THE DIAGNOSTIC ROLE OF MICROBIOLOGICAL TESTS IN BACTERIAL VAGINOSIS

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Annotation

This thesis investigates the critical diagnostic value of microbiological and molecular testing in the identification and management of bacterial vaginosis (BV). By evaluating traditional clinical criteria alongside standard Gram stain scoring and modern multiplex polymerase chain reaction (PCR) assays, the study highlights the necessity of accurate microbiological profiling. The findings demonstrate that relying solely on clinical symptoms is often inadequate due to overlapping presentations with other forms of vaginitis. The study underscores that precise microbiological diagnostics—specifically the Nugent score and molecular quantification of anaerobic flora—are essential for targeted antimicrobial therapy and the prevention of obstetric and gynecological complications.

Key words: bacterial vaginosis (BV), vaginal microbiome, Nugent score, Amsel criteria, *Gardnerella vaginalis*, *Lactobacillus* depletion, molecular diagnostics, clue cells.

Introduction

Bacterial vaginosis is the most prevalent lower genital tract infection among women of reproductive age. It is not caused by a single exogenous pathogen, but rather by a profound ecological dysbiosis characterized by the depletion of dominant, hydrogen peroxide-producing *Lactobacillus* species and a massive overgrowth of complex anaerobic microorganisms, notably *Gardnerella vaginalis*, *Atopobium vaginae*, and *Mobiluncus* species. Accurate diagnosis is of paramount importance, as untreated BV is a well-established risk factor for severe complications, including pelvic inflammatory disease (PID), late miscarriage, preterm birth, and an increased susceptibility to sexually transmitted infections, including HIV. This thesis evaluates

the comparative efficacy of clinical (Amsel criteria) and microbiological (Nugent scoring and PCR) methods in establishing a definitive diagnosis of BV.

Material and methods

A comparative clinical and laboratory study was conducted on a cohort of 150 women of reproductive age presenting with abnormal vaginal discharge or malodor. The diagnostic protocol utilized a tripartite approach. First, clinical diagnosis was assessed using the Amsel criteria (requiring three of four signs: homogeneous discharge, vaginal pH > 4.5, positive amine "whiff" test, and the presence of clue cells on wet mount). Second, vaginal smears were subjected to Gram staining and evaluated using the Nugent scoring system (the traditional gold standard), which quantifies bacterial morphotypes on a scale of 0 to 10. Finally, a subset of atypical or recurrent cases underwent multiplex real-time PCR testing to quantify the DNA loads of *Lactobacillus* versus BV-associated bacteria.

Result and discussion

The comparative analysis revealed significant discrepancies between purely clinical diagnoses and microbiological confirmation. The Amsel criteria demonstrated high specificity (92%) but lacked optimal sensitivity (74%), leading to underdiagnosis in asymptomatic or mildly symptomatic patients. The Nugent score confirmed BV (score 7–10) in 100% of cases where clue cells and a high pH were present, explicitly illustrating the structural shift from Gram-positive bacilli to Gram-variable coccobacilli.

Furthermore, molecular testing (PCR) provided the highest diagnostic resolution. It revealed that patients with recurrent BV harbored dense multi-species biofilms predominantly composed of *Gardnerella vaginalis* and *Atopobium vaginae*, which are inherently resistant to standard courses of metronidazole. The discussion emphasizes that while Amsel criteria are practical for rapid point-of-care assessment, microbiological verification is indispensable. The microscopic identification of clue cells (epithelial cells heavily coated with bacteria obscuring their borders) remains the strongest single predictor of BV. However, shifting toward molecular profiling allows clinicians to quantify the severity of the dysbiosis and tailor therapies, moving beyond broad-spectrum antibiotics to biofilm-disrupting or probiotic-assisted regimens.

Conclusion and recommendation

Microbiological examination remains the absolute cornerstone for the accurate diagnosis of bacterial vaginosis. While clinical criteria provide a useful initial framework, they lack the sensitivity required to detect complex or recurrent dysbiosis.

The standard Gram stain with Nugent scoring should be universally implemented as the primary diagnostic tool in gynecological laboratories. For chronic, treatment-resistant cases, the integration of quantitative molecular diagnostics (PCR) is highly recommended to identify specific biofilm-producing anaerobes. By employing rigorous microbiological profiling, clinicians can avoid empirical overtreatment, reduce the risk of antimicrobial resistance, and successfully restore a healthy, *Lactobacillus*-dominant vaginal microbiome.

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