PREDICTION OF RECURRENCE IN BACTERIAL VAGINOSIS AND VULVOVAGINAL CANDIDIASIS IN REPRODUCTIVE AGE WOMEN

Gulnora Toshtemirovna Rabbimova –

Associate Professor, Department of Obstetrics and Gynecology No. 2, PhD,

Samarkand State Medical University

Republic of Uzbekistan.

Abstract. Recurrent bacterial vaginosis (RBV) and recurrent vulvovaginal candidiasis (RVVC) are common and challenging conditions among reproductive-age women, characterised by high rates of relapse, associated morbidity, and adverse psychosocial impact. This review examines key prognostic factors for recurrence in both RBV and RVVC, explores underlying microbiological and host mechanisms, and discusses strategies for prediction and prevention of recurrence. Understanding risk factors such as sexual behaviour, microbial biofilm formation, partner treatment, and host immune response may enable more effective personalised management of recurrence in reproductive-age women.

Keywords: bacterial vaginosis; vulvovaginal candidiasis; recurrence; prognostic factors; reproductive-age women; biofilm; microbiome

Introduction. Bacterial vaginosis (BV) and vulvovaginal candidiasis (VVC) are among the most frequent vaginal disorders in women of reproductive age. While initial episodes are treatable, recurrence remains a major gap in care. Recurrent BV (commonly defined as ≥ 3–4 episodes per year) and RVVC (≥ 4 episodes per

year) affect quality of life and may increase risks of adverse reproductive outcomes. For this reason, prediction of recurrence is of clinical importance. This review aims to summarise current evidence on predictors of recurrence for BV and VVC, highlight overlapping and distinct mechanisms, and discuss clinical implications for risk stratification and prevention.

Prognostic factors in recurrent bacterial vaginosis. A number of epidemiological studies have characterised risk factors for BV recurrence. A systematic review and meta-analysis found that new or multiple male sexual partners increased the risk of BV (relative risk ~1.6 for new/multiple male partners; ~2.0 for any female partners) and that condom use was protective (RR ~0.8) (1,2).

In a retrospective case-control study of RBV, only African-American ethnicity and having more than one male partner in the prior two years were significantly associated with recurrence, whereas other behaviours (douching, intrauterine device use, tub baths, smoking) were not associated in that sample (5).

Other factors reported in the literature include: lack of Lactobacillus dominance in the vaginal microbiome, presence of biofilm-forming bacteria such as Gardnerella vaginalis and Atopobium vaginae, antibiotic disruption of flora, smoking, hormonal changes, and partner reinfection (3). For prediction of recurrence, practical factors include sexual partner factors, microbiome characteristics (low Lactobacillus, high diversity anaerobes), history of prior episodes, and treatment adherence. Moreover, biofilm formation and microbial resilience are increasingly recognised as mechanisms underlying early recurrence (3).

Prognostic factors in recurrent vulvovaginal candidiasis. RVVC is defined as four or more clinically confirmed episodes within 12 months. According to a

Cochrane review, RVVC affects up to 5% of women and is challenging to prevent. Evidence on interventions to reduce recurrence is of low certainty (0search0). A systematic review highlighted that persistence of the same strain (relapse) accounts for approximately 59% of RVVC cases, while reinfection with new strains comprises the remainder (9). Key host-related risk factors include obesity, comorbid vulvar conditions, age ≥ 40, and imperfect maintenance therapy (6,8). Non-albicans Candida species, biofilms, and antifungal resistance further complicate prognosis (4,9).

In terms of prediction, important factors are: prior number of episodes, presence of non-albicans species, evidence of biofilm, host immune or anatomical vulnerability (e.g., diabetes, immunosuppression), and suboptimal maintenance prophylaxis.

Shared mechanisms and comparative insights. Although BV and VVC have distinct microbiological etiologies – BV relating to dysbiosis and anaerobic overgrowth, whereas VVC involves Candida overgrowth – both share common features that influence recurrence risk: microbial biofilms, impaired host vaginal immunity, microbiome disruption (e.g., after antibiotic exposure), sexual partner influence, and behavioural factors. For example, recurrence in both may reflect persistence of pathogenic forms (biofilm-protected) or reinfection from partners or self-colonised niches.

Therefore, prediction of recurrence may benefit from integrated assessment of: (i) baseline microbial profile (Lactobacillus dominance vs high diversity; presence of Candida non-albicans); (ii) behavioural factors (sexual partners, hygiene practices); (iii) host factors (obesity, diabetes, immune status); (iv) treatment factors (adequacy of induction and maintenance therapy, partner treatment). A risk-scoring approach may be feasible.

Clinical implications and prevention of recurrence. From a prognostic perspective, clinicians should stratify patients by recurrence risk: reproductive-age women with histories of multiple episodes, high-risk behaviours, partner change, microbiome disruption or comorbid conditions (e.g., diabetes) should be offered enhanced monitoring and preventive strategies.Key preventive strategies include: partner treatment or counselling (especially for BV), extended maintenance therapy (for RVVC, e.g., weekly fluconazole for six months, though data remains sub-optimal) (9,10), probiotic or microbiome-restorative interventions, avoidance of douching or disruptive behaviours, smoking cessation, and strict management of comorbidities (e.g., glycaemic control in diabetic women). Future prognostic models should incorporate microbiome biomarkers (e.g., Lactobacillus crispatus dominance, presence of biofilm-forming species) and host immune markers for more personalised prevention. Research into novel interventions (e.g., biofilm disruptors, partner-directed therapy) is warranted.

Conclusion. Recurrence of bacterial vaginosis and vulvovaginal candidiasis in reproductive-age women is driven by multifactorial mechanisms involving host, microbial, behavioural and treatment-related factors. Recognising and stratifying these risk elements allows better prediction of recurrence and facilitates targeted preventive care. Further large-scale prospective studies are needed to validate risk-prediction models and test interventions tailored to high-risk women.

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