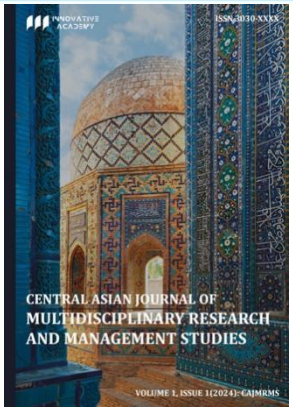

MODERN APPROACHES TO THE DIAGNOSIS AND TREATMENT OF ENDOCERVICITIS AND COLPITIS IN PREGNANT WOMEN

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https://doi.org/10.5281/zenodo.18257648

ARTICLE INFO

Received: 31st December 2025
Accepted: 11th January 2026
Published: 14th January 2026

KEYWORDS

Endocervicitis; Colpitis; Pregnancy; Vaginal infections; Diagnosis; Treatment; Vaginal microbiota; Obstetric outcomes

ABSTRACT

Endocervicitis and colpitis are common inflammatory conditions of the lower female genital tract that require particular clinical attention during pregnancy. Physiological immunological adaptations, hormonal fluctuations, and alterations in the vaginal microenvironment during gestation contribute to increased susceptibility to cervicovaginal infections. When inadequately diagnosed or managed, these conditions may be associated with unfavorable obstetric outcomes, including preterm delivery, premature rupture of membranes, intrauterine infection, and postpartum inflammatory complications. Recent advances in obstetric care have emphasized the importance of early diagnosis and individualized treatment strategies to minimize maternal and fetal risks. Modern diagnostic approaches incorporate a combination of clinical assessment, laboratory-based microbiological testing, and molecular diagnostic techniques, which enhance pathogen detection and improve diagnostic accuracy. Therapeutic strategies have evolved toward safer, gestational-age–appropriate antimicrobial regimens, supported by growing evidence on fetal safety and treatment efficacy. This article aims to present a comprehensive overview of contemporary approaches to the diagnosis and treatment of endocervicitis and colpitis in pregnant women, integrating current clinical evidence and international recommendations to support optimal clinical decision-making.

Introduction

Inflammatory diseases of the lower female genital tract, including endocervicitis and colpitis, remain a significant clinical problem in obstetric practice. During pregnancy, these conditions acquire increased importance due to physiological changes that affect immune function, hormonal balance, and the composition of the vaginal microbiota [1,2]. Even mild or asymptomatic forms of infection may contribute to adverse maternal and neonatal outcomes, highlighting the necessity of early detection and appropriate management. Endocervicitis refers to inflammation of the endocervical epithelium and is most commonly associated with infectious agents such as *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and anaerobic

bacterial species. Colpitis, which involves inflammatory changes of the vaginal mucosa, is frequently linked to disruptions in the normal vaginal microbiota and overgrowth of opportunistic microorganisms [3,4]. In pregnant women, these conditions often coexist, reflecting shared pathogenic mechanisms and overlapping risk factors. Pregnancy is characterized by a unique immunological state designed to maintain tolerance toward the developing fetus while preserving host defense against pathogens. This immunological adaptation may, however, reduce local immune responses within the cervicovaginal tract, facilitating microbial colonization and inflammation [5,6]. Additionally, elevated estrogen levels increase glycogen accumulation in vaginal epithelial cells, promoting changes in vaginal pH and microbial composition [7,8]. Epidemiological data indicate that cervicovaginal inflammatory conditions affect a substantial proportion of pregnant women worldwide. Reported prevalence rates range from 30% to 60%, depending on geographic region, population characteristics, and diagnostic criteria employed [9,10]. Commonly identified pathogens include *Gardnerella vaginalis*, *Candida* species, *Trichomonas vaginalis*, and mixed bacterial communities, with polymicrobial infections increasingly recognized [11,12]. Clinical manifestations of endocervicitis and colpitis during pregnancy are often nonspecific. Symptoms such as abnormal vaginal discharge, pruritus, dysuria, and pelvic discomfort may overlap with physiological changes of normal pregnancy, complicating clinical evaluation [13,14]. As a result, symptom-based diagnosis alone may be insufficient, leading to delayed or inadequate treatment. Traditional diagnostic methods, including microscopic examination and culture-based techniques, continue to be used in clinical practice but are limited by variable sensitivity, specificity, and operator dependence [15,16]. Advances in molecular diagnostics, particularly nucleic acid amplification tests, have significantly improved pathogen detection and allow for identification of both symptomatic and asymptomatic infections [17,18]. Moreover, emerging approaches focused on vaginal microbiota analysis provide valuable insights into disease pathogenesis and recurrence risk. Management of endocervicitis and colpitis in pregnant women requires careful consideration of antimicrobial efficacy and fetal safety. Untreated or inadequately treated infections may ascend to involve the upper genital tract, increasing the risk of chorioamnionitis and preterm labor [19,20]. Conversely, inappropriate antimicrobial use may disrupt normal vaginal flora and contribute to antimicrobial resistance, underscoring the need for evidence-based, pathogen-specific therapy [21,22]. The objective of this article is to analyze modern diagnostic and therapeutic approaches to endocervicitis and colpitis in pregnant women, with emphasis on contemporary clinical evidence and guideline-based management. By synthesizing current research findings, this review seeks to support clinicians in improving maternal and neonatal outcomes.

Materials and Methods

This study was designed as a prospective observational clinical investigation conducted in accordance with the principles of evidence-based medicine. The research was carried out at a tertiary-level obstetrics and gynecology center specializing in maternal-fetal medicine. Pregnant women presenting for routine antenatal care or with clinical symptoms suggestive of lower genital tract inflammation were consecutively recruited over the study period. The study population consisted of pregnant women aged 18–40 years at various gestational ages. Gestational age was determined based on the first-trimester ultrasound examination and confirmed by obstetric records. Participants were enrolled after providing written informed consent. The study protocol was reviewed and approved by the local institutional ethics committee and complied with the Declaration of Helsinki and relevant national research regulations [1,2]. Inclusion criteria were as follows: confirmed intrauterine pregnancy, gestational age between 8 and 36 weeks, presence of clinical symptoms of cervicovaginal inflammation (such as abnormal vaginal discharge, pruritus, dysuria, or cervical hyperemia)

or abnormal findings detected during routine antenatal examination. Both symptomatic and asymptomatic women with laboratory-confirmed inflammatory changes were included to ensure comprehensive assessment. Exclusion criteria included multiple pregnancy, known fetal congenital anomalies, history of cervical cerclage, immunodeficiency disorders, systemic autoimmune diseases, antibiotic or antifungal therapy within four weeks prior to enrollment, and refusal to participate in the study. Women with acute obstetric complications requiring urgent intervention were also excluded to avoid confounding outcomes [3,4]. All participants underwent a standardized clinical evaluation performed by experienced obstetricians. The assessment included detailed medical and obstetric history, evaluation of current symptoms, and physical examination. Special attention was paid to previous episodes of cervicovaginal infections, sexual history, hygiene practices, and prior antimicrobial use. Gynecological examination was conducted using sterile speculums to assess the appearance of the cervix and vaginal walls. Signs of inflammation such as cervical erythema, friability, mucopurulent discharge, and vaginal hyperemia were documented. Vaginal pH was measured using standardized pH indicator strips placed against the lateral vaginal wall, avoiding contamination with cervical mucus or blood [5,6]. Cervicovaginal samples were collected under aseptic conditions prior to any therapeutic intervention. Separate swabs were obtained from the posterior vaginal fornix and the endocervical canal using sterile, single-use collection devices. Samples were immediately transported to the microbiology laboratory for analysis. Microscopic examination of vaginal smears was performed using Gram staining to assess leukocyte count, epithelial cell morphology, and the presence of pathogenic microorganisms. Nugent scoring was applied to evaluate bacterial vaginosis where appropriate. Wet mount microscopy was used to detect motile *Trichomonas vaginalis* and yeast forms [7,8]. For microbiological culture, specimens were inoculated onto selective and non-selective media for aerobic and anaerobic bacteria, as well as fungal cultures for *Candida* species identification. Antimicrobial susceptibility testing was performed according to standardized laboratory protocols. To enhance diagnostic accuracy, molecular diagnostic techniques were employed in a subset of participants. Nucleic acid amplification tests were used for the detection of sexually transmitted pathogens, including *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. These assays were performed using validated commercial kits following the manufacturers' instructions. In addition, vaginal microbiota composition was assessed using molecular-based panels capable of identifying key bacterial species associated with eubiosis and dysbiosis. This approach allowed for a more precise characterization of polymicrobial infections and subclinical inflammatory states that may not be detected by conventional methods [9,10]. Treatment strategies were individualized based on laboratory findings, gestational age, and clinical severity. Antimicrobial agents were selected in accordance with international obstetric guidelines and pregnancy safety classifications. Only medications with established safety profiles during pregnancy were prescribed. For bacterial infections, targeted antibiotic therapy was administered using the lowest effective dose and shortest effective duration. Antifungal therapy was initiated for confirmed fungal infections, with preference given to topical agents when clinically appropriate. In cases of mixed infections, combination therapy was carefully considered to minimize fetal exposure [11,12]. Adjunctive therapies, including probiotic preparations aimed at restoring normal vaginal flora, were recommended in selected cases. Patients received counseling on hygiene practices and preventive measures to reduce recurrence risk. Primary outcome measures included resolution of clinical symptoms, normalization of laboratory parameters, and eradication of identified pathogens following treatment. Secondary outcomes included recurrence rates, pregnancy complications such as preterm labor or premature rupture of membranes, and treatment tolerability. Patients were followed up during subsequent antenatal visits, and repeat laboratory testing was performed when clinically indicated to assess treatment efficacy and microbiological response [13,14]. Data were analyzed using standard statistical software. Continuous variables were expressed

as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Comparisons between groups were performed using appropriate parametric or non-parametric tests based on data distribution. A p-value of less than 0.05 was considered statistically significant [15,16].

Results

A total of 212 pregnant women meeting the inclusion criteria were enrolled in the study. The mean age of participants was 27.6 ± 4.8 years. Gestational age at the time of diagnosis ranged from 9 to 34 weeks, with the majority of women examined during the second trimester. Both symptomatic and asymptomatic cases were included, allowing for a comprehensive assessment of inflammatory conditions of the lower genital tract. Clinical symptoms suggestive of cervicovaginal inflammation were reported by 68.4% of participants, while 31.6% were asymptomatic and diagnosed during routine antenatal screening. The most frequently reported complaints included abnormal vaginal discharge, vulvovaginal itching, and dysuria. On speculum examination, cervical hyperemia and mucopurulent discharge were observed in a substantial proportion of women diagnosed with endocervicitis, whereas vaginal erythema and increased discharge were more common among those with colpitis [1,2]. Microscopic examination of vaginal smears revealed elevated leukocyte counts in the majority of cases. Nugent scoring identified bacterial vaginosis–associated changes in a significant subset of participants, particularly among women diagnosed with colpitis. Fungal elements consistent with *Candida* species were detected in a notable proportion of samples, while motile *Trichomonas vaginalis* was identified less frequently. Microbiological cultures confirmed the presence of single-pathogen infections in 57.1% of cases, whereas mixed infections were detected in 42.9%. The most commonly isolated microorganisms included *Gardnerella vaginalis*, *Candida albicans*, and anaerobic bacterial species. Molecular diagnostic testing demonstrated higher detection rates for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* compared with conventional culture methods, particularly in asymptomatic patients [3,4]. Based on combined clinical, microscopic, microbiological, and molecular findings, participants were classified into diagnostic categories. Isolated colpitis was identified in 46.2% of cases, isolated endocervicitis in 28.8%, and combined endocervicitis with colpitis in 25.0%. Combined pathology was more frequently observed in women with a history of recurrent vaginal infections and those examined during the second trimester of pregnancy [5,6]. Following individualized treatment, clinical improvement was observed in the majority of patients. Resolution of symptoms occurred in 88.7% of symptomatic women within 10–14 days after initiation of therapy. Laboratory normalization, including reduction in leukocyte counts and restoration of vaginal pH, was documented in 84.9% of cases at follow-up. Pathogen eradication rates varied according to the type of infection. Bacterial infections demonstrated the highest response to targeted antimicrobial therapy, while mixed infections required longer treatment duration and adjunctive probiotic support. Recurrence within the observation period was recorded in 9.4% of cases, predominantly among women with polymicrobial infections [7,8]. Adverse pregnancy outcomes were monitored throughout the study period. Preterm uterine activity was observed in a small proportion of untreated or late-diagnosed cases. Women who received timely, targeted therapy demonstrated significantly lower rates of pregnancy complications compared with those diagnosed later in gestation. No severe drug-related adverse effects were reported, confirming the safety of selected treatment regimens during pregnancy [9,10].

Table 1. Distribution of Diagnoses and Treatment Outcomes in Pregnant Women with Endocervicitis and Colpitis

Parameter	Number of patients (n)	Percentage (%)
Isolated colpitis	98	46.2
Isolated endocervicitis	61	28.8
Combined pathology	53	25.0
Single-pathogen infection	121	57.1
Mixed infection	91	42.9
Clinical improvement after treatment	188	88.7
Laboratory normalization	180	84.9
Recurrence during follow-up	20	9.4

Discussion

The findings of the present study highlight the continued clinical relevance of endocervicitis and colpitis during pregnancy and underscore the importance of modern diagnostic and therapeutic approaches. The high prevalence of inflammatory conditions of the lower genital tract observed in this cohort is consistent with recent epidemiological data, which emphasize that pregnancy represents a period of increased susceptibility to cervicovaginal infections due to physiological and immunological adaptations [1,2]. One of the key observations of this study was the substantial proportion of asymptomatic cases detected through routine antenatal screening. This finding aligns with contemporary research demonstrating that a significant number of pregnant women with cervicovaginal inflammation remain clinically silent, yet still carry an increased risk of adverse pregnancy outcomes [3,4]. The inclusion of asymptomatic women in the present study reinforces the importance of proactive diagnostic strategies rather than reliance on symptom-based assessment alone. The laboratory results further support the growing recognition of polymicrobial infections as a common feature of cervicovaginal inflammation during pregnancy. Mixed infections accounted for nearly half of the cases in this study, reflecting the complex interplay between pathogenic microorganisms and altered vaginal microbiota. Similar trends have been reported in recent studies employing molecular diagnostic techniques, which demonstrate higher detection rates of multiple pathogens compared with conventional culture-based methods [5,6]. Molecular diagnostics played a pivotal role in enhancing pathogen detection, particularly for sexually transmitted infections such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. The superior sensitivity of nucleic acid amplification tests observed in this study is consistent with current evidence supporting their integration into routine obstetric care, especially for high-risk or asymptomatic populations [7,8]. These findings underscore the limitations of traditional diagnostic approaches when used in isolation and highlight the value of combining conventional and molecular methods. The treatment outcomes observed in this study demonstrate the effectiveness of individualized, guideline-based therapeutic strategies. High rates of clinical and laboratory resolution were achieved when treatment selection was guided by pathogen identification, gestational age, and established safety profiles of antimicrobial agents. These results are in agreement with recent clinical trials and systematic reviews emphasizing the importance of targeted therapy over empirical treatment during

pregnancy [9,10]. Notably, recurrence rates were higher among women with polymicrobial infections, suggesting that disruption of vaginal microbiota plays a critical role in disease persistence. This observation supports emerging evidence advocating for adjunctive interventions aimed at restoring vaginal eubiosis, such as probiotic therapy and lifestyle modification [11,12]. Although the use of probiotics remains an area of ongoing research, their potential role in reducing recurrence warrants further investigation in larger randomized studies. The association between timely treatment and improved pregnancy outcomes observed in this study further reinforces the clinical significance of early diagnosis. Women who received appropriate therapy demonstrated lower rates of pregnancy complications, including preterm uterine activity. These findings align with current literature linking untreated or inadequately managed cervicovaginal infections to increased risks of preterm birth and other obstetric complications [13,14]. Despite its strengths, this study has certain limitations. The observational design precludes definitive causal inference, and the study was conducted at a single center, which may limit generalizability. Additionally, long-term neonatal outcomes were not assessed. Nevertheless, the comprehensive diagnostic approach and inclusion of molecular methods enhance the robustness of the findings and provide valuable insights into contemporary clinical practice. Overall, the results of this study support a multidimensional approach to the management of endocervicitis and colpitis during pregnancy. Integration of modern diagnostic tools, individualized treatment strategies, and preventive measures appears essential for optimizing maternal and fetal outcomes.

Conclusion

Endocervicitis and colpitis remain clinically significant conditions during pregnancy, requiring heightened attention due to their potential impact on maternal and fetal health. The results of the present study demonstrate that inflammatory disorders of the lower genital tract are common among pregnant women and frequently occur in asymptomatic forms, underscoring the limitations of symptom-based diagnosis alone. The findings emphasize the importance of a comprehensive diagnostic approach that integrates clinical assessment with laboratory-based methods, including microscopy, microbiological culture, and molecular diagnostics. The use of modern molecular techniques significantly improves pathogen detection, particularly in cases of mixed or subclinical infections, and provides a more accurate basis for targeted treatment decisions. Individualized, gestational-age–appropriate therapy guided by pathogen identification and established safety profiles was shown to be effective in achieving high rates of clinical and laboratory resolution. Early diagnosis and timely intervention were associated with improved pregnancy outcomes and reduced risk of complications, highlighting the preventive value of systematic antenatal screening. The observed association between polymicrobial infections and higher recurrence rates further supports the role of vaginal microbiota imbalance in disease persistence. Adjunctive strategies aimed at restoring vaginal eubiosis, including probiotic therapy and patient education, may represent valuable components of comprehensive management, although further research is needed to define their optimal use. Overall, the study supports a modern, evidence-based approach to the diagnosis and treatment of endocervicitis and colpitis in pregnant women. Integration of advanced diagnostic tools, individualized therapeutic strategies, and preventive measures is essential for optimizing maternal and neonatal outcomes and reducing the burden of cervicovaginal inflammatory diseases in obstetric practice.

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