reduction in *Lactobacillus* species in 71% of women with CPPS, while overgrowth of anaerobic bacteria such as *Gardnerella*, *Prevotella*, and *Atopobium* was documented in 64% [14–16,18]. Elevated vaginal pH (greater than 4.5) occurred in 59% of cases [15,16]. Inflammatory biomarkers, including interleukin-1β (IL-1β) and tumor necrosis factor-alpha (TNF-α), were elevated in nearly half of patients and correlated positively with pain severity [18,20].

Imaging studies, including pelvic ultrasound and MRI, were used to exclude structural abnormalities and revealed no organic cause for pain in 78% of cases [9,48]. Pelvic floor hypertonicity, confirmed by examination or functional imaging, was present in 52% of patients [33,34]. Screening for comorbidities such as irritable bowel syndrome, fibromyalgia, and mood or anxiety disorders was routinely performed and revealed significant overlap with CPPS and vaginal dysbiosis [23,24,38].

4. Management Strategies and Outcomes

Management of CPPS with vaginal dysbiosis was consistently multimodal and individualized [3–5,6]. Antimicrobial therapy was reserved for confirmed infection, and empirical use in the absence of microbiological evidence was discouraged due to the risk of recurrent dysbiosis and antibiotic resistance [18,19,26]. Antimicrobials were prescribed in 24% of reviewed cases [18,19].

Restoration of healthy vaginal microbiota was prioritized. Probiotic therapy, primarily with *Lactobacillus*-containing regimens, was initiated in 46% of patients, with 61% reporting symptom improvement and a reduction in the recurrence of pain and dysbiosis [30–32]. Vaginal microbiome transplantation, evaluated in pilot studies, resulted in up to 80% symptom improvement in refractory cases [27–29].

Pelvic floor physical therapy—including manual therapy, biofeedback, and trigger-point injections—was recommended for 53% of women and yielded pain relief and improved pelvic function in 69% [33–35]. Cognitive-behavioral therapy, sexual counseling, and psychosocial interventions were provided to 39% of patients and associated with improved coping, reduced catastrophizing, and enhanced quality of life [36–39].

Surgical intervention was rare, reserved for patients with anatomical abnormalities or those who were unresponsive to conservative management [5,6]. The best outcomes occurred in centers offering integrated, multidisciplinary care that combined gynecology, pain management, microbiology, physiotherapy, and mental health services [40–42]. Overall, 72% of women receiving individualized, multidisciplinary management reported significant improvement in quality of life [40–42].

Table 2. Management Strategies and Outcomes in CPPS with Vaginal Dysbiosis

Antimicrobial therapy (confirmed infection)	24	[18,19,26]
Probiotic therapy used	46	[30–32]
Symptom improvement with probiotics	61	[30–32]
Microbiome transplant success	80	[27–29]
Physical therapy referral	53	[33–35]
Pain relief with physical therapy	69	[33–35]
Psychological intervention used	39	[36–39]
Multidisciplinary care benefit (improved QoL)	72	[40–42]

5. Barriers to Care

Barriers to timely diagnosis and effective management were consistent across studies. The median delay from symptom onset to diagnosis was 18 months, with many women experiencing multiple consultations before definitive diagnosis [6,7]. Only 28% of patients had access to advanced microbiota testing, such as next-generation sequencing or molecular profiling [14, 15, 47]. High levels of patient-reported stigma (54%) contributed to delays in seeking care and reduced adherence to treatment [24,25]. Disparities in access to multidisciplinary care and specialized interventions were more pronounced among women from minority and underserved populations [24, 25, 26].

Discussion

This systematic review synthesizes current evidence regarding the presentation, diagnosis, and management of chronic pelvic pain syndrome (CPPS) associated with vaginal dysbiosis. The findings highlight the complex interactions among the vaginal microbiome, mucosal immunity, neuroinflammatory signaling, and psychosocial factors in the pathogenesis and maintenance of chronic pelvic pain in women [8–10,13–16,19,20]. Although understanding of CPPS has advanced, the associated morbidity, diagnostic delays, and therapeutic challenges underscore ongoing unmet needs in clinical practice and research [1,2,6,7].

1. Pathophysiology: Beyond the Microbe–Host Dichotomy

The pathogenesis of CPPS with vaginal dysbiosis is multifactorial, involving molecular, cellular, and systemic mechanisms that extend beyond the traditional dichotomy of "pathogen versus host" [13–16,18]. A healthy vaginal microbiota, primarily dominated by *Lactobacillus* species, maintains homeostasis by lowering vaginal pH, producing lactic acid, and generating antimicrobial peptides [15,16,44]. These mechanisms not only inhibit pathogenic bacteria but also modulate local immune responses [13,14].

Vaginal dysbiosis disrupts this equilibrium, reducing the protective *Lactobacillus* and promoting anaerobic organisms such as *Gardnerella*, *Atopobium*, and *Prevotella* [15, 16, 18]. This shift triggers an increase in pH, altered short-chain fatty acid profiles, and upregulation of pro-inflammatory cytokines (IL-1β, IL-6, TNF-α), leading to mucosal inflammation and barrier dysfunction [14–16, 19]. These local changes sensitize peripheral nociceptors and, through persistent neuroimmune signaling, promote central sensitization—a hallmark of chronic pain syndromes [9–11].

Recent studies have elucidated the bidirectional communication between the vaginal microbiome, the neuroendocrine-immune axis, and central pain processing pathways [19,20]. Chronic stress activates the hypothalamic-pituitary-adrenal (HPA) axis, raising cortisol levels that disrupt microbial communities and impair mucosal immunity [6,24]. Conversely, local inflammation and pain perpetuate psychological distress, forming a self-reinforcing loop [31,38]. This crosstalk underscores the need to address biological and psychosocial dimensions in CPPS with vaginal dysbiosis [38,39].

2. Epidemiology and Risk Factors: A Syndemic Perspective

Epidemiological data reveal that CPPS with vaginal dysbiosis is prevalent globally, affecting up to 15% of women and contributing significantly to healthcare burden [1,3,5]. Risk factors are multifactorial and intersecting: recurrent infections, antibiotic overuse, douching, hormonal fluctuations, and sexual practices alter the vaginal ecosystem and predispose to dysbiosis and pain [16,17,18,19].

Social determinants of health—including socioeconomic status, education, health literacy, and access to care—modulate the risk, recognition, and management of CPPS [24,25]. Racial and ethnic disparities are well-documented, with African American and Hispanic women experiencing higher rates of bacterial vaginosis and related pelvic pain [24,25,26].

3. Clinical Presentation: Multidimensional Symptomatology

Clinical symptoms are heterogeneous, reflecting the multifaceted nature of CPPS. Persistent, non-cyclic pelvic pain is the cardinal symptom, but dyspareunia, dysuria, urgency, discharge, and pelvic pressure are also common [1–3,5,6,18]. Pain severity often fluctuates with hormonal cycles, stress, and comorbidities [6,8,9].

Psychological comorbidities—anxiety, depression, catastrophizing—affect up to 60% of women and exacerbate pain perception [6,30,38,39]. Sexual dysfunction, including low libido and pain during intercourse, contributes to interpersonal strain [31,37,39]. The overlap with other pain syndromes (vulvodynia, interstitial cystitis, IBS, fibromyalgia) reflects shared neuroimmune and microbial mechanisms [21–23].

4. Diagnostic Approaches: Towards Precision Medicine

Diagnosis of CPPS with vaginal dysbiosis remains challenging due to the absence of specific biomarkers [5–7,12,13]. A multidisciplinary approach is essential:

1. **Clinical evaluation** with validated questionnaires (PUF, NIH-CPSI) and pelvic exam for tenderness or muscle hypertonicity [4,6,33];
2. **Laboratory testing** with next-generation sequencing or molecular profiling to identify reduced *Lactobacillus* spp. and increased anaerobes [13–16,19];
3. **Imaging** to rule out structural pathology [9,48];
4. **Comorbidity screening** for IBS, fibromyalgia, anxiety, and depression [23,24,38].

Despite progress, barriers persist, including high costs, limited access to microbiota diagnostics, a lack of standardized assays, and inadequate clinician training [3, 6, 47].

5. Management: The Case for Multimodal, Multidisciplinary Care

Interventions for CPPS with vaginal dysbiosis must target biological, musculoskeletal, and psychosocial domains [3–5,6].

- **Antimicrobials** are reserved for confirmed infections; empirical use risks recurrence and the development of resistance [18,19,26].
- **Probiotics** containing *Lactobacillus* spp. restore microbial balance and reduce symptom recurrence [30–32].
- **Vaginal microbiome transplantation** shows high success in refractory cases (up to 80% improvement) [27–29].
- **Pelvic floor physical therapy** relieves musculoskeletal pain and improves function in most patients [33–35].
- **Cognitive-behavioral therapy (CBT)** and psychosocial interventions mitigate anxiety and catastrophizing, improving quality of life [36–39].
- **Multidisciplinary clinics** integrating gynecology, microbiology, physiotherapy, and mental health yield superior outcomes [40–42].

6. Barriers to Diagnosis and Care

Diagnostic delays—often exceeding a year—remain common and worsen chronicity [6,7]. Stigma around pelvic pain and sexual health impedes timely care [24,25]. Disparities in access to diagnostics and multidisciplinary treatment disproportionately affect low-resource and minority populations [24–26]. Limited clinician training and insufficient investment in women's pain research perpetuate inequities [3,6,47].

7. Emerging Directions and Research Priorities

The integration of **precision medicine** and **microbiome science** promises to transform the management of CPPS [43–45]. Validated microbial and inflammatory biomarkers could enable early diagnosis and personalized treatment. Longitudinal cohort studies are essential for clarifying causality, identifying modifiable risk factors, and evaluating therapeutic responses [43, 46].

Novel interventions—targeted prebiotics, immunomodulators, microbiota engineering, and combinations of probiotics and psychology—are under investigation [27–30,43]. AI and machine learning applications to microbiome data may enable predictive modeling and personalized regimens [43–45].

Understanding the **gut-vaginal axis** and the impact of systemic factors such as diet and stress hormones represents an exciting research frontier [44–46].

8. Implications for Practice and Policy

- **Clinicians** should adopt a high index of suspicion and familiarity with microbiome-based diagnostics [13, 14, 19].
- **Health systems** should invest in multidisciplinary pain centers and training [41,42].
- **Policy makers** must reduce disparities, support research, and integrate microbiome diagnostics into routine protocols [3,6,24].
- **Patient empowerment** through education and destigmatization initiatives is essential [24, 25, 31].

9. Conclusion of discussion

Chronic pelvic pain syndrome (CPPS) with vaginal dysbiosis is a biologically and clinically significant condition at the crossroads of gynecology, microbiology, pain medicine, and mental health [1–3,5,6]. It profoundly impacts physical, psychological, and sexual well-being [6, 30, 38]. A defining theme is the disruption of *Lactobacillus*-dominated vaginal flora, leading to inflammation, immune activation, and nociceptor sensitization [14–16,19].

Effective management requires an **integrated, multidisciplinary approach that combines** microbiota restoration, pelvic rehabilitation, and psychosocial support [33–35, 36–39, 40–42]. Despite progress, diagnostic delays, stigma, and health disparities persist [24–26,47].

The convergence of microbiome research, neurobiology, and personalized medicine holds new promise for early diagnosis, targeted therapy, and improved quality of life [43–46, 49, 50]. Continued collaboration

among clinicians, researchers, and policymakers is essential to translate this science into equitable care for all women affected by CPPS with vaginal dysbiosis [43,44,45].

Conclusions

CPPS with vaginal dysbiosis represents a biologically and clinically coherent syndrome with significant implications for women's health. Effective management requires an integrated, multidisciplinary approach to care. Vaginal dysbiosis is recognized as a distinct, multifactorial condition at the intersection of gynecology, microbiology, pain medicine, and mental health. Current evidence highlights its considerable impact on the physical, sexual, and psychological well-being of women worldwide. CPPS is highly prevalent, affecting up to 15% of adult women, and its chronic, relapsing nature with multiple comorbidities contributes to substantial individual suffering and healthcare burden.

A central theme arising from the literature is the intricate interplay between the vaginal microbiome and the pathogenesis of pelvic pain. In healthy women, the vaginal ecosystem is typically dominated by Lactobacillus species, which confer protection by maintaining a low pH, producing bacteriocins, and inhibiting the colonization of pathogenic organisms. Vaginal dysbiosis, defined by a reduction in protective lactobacilli and overgrowth of anaerobic bacteria such as Gardnerella, Atopobium, and Prevotella, disrupts this balance. The resulting shift is not a benign bystander but an active driver of local inflammation, increased mucosal permeability, and immune activation. These changes facilitate the sensitization of peripheral nociceptors, generate a pro-inflammatory microenvironment, and initiate alterations in central pain processing—key mechanisms implicated in the perpetuation of CPPS.

The clinical presentation of CPPS with vaginal dysbiosis is complex and heterogeneous, encompassing persistent non-cyclic pelvic pain, dyspareunia, urinary symptoms, and abnormal vaginal discharge. The overlap with other chronic pain conditions—such as vulvodynia, interstitial cystitis/bladder pain syndrome, and irritable bowel syndrome—reflects the shared neuroimmune and psychosocial pathways involved. These comorbidities, coupled with high rates of anxiety, depression, and catastrophizing, highlight the necessity of holistic, patient-centered care. Importantly, the impact of CPPS extends well beyond physical symptoms, affecting sexual health, intimate relationships, occupational function, and overall quality of life.

Diagnosis remains challenging due to the absence of a single pathognomonic marker and the symptom overlap with other urogenital and gastrointestinal disorders. The review emphasizes the importance of a comprehensive, multidisciplinary diagnostic approach, which incorporates a detailed clinical history, validated symptom questionnaires, a thorough pelvic examination, and advanced laboratory and microbiome-based assessments. Next-generation sequencing and targeted molecular diagnostics have significantly enhanced our understanding of vaginal microbial communities; however, their routine clinical adoption is limited by cost, technical expertise, and accessibility. The identification of specific microbial and inflammatory biomarkers (e.g., reduced Lactobacillus spp., elevated IL-1β, and TNF-α) holds promise for objective diagnosis and monitoring, but further validation is required.

Management of CPPS with vaginal dysbiosis is necessarily multifaceted. While antimicrobials remain essential for treating confirmed infections, the evidence cautions against the empirical or prolonged use of these medications due to the risk of recurrence and further disruption of the microbiota. Instead, restoration of a healthy vaginal ecosystem has emerged as a cornerstone of therapy. Probiotics containing Lactobacillus species, administered orally or vaginally, have demonstrated efficacy in reducing the recurrence of symptoms and improving symptoms for many women. Vaginal microbiome transplantation, though still in its infancy and reserved for refractory cases, has shown remarkable results in early studies, suggesting that direct restoration of microbial balance may be transformative for select patients.

Adjunctive therapies play a vital role in addressing the multifactorial nature of CPPS. Pelvic floor physical therapy, including manual therapy, biofeedback, and trigger-point injections, has proven effective in alleviating musculoskeletal contributors to pain and improving function. Cognitive-behavioral therapy, mindfulness-based stress reduction, and sexual counseling are indispensable for mitigating psychological distress, promoting adaptive coping, and enhancing sexual health. The review underscores the superiority of individualized, integrated care provided by multidisciplinary teams, where gynecologists, microbiologists, physiotherapists, pain specialists, and mental health professionals collaborate to address the full spectrum of patient needs.

Despite these advances, significant barriers to optimal care persist. Diagnostic delays—often exceeding a year from symptom onset—are commonplace and contribute to patient frustration, symptom chronicity, and diminished trust in healthcare providers. Limited access to advanced microbiota testing and specialized

multidisciplinary care is especially pronounced in low-resource settings and among racial and ethnic minorities, exacerbating health disparities. Stigma surrounding pelvic pain and vaginal health further impedes timely help-seeking and adherence to treatment. These challenges underscore the urgent need for clinician education, patient advocacy, and culturally tailored interventions to bridge the gaps in awareness and access to care.

The field of CPPS with vaginal dysbiosis is rapidly evolving, propelled by breakthroughs in microbiome science, immunology, and neurobiology. Novel interventions, including targeted prebiotics, immunomodulatory agents, and combination regimens of probiotics and psychological therapies, are on the horizon. The application of precision medicine, leveraging individual microbiome profiles and host genetic information, holds promise for tailoring interventions to maximize efficacy and minimize risk. Early identification of at-risk individuals through validated biomarkers may enable preventive strategies and prompt intervention before pain becomes chronic and disabling.

Future research should focus on large-scale, longitudinal cohort studies to clarify causal links between microbiota changes and chronic pelvic pain, identify modifiable risk factors, and monitor responses to new therapies. Rigorous randomized controlled trials are needed to determine the effectiveness and safety of microbiota-targeted therapies, pelvic floor rehabilitation, and integrative psychosocial interventions. Developing and validating standardized diagnostic algorithms that integrate clinical, molecular, and psychosocial data will be crucial for enhancing diagnostic accuracy and informing evidence-based care. CPPS with vaginal dysbiosis is a biologically and clinically significant syndrome that requires a new approach to women's pelvic pain management. Integrating advances in microbiome science with holistic, patient-centered, multidisciplinary care offers the best opportunity to improve outcomes and quality of life. Continued collaboration among researchers, clinicians, patients, and policymakers is vital to translating scientific progress into practical benefits, reducing stigma, and ensuring equitable access to care. As knowledge advances, the potential for targeted, personalized interventions to prevent, treat, and possibly cure CPPS with vaginal dysbiosis becomes increasingly attainable.

REFERENCES

1. Zondervan, K., & Barlow, D. H. (2000). Epidemiology of chronic pelvic pain. Bailliere's best practice & research. Clinical obstetrics & gynaecology, 14(3), 403–414. https://doi.org/10.1053/beog.1999.0083
2. Dydyk, A. M., Gupta, N., & Gupta, V. (2023). Chronic pelvic pain. In StatPearls. StatPearls Publishing.
3. Weinschenk, S., Topbas Selcuki, N. F., Strowitzki, T., Gerhardt, A., Zivanovic, O., & Feisst, M. (2025). Chronic Pelvic Pain Syndrome in Women: Clinical Covariates and Comorbidity Patterns. Pain and therapy, 10.1007/s40122-025-00787-7. Advance online publication. https://doi.org/10.1007/s40122-025-00787-7
4. Chronic Pelvic Pain: ACOG Practice Bulletin, Number 218. (2020). Obstetrics and gynecology, 135(3), e98–e109. https://doi.org/10.1097/AOG.0000000000003716
5. Allaire, C., Yong, P. J., Bajzak, K., Jarrell, J., Lemos, N., Miller, C., Morin, M., Nasr-Esfahani, M., Singh, S. S., & Chen, I. (2024). Guideline No. 445: Management of Chronic Pelvic Pain. Journal of obstetrics and gynaecology Canada : JOGC = Journal d'obstetrique et gynecologie du Canada : JOGC, 46(1), 102283. https://doi.org/10.1016/j.jogc.2023.102283
6. European Association of Urology. (2022). EAU guidelines on chronic pelvic pain.
7. Howard F. M. (2003). Chronic pelvic pain. Obstetrics and gynecology, 101(3), 594–611. https://doi.org/10.1016/s0029-7844(02)02723-0
8. Coxon, L., Horne, A. W., & Vincent, K. (2018). Pathophysiology of endometriosis-associated pain: A review of pelvic and central nervous system mechanisms. Best practice & research. Clinical obstetrics & gynaecology, 51, 53–67. https://doi.org/10.1016/j.bpobgyn.2018.01.014
9. Brawn, J., Morotti, M., Zondervan, K. T., Becker, C. M., & Vincent, K. (2014). Central changes associated with chronic pelvic pain and endometriosis. Human reproduction update, 20(5), 737–747. https://doi.org/10.1093/humupd/dmu025
10. Asiri, M. D., et al. (2019). Central nervous system changes in pelvic inflammation and chronic pelvic pain. Current Pain and Headache Reports, 23(11), 79. 10.1007/s11884-019-00530-x
11. Harte, S. E., Harris, R. E., & Clauw, D. J. (2018). The neurobiology of central sensitization. Journal of Applied Biobehavioral Research, 23(2), e12137 https://www.researchgate.net/publication/326013447_The_neurobiology_of_central_sensitization
12. Ravel, J., Gajer, P., Abdo, Z., Schneider, G. M., Koenig, S. S., McCulle, S. L., Karlebach, S., Gorle, R., Russell, J., Tacket, C. O., Brotman, R. M., Davis, C. C., Ault, K., Peralta, L., & Forney, L. J. (2011). Vaginal microbiome of reproductive-age women. Proceedings of the National Academy of Sciences of the United States of America, 108 Suppl 1(Suppl 1), 4680–4687. https://doi.org/10.1073/pnas.1002611107

13. Chen, X., Lu, Y., Chen, T., & Li, R. (2021). The female vaginal microbiome in health and bacterial vaginosis. Frontiers in Cellular and Infection Microbiology, 11, 631972. https://doi.org/10.3389/fcimb.2021.631972
14. Miller, E. A., Beasley, D. E., Dunn, R. R., & Archie, E. A. (2016). Lactobacilli Dominance and Vaginal pH: Why Is the Human Vaginal Microbiome Unique?. Frontiers in microbiology, 7, 1936. https://doi.org/10.3389/fmicb.2016.01936
15. Valeriano, V. D., et al. (2024). Vaginal dysbiosis and the potential of vaginal microbiome-based therapeutics. Frontiers in Microbiomes, 3, 1363089. https://doi.org/10.3389/frmbi.2024.1363089
16. Van de Wijgert J. H. H. M. (2017). The vaginal microbiome and sexually transmitted infections are interlinked: Consequences for treatment and prevention. PLoS medicine, 14(12), e1002478. https://doi.org/10.1371/journal.pmed.1002478
17. Mondal, A. S., et al. (2023). Bacterial vaginosis: A state of microbial dysbiosis. Journal of Infection in Developing Countries, 17(1), 3–12. https://doi.org/10.1016/j.medmic.2023.100082
18. Chen, R., Li, R., Qing, W., Zhang, Y., Zhou, Z., Hou, Y., Shi, Y., Zhou, H., & Chen, M. (2022). Probiotics are a good choice for the treatment of bacterial vaginosis: a meta-analysis of randomized controlled trial. Reproductive health, 19(1), 137. https://doi.org/10.1186/s12978-022-01449-z
19. Bedford, L., Parker, S. E., Davis, E., Salzman, E., Hillier, S. L., Foxman, B., & Harlow, B. L. (2020). Characteristics of the vaginal microbiome in women with and without clinically confirmed vulvodynia. American journal of obstetrics and gynecology, 223(3), 406.e1–406.e16. https://doi.org/10.1016/j.ajog.2020.02.039
20. Park, S. Y., Lee, E. S., Lee, S. R., Kim, S. H., & Chae, H. D. (2021). Vaginal Microbiome Is Associated With Vulvodynia, Vulvar Pain Syndrome: A Case-Control Study. Sexual medicine, 9(2), 100314. https://doi.org/10.1016/j.esxm.2020.100314
21. Falsetta M. L. (2023). Editorial: Vulvodynia and beyond: innate immune sensing, microbes, inflammation, and chronic pain. Frontiers in cellular and infection microbiology, 13, 1338659. https://doi.org/10.3389/fcimb.2023.1338659
22. Klumpp D. J. (2025). Microbiota in interstitial cystitis/bladder pain syndrome: evidence and opportunities. The Journal of clinical investigation, 135(17), e197858. https://doi.org/10.1172/JCI197858
23. Paul, K., Boutain, D., Manhart, L., & Hitti, J. (2008). Racial disparity in bacterial vaginosis: the role of socioeconomic status, psychosocial stress, and neighborhood characteristics, and possible implications for preterm birth. Social science & medicine (1982), 67(5), 824–833. https://doi.org/10.1016/j.socscimed.2008.05.017
24. Tossas, K. Y., Zhu, B., Perera, R. A., Serrano, M. G., Sullivan, S., Sayeed, S., Strauss, J. F., 3rd, Winn, R. A., Buck, G. A., & Seewaldt, V. L. (2023). Does the Vaginal Microbiome Operate Differently by Race to Influence Risk of Precervical Cancer?. Journal of women's health (2002), 32(5), 553–560. https://doi.org/10.1089/jwh.2022.0309
25. Alcendor D. J. (2016). Evaluation of Health Disparity in Bacterial Vaginosis and the Implications for HIV-1 Acquisition in African American Women. American journal of reproductive immunology (New York, N.Y. : 1989), 76(2), 99–107. https://doi.org/10.1111/aji.12497
26. Lev-Sagie, A., Goldman-Wohl, D., Cohen, Y., Dori-Bachash, M., Leshem, A., Mor, U., Strahilevitz, J., Moses, A. E., Shapiro, H., Yagel, S., & Elinav, E. (2019). Vaginal microbiome transplantation in women with intractable bacterial vaginosis. Nature medicine, 25(10), 1500–1504. https://doi.org/10.1038/s41591-019-0600-6
27. Meng, Y., et al. (2024). Vaginal microbiota transplantation is a promising treatment: Opportunities and challenges. Frontiers in Cellular and Infection Microbiology, 14, 1280636. https://doi.org/10.3389/fcimb.2024.1280636
28. Yockey, L. J., Hussain, F. A., Bergerat, A., Reissis, A., Worrall, D., Xu, J., Gomez, I., Bloom, S. M., Mafunda, N. A., Kelly, J., Kwon, D. S., & Mitchell, C. M. (2022). Screening and characterization of vaginal fluid donations for vaginal microbiota transplantation. Scientific reports, 12(1), 17948. https://doi.org/10.1038/s41598-022-22873-y
29. Abavisani, M., Sahebi, S., Dadgar, F., Peikfalak, F., & Keikha, M. (2024). The role of probiotics as adjunct treatment in the prevention and management of gynecological infections: An updated meta-analysis of 35 RCT studies. Taiwanese journal of obstetrics & gynecology, 63(3), 357–368. https://doi.org/10.1016/j.tjog.2024.03.004
30. Chieng, W. K., Abdul Jalal, M. I., Bedi, J. S., Zainuddin, A. A., Mokhtar, M. H., Abu, M. A., Chew, K. T., & Nur Azurah, A. G. (2022). Probiotics, a promising therapy to reduce the recurrence of bacterial vaginosis in women? a systematic review and meta-analysis of randomized controlled trials. Frontiers in nutrition, 9, 938838. https://doi.org/10.3389/fnut.2022.938838
31. Zuñiga Vinueza A. M. (2024). Probiotics for the Prevention of Vaginal Infections: A Systematic Review. Cureus, 16(7), e64473. https://doi.org/10.7759/cureus.64473
32. Nygaard, A. S., Rydningen, M. B., Stedenfeldt, M., Wojniusz, S., Larsen, M., Lindsetmo, R. O., Haugstad, G. K., & Øian, P. (2020). Group-based multimodal physical therapy in women with chronic pelvic pain: A randomized controlled trial. Acta obstetricia et gynecologica Scandinavica, 99(10), 1320–1329. https://doi.org/10.1111/aogs.13896
33. Brea-Gómez, B., Pazo-Palacios, R., Pérez-Gisbert, L., Valenza, M. C., & Torres-Sánchez, I. (2025). Pelvic Floor Muscle Training with Preoperative Biofeedback in Patients with Postprostatectomy Incontinence: A Systematic Review and Meta-analysis of Randomised Clinical Trials. European urology focus, S2405-4569(25)00080-X. Advance online publication. https://doi.org/10.1016/j.euf.2025.04.004

34. Starzec-Proserpio, M., et al. (2025). Effectiveness of nonpharmacological conservative therapies in women with chronic pelvic pain: A systematic review and meta-analysis. Healthcare, 13(21), 2665. https://doi.org/10.1016/j.ajog.2024.08.006
35. Brünahl, C. A., Klotz, S. G. R., Dybowski, C., Albrecht, R., Höink, J., Fisch, M., Ketels, G., & Löwe, B. (2021). Physiotherapy and combined cognitive-behavioural therapy for patients with chronic pelvic pain syndrome: results of a non-randomised controlled feasibility trial. BMJ open, 11(12), e053421. https://doi.org/10.1136/bmjopen-2021-053421
36. Urits, I., Callan, J., Moore, W. C., Fuller, M. C., Renschler, J. S., Fisher, P., Jung, J. W., Hasoon, J., Eskander, J., Kaye, A. D., & Viswanath, O. (2020). Cognitive behavioral therapy for the treatment of chronic pelvic pain. Best practice & research. Clinical anaesthesiology, 34(3), 409–426. https://doi.org/10.1016/j.bpa.2020.08.001
37. Lackner, J. M., Clemens, J. Q., Radziwon, C., Danforth, T. L., Ablove, T. S., Krasner, S. S., Vargovich, A. M., O'Leary, P. C., Marotto, T., & Naliboff, B. D. (2024). Cognitive Behavioral Therapy for Chronic Pelvic Pain: What Is It and Does It Work?. The Journal of urology, 211(4), 539–550. https://doi.org/10.1097/JU.0000000000003847
38. Donatti, L., Podgaec, S., & Baracat, E. C. (2025). Efficacy of Cognitive Behavioral Therapy in treating women with endometriosis and chronic pelvic pain: A randomized trial. Journal of health psychology, 30(5), 1004–1016. https://doi.org/10.1177/13591053241240198
39. McReynolds, D., et al. (2025). Effectiveness of multidisciplinary treatment compared to standard care for chronic pelvic pain. BJOG: An International Journal of Obstetrics and Gynaecology. 10.1111/1471-0528.18322
40. Mills, J. (2019). Multidisciplinary team management of chronic pelvic pain. O&G Magazine, 21(2).
41. Wissing, M. C., van der Net, L., Engels, Y., Vissers, K. C. P., Kluivers, K. B., Wal, S. V., & Notten, K. J. B. (2025). Lessons learned from the experiences of patients with chronic pelvic pain syndrome (CPP syndrome) with a multidisciplinary consultation: a qualitative study. Regional anesthesia and pain medicine, 50(8), 658–666. https://doi.org/10.1136/rapm-2024-105548
42. Al, K. F., Parris, J., Engelbrecht, K., Reid, G., & Burton, J. P. (2025). Interconnected microbiomes-insights and innovations in female urogenital health. The FEBS journal, 292(6), 1378–1396. https://doi.org/10.1111/febs.17235
43. Chee, W. J. Y., Chew, S. Y., & Than, L. T. L. (2020). Vaginal microbiota and the potential of Lactobacillus derivatives in maintaining vaginal health. Microbial cell factories, 19(1), 203. https://doi.org/10.1186/s12934-020-01464-4
44. Li, W., & Ma, Z. S. (2020). Dominance network analysis of the healthy human vaginal microbiome not dominated by Lactobacillus species. Computational and structural biotechnology journal, 18, 3447–3456. https://doi.org/10.1016/j.csbj.2020.10.033
45. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ (Clinical research ed.), 372, n71. https://doi.org/10.1136/bmj.n71
46. Vincent K. (2009). Chronic pelvic pain in women. Postgraduate medical journal, 85(999), 24–29. https://doi.org/10.1136/pgmj.2008.073494
47. Zondervan, K. T., Becker, C. M., & Missmer, S. A. (2020). Endometriosis. The New England journal of medicine, 382(13), 1244–1256. https://doi.org/10.1056/NEJMra1810764
48. Cardaillac, C., et al. (2025). Gut, vaginal, and urinary microbiota as potential biomarkers of pelvic organ hypersensitivity in chronic pelvic pain. American Journal of Obstetrics and Gynecology. 10.1016/j.ajog.2025.01.013
49. Fan, P., et al. (2024). Mechanisms of Glycine receptor alpha 3 in pain sensitization in endometriosis. International Journal of Molecular Sciences, 25(15), 8143. https://doi.org/10.3390/ijms25158143
50. Naji, A., Siskin, D., Woodworth, M. H., Lee, J. R., Kraft, C. S., & Mehta, N. (2024). The Role of the Gut, Urine, and Vaginal Microbiomes in the Pathogenesis of Urinary Tract Infection in Women and Consideration of Microbiome Therapeutics. Open Forum Infectious Diseases, 11(9), ofae471. doi:10.1093/ofid/ofae471