

Bacterial vaginosis: An overview

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Abstract

Bacterial vaginosis (BV) is a commonly-occurring and well-studied cause of vaginal discharge. It is characterised by typical and unsettling symptoms, with an array of risk factors and complications associated with the condition. Treatment is aimed at reducing symptoms and preventing any further complications or infections. This paper is intended to provide a review of recent information on the pathophysiology, an overview of the clinical presentation, complications and treatment of bacterial vaginosis.

Keywords: bacterial vaginosis, biofilm, anaerobes, metronidazole, clindamycin

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Introduction

Bacterial vaginosis is a common condition caused by an overgrowth of bacteria in the vagina, known to affect a lot of women all around the world.¹ Discoveries on the cause and clinical presentation have expanded the knowledge of health practitioners regarding the disease, leading to therapy discovery and advancement, effective patient education, and ultimately improving the quality of life of the patient.¹ BV is the most common cause amongst all the known causes of vaginal discharge and is characterised by a malodorous vaginal discharge, in women of childbearing age.² Those patients most severely affected experience an offensive, fishy-smelling discharge, which recurs frequently, often around the time of menstruation.^{1,2} In others, bacterial vaginosis may be transient and asymptomatic in nature.^{1,2} The condition usually responds to treatment with antibiotics but can relapse rapidly; the reported rates of relapse are more than 50% within 3–6 months.² This points to the fact that there is a need for alternatives to antibiotics and to find a way to intercept relapses.^{1,2} Bacterial vaginosis is very common, but its exact prevalence varies and depends on the patient population in question.^{1,2} It may be diagnosed both clinically and microbiologically.^{1,2} Some recent studies imply that it is sexually transmitted, with more pathogenic strains of *Gardnerella vaginalis* being identified and recovered in the male partners of females diagnosed with bacterial vaginosis.^{1,2} It was also stated to be a risk factor in people having multiple sexual partners. In contrast, early studies reported findings of an estimated 12% of virgin female participants diagnosed with bacterial vaginosis showing that the disease can be seen in females who have not had sexual intercourse.^{1,2}

Pathophysiology

The presence of so-called vaginal clue cells, which are squamous epithelial cells coated with the anaerobic Gram-variable *Gardnerella vaginalis*, and other anaerobic bacteria, points to a

diagnosis of bacterial vaginosis.³ The description and occurrence of clue cells have been consistent in the studies of bacterial vaginosis, and also recognised in the Amsel criteria, which is widely regarded as a highly effective tool in diagnosing bacterial vaginosis.³ *Gardnerella* species have been implicated in samples of cells coated with Gram-variable bacilli.³ With advances in microbiological techniques, it has been possible to demonstrate, in non-specific vaginitis, a change of vaginal micro-flora, which forms the basis of the pathophysiology of the disease.⁴ Evidence has shown that a wide variety of pathogenic bacteria may be associated with this condition. These include *Mobiluncus*, *Bacteroides* species, Peptostreptococci and *Mycoplasma*, as well as *Gardnerella vaginalis*, *Ureaplasma urealyticum*, *Streptococcus viridans* and *Atopobium vaginae*.⁵

The characteristics of the vaginal microbiota are known to undergo changes over the course of a female's lifetime, and the nature of these changes may be influenced or modulated by a wide variety of factors. These include hereditary predisposition, as well as the levels of circulating oestrogen in her bloodstream.⁶ Also refer to the common risk factors listed in Table I.

The role that vaginal *Lactobacilli* can play as a boundary of defence against various vaginal pathogens, has also been elucidated.^{5,6,7} It has been shown that vaginal *Lactobacilli* produce hydrogen peroxide (H₂O₂), a unique characteristic that allows these organisms to sustain a vigorous and healthy vaginal microbiota. Studies have shown this critical process to be abated in a patient with bacterial vaginosis.^{5,6,7}

Hydrogen peroxide-producing *Lactobacilli* have been shown to provide quite considerable support in the prevention of increased concentrations of the potentially pathogenic anaerobes that are habitually present in the vaginal flora.^{5,6,7} With a loss of *Lactobacilli*, the vaginal pH becomes more alkaline and much higher concentrations of vaginal anaerobes start to appear.⁷

Subsequently, the multiplying anaerobes start to produce an abundance of proteolytic carboxylase enzymes, which break down vaginal peptides into a range of unstable, volatile amines that are ill-smelling. This is accompanied by increased vaginal transudation and squamous epithelial cell exfoliation.⁷ These signs form part of the typical clinical appearance of patients with bacterial vaginosis.⁸

It has been suggested by many studies with significantly increasing evidence,⁹ that *G. vaginalis* is the main pathogen that causes BV. In addition, it has recently been supported that the development of a biofilm may be a required component of this process of developing a gradual overgrowth of stable anaerobic vaginal flora.^{9,10} A cohesive form of *G. vaginalis* adheres to the vaginal epithelium and then forms the framework to which other species attach.¹¹ *G. vaginalis* accounts for 90% of the bacteria in the biofilm of the microbiota on the epithelial surfaces of vaginal biopsy specimens, while *Atopobium vaginae* made up most of the remainder.^{12,13}

The associated risk factors, clinical features and possible complications of bacterial vaginosis are summarised in Table I.

Management and treatment of bacterial vaginosis

Antibiotics are the mainstay of therapy for symptomatic BV, but asymptomatic women with *Gardnerella vaginalis* colonisation do not need treatment.¹⁵

Goals of treatment

The main treatment goals in this setting are¹⁵:

- Relief of symptoms in women with symptomatic infection.
- Prevention of postoperative infection in those with asymptomatic infection prior to abortion or hysterectomy.

Non-pregnant women

In non-pregnant women with symptomatic BV, the following course of treatment is typically recommended^{19,20}:

- A single dose of 2 gram of metronidazole can be used, but metronidazole 400 mg orally, twice daily for five days is more effective **OR**
- Metronidazole gel 37.5 mg/5 gram (one full applicator) intravaginally, daily at night for five days **OR**
- Clindamycin cream 20 mg/gram (one full applicator) intravaginally at bedtime, daily for seven days.

Alternatively, the following may also be considered:

- Clindamycin 300 mg orally, twice daily for seven days **OR**
- Clindamycin ovule (vaginal suppository) 100 mg intravaginally, once daily for three days **OR**
- Tinidazole 2 gram orally for two days **OR**
- Tinidazole 1 gram orally, once daily for five days.

Pregnant women

The treatment options during pregnancy are as follows^{20,21}:

- Metronidazole 400 mg orally, twice daily for seven days **OR**
- Metronidazole 200 mg orally, three times daily for seven days **OR**
- Clindamycin 300 mg orally, twice daily.

Metronidazole is considered safe even in the first trimester and does not appear to contribute to low birth weight, premature birth, or birth defects.²⁰

Breastfeeding women

Women with symptomatic BV who are breastfeeding should be treated. Of note, clindamycin has the potential to cause adverse effects on the breastfed infant's gastrointestinal flora, so the infant should be monitored for diarrhoea, candidiasis (thrush, diaper rash) or, rarely, blood in the stool, indicating possible antibiotic-associated colitis. Clindamycin vaginal cream is preferred for use in breastfeeding women, because of the lower incidence of unwanted systemic effects.²²

Sexual partners

There is no data to support the treatment of asymptomatic sexual partners.²³ It is not necessary to treat male sexual partners of affected women, because there seems to be a lack of robust evidence that the woman's response to therapy, and the associated risk of relapse, may be influenced by the treatment of her male sexual partner.²³ However, some studies have reported reduced rates of recurrence when male sexual partners used condoms routinely during coitus or when women remained abstinent.²³

Conclusion

Bacterial vaginosis (BV) is a commonly-occurring condition of the female sexual tract, mostly associated with the overgrowth of pathogenic, anaerobic bacteria in the presence of a suitable biofilm, an adverse change in the vaginal pH, or a lack of H₂O₂-producing *Lactobacilli* in the vagina. Symptomatic BV warrants

Table I. Associated risk factors, clinical features and possible complications of bacterial vaginosis¹⁴⁻¹⁸

Associated risk factors	Clinical features	Possible complications
<ul style="list-style-type: none"> • Recent antibiotic use. • Decreased oestrogen production. • Wearing an intrauterine device (IUD). • Douching. • Sexual activity that could lead to transmission (e.g. having a new sexual partner or a recent increase in the number of sexual partners). 	<ul style="list-style-type: none"> • Vaginal odour (the most common symptom of BV, often recognised only after sexual intercourse. The alkalinity of semen may cause a release of volatile amines from the vaginal discharge and cause a fishy odour. • Mildly to moderately increased vaginal discharge. • Vulvar irritation (less common). • Dysuria or dyspareunia (rare). 	<ul style="list-style-type: none"> • Preterm delivery in pregnant women. • Low birthweight babies. • Pelvic inflammatory disease (PID). • Post-abortion sepsis. • Post-Caesarean section endometritis. • Herpes simplex virus type 2 (HSV-2). • Gonorrhoea. • Chlamydia and <i>Trichomonas</i> infection. • Increased rates of HIV acquisition.

proper antibiotic treatment, either locally or systemically, even in pregnant women and breastfeeding mothers. Effective treatment will reduce the likelihood of complications and provide much-needed relief of the unpleasant symptoms associated with this condition.

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