



Original Article

Prevalence and Associated Risk Factors of Bacterial Vaginosis Among Reproductive-Aged Women Attending a Gynecology Outpatient Department: A Cross-Sectional Study

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Received: 03-02-2026

Accepted: 05-03-2026

Available online: 22-03-2026

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Medical and Pharmaceutical Research

ABSTRACT

Background: Bacterial vaginosis (BV) is the most common cause of vaginal discharge among women of reproductive age and is associated with significant reproductive and gynecological morbidity. Despite its high prevalence, it often remains underdiagnosed, particularly in outpatient settings.

Objectives: To determine the prevalence and associated risk factors of bacterial vaginosis among women aged 15–45 years attending a gynecology outpatient department.

Materials and Methods: This hospital-based cross-sectional study was conducted among 120 women attending the gynecology outpatient department of a multispecialty hospital. Data on socio-demographic characteristics, reproductive history, and behavioral factors were collected using a structured questionnaire. Clinical examination and laboratory evaluation were performed, and BV was diagnosed using Amsel's criteria. Descriptive statistics were used for analysis.

Results: The prevalence of Bacterial vaginosis was 9.2%. The highest prevalence was observed in women aged 25–35 years. BV was more common among symptomatic women (14%) compared to asymptomatic women (6%). A higher prevalence was noted among women not using contraception and those with longer duration of cohabitation. Elevated vaginal pH, presence of clue cells, and positive amine test showed strong association with BV.

Conclusion: Bacterial vaginosis is a common yet under-recognized condition among reproductive-aged women. Routine screening using simple clinical methods such as Amsel's criteria, along with awareness and preventive strategies, can help reduce associated morbidity.

Keywords: Bacterial vaginosis (BV); Prevalence; Risk factors; Amsel criteria; Vaginal discharge; Reproductive age.

INTRODUCTION

Bacterial vaginosis (BV) is the most common cause of vaginal discharge among women of reproductive age worldwide and represents a significant public health concern. It accounts for nearly 40–50% of cases of abnormal vaginal discharge and is characterized by an imbalance in the normal vaginal microbiota, with depletion of hydrogen peroxide-producing lactobacilli and overgrowth of anaerobic organisms such as *Gardnerella vaginalis*, *Prevotella* species, and *Mobiluncus* species (1).

The vaginal ecosystem plays a crucial role in maintaining genital tract health. Lactobacilli help maintain an acidic vaginal pH and prevent colonization by pathogenic organisms. In BV, this protective mechanism is disrupted, resulting in elevated

vaginal pH and proliferation of anaerobic bacteria, leading to production of volatile amines responsible for the characteristic malodorous discharge (2).

Globally, the prevalence of BV varies widely, ranging from 10% to 50% depending on the population studied, with higher rates observed in low- and middle-income countries (3). Recent studies suggest that BV affects nearly one-third of women of reproductive age, making it one of the most prevalent gynecological conditions worldwide (4). Despite its high prevalence, BV remains underdiagnosed, especially in resource-limited settings.

A notable feature of BV is that approximately 50–75% of affected women are asymptomatic, which contributes to delayed diagnosis and increased risk of complications (5). Asymptomatic BV is clinically important as it has been associated with increased susceptibility to sexually transmitted infections, including human immunodeficiency virus (HIV), herpes simplex virus, and *Chlamydia trachomatis* infection (6,7).

BV is also associated with adverse reproductive and obstetric outcomes. Studies have demonstrated its association with pelvic inflammatory disease, post-operative infections, and infertility (8). In pregnant women, BV has been linked to preterm labor, premature rupture of membranes, and low birth weight infants (9).

The etiology of BV is multifactorial and not completely understood. Several behavioral and biological factors have been implicated, including multiple sexual partners, early sexual debut, unprotected intercourse, vaginal douching, and smoking (10). Use of barrier contraception appears to be protective, while certain contraceptive practices and hygiene behaviors may influence the risk of BV (11).

Diagnosis of BV in clinical practice is commonly based on Amsel's criteria, which include homogeneous vaginal discharge, elevated vaginal pH (>4.5), positive amine (whiff) test, and presence of clue cells on microscopy (12). Although Gram stain using Nugent scoring is considered the gold standard, it is not always feasible in routine outpatient settings, especially in developing countries (13).

In India, available data on BV are limited and largely restricted to high-risk groups or community-based studies. There is a paucity of hospital-based studies evaluating BV among the general population attending gynecology outpatient departments (14). Understanding the prevalence and associated risk factors in this population is essential for developing effective screening and preventive strategies.

Given the high burden of disease, its asymptomatic nature, and associated complications, early identification of BV is crucial. Therefore, the present study was undertaken to determine the prevalence and associated risk factors of bacterial vaginosis among reproductive-aged women attending a gynecology outpatient department.

MATERIALS AND METHODS:

Study Design

This was a hospital-based descriptive cross-sectional study conducted to determine the prevalence and associated risk factors of bacterial vaginosis among reproductive-aged women.

Study Setting

The study was carried out in the Department of Obstetrics and Gynaecology at a multispecialty hospital in Chennai, India. The hospital caters to a diverse population, including patients from both urban and semi-urban backgrounds.

Study Duration

The study was conducted over a period of eight months, from September 2013 to April 2014.

Study Population

A total of 120 women aged between 15 and 45 years attending the gynecology outpatient department (OPD) during the study period were included. Both symptomatic and asymptomatic women were enrolled after applying eligibility criteria.

Sample Size

This was a time-bound study, and all eligible participants presenting during the study period were included, resulting in a final sample size of 120 participants.

Inclusion Criteria

- Women aged 15–45 years
- Women attending the gynecology OPD
- Both symptomatic and asymptomatic individuals

- Willing to provide informed consent

Exclusion Criteria

- Pregnant women
- Women with active vaginal bleeding
- Women who had received antibiotics within the previous two weeks
- Unmarried women

Ethical Considerations

The study protocol was approved by the institutional ethics committee. Informed written consent was obtained from all participants prior to enrollment.

Data Collection Procedure

Data were collected using a pretested structured proforma, which included:

- Socio-demographic details (age, education, religion)
- Obstetric and gynecological history
- Sexual and marital history
- Contraceptive practices
- Presenting complaints (e.g., vaginal discharge, itching, odor)

All participants were interviewed in a language comfortable to them (Tamil or English), ensuring clarity and accuracy of responses.

Clinical Examination

A detailed general and pelvic examination was performed for all participants under aseptic precautions.

- A sterile speculum examination was carried out without the use of antiseptic solutions
- The nature, color, and consistency of vaginal discharge were noted
- The condition of the cervix and vaginal walls was assessed

Sample Collection

Two high vaginal swabs were collected from the posterior fornix of the vagina:

1. **First swab:**
 - Mixed with normal saline
 - Examined under microscope (wet mount) for **clue cells**, *Trichomonas vaginalis*, and fungal elements
2. **Second swab:**
 - Used for **amine (whiff) test** by adding 10% potassium hydroxide (KOH)

Additionally, vaginal pH was measured by applying pH paper to the vaginal discharge.

Diagnostic Criteria for Bacterial Vaginosis

Bacterial vaginosis was diagnosed using Amsel's criteria, and a diagnosis was made when at least three of the following four criteria were present:

1. Homogeneous, thin, greyish-white vaginal discharge
2. Vaginal pH > 4.5
3. Positive amine (whiff) test
4. Presence of clue cells on microscopic examination

Participants were also screened for other infections such as trichomoniasis and candidiasis.

Laboratory Analysis

All laboratory investigations were carried out in the microbiology laboratory of the hospital using standard procedures.

Statistical Analysis

Data collected were entered into Microsoft Excel and analyzed using SPSS version 11.5.

- Descriptive statistics such as frequencies and percentages were calculated
- Results were presented using tables, charts, and graphs
- Associations between variables were interpreted descriptively

RESULTS:

A total of 120 women aged 15–45 years attending the gynecology outpatient department were included in the study. Out of 120 participants, 11 women were diagnosed with bacterial vaginosis, giving an overall prevalence of 9.2%.

The majority of participants belonged to the 25–35 years age group, which also showed the highest prevalence of BV (11%). (Table 1)

Table 1: Age-wise Distribution of Participants and BV Prevalence

Age Group (years)	Total (n)	BV Positive (n)	Percentage (%)
15–25	40	3	7%
25–35	64	7	11%
35–45	16	1	6%
Total	120	11	9.2%

Among the study population, 61 (51%) women presented with symptoms. BV was more common among symptomatic women (14%) compared to asymptomatic women (6%). (Table 2)

Table 2: Association of BV with Symptoms

Symptoms	Total (n)	BV Positive (n)	Percentage (%)
Present	61	8	14%
Absent	59	3	6%
Total	120	11	9.2%

A higher prevalence of BV was observed among women who were not using any contraceptive method (14%). (Table 3)

Table 3: BV Distribution According to Contraceptive Method

Contraception Method	Total (n)	BV Positive (n)	Percentage (%)
None	56	8	14%
Tubal ligation	50	3	6%
IUCD	12	0	0%
Barrier method	1	0	0%
Natural method	1	0	0%
Total	120	11	9.2%

Watery grey discharge was the most common type observed and was frequently associated with BV. (Table 4)

Table 4: BV Distribution Based on Type of Vaginal Discharge

Type of Discharge	Total (n)	BV Positive (n)	Percentage (%)
Watery grey	92	9	10%
Milky white	20	1	5%
Curdy	5	0	0%
Thick white	2	1	50%
Yellow	1	0	0%
Total	120	11	9.2%

Clue cells were present in all BV-positive cases, showing a strong association with the diagnosis. (Table 5)

Table 5: Association of BV with Clue Cells

Clue Cells	Total (n)	BV Positive (n)	Percentage (%)
Present	9	9	100%
Absent	111	2	2%
Total	120	11	9.2%

All patients with a positive amine test were diagnosed with BV, indicating high specificity. (Table 6)

Table 6: Association of BV with Amine Test

Amine Test	Total (n)	BV Positive (n)	Percentage (%)
Positive	3	3	100%
Negative	117	8	7%
Total	120	11	9.2%

All BV cases had vaginal pH greater than 4.5, demonstrating a strong correlation. (Table 7)

Table 7: Association of BV with Vaginal pH

Vaginal pH	Total (n)	BV Positive (n)	Percentage (%)
≤ 4.5	32	0	0%
> 4.5	88	11	13%
Total	120	11	9.2%

Candidiasis was slightly more prevalent than BV, while no cases of trichomoniasis were observed. (Table 8)

Table 8: Distribution of Vaginal Infections

Organism	Number (n)	Percentage (%)
Bacterial vaginosis	11	9.2%
Candidiasis	12	10%
Trichomoniasis	0	0%

BV cases were distributed across all educational levels, with a higher proportion observed in HSE and postgraduate groups. (Table 9)

Table 9: BV Distribution According to Educational Status

Education Level	Total (n)	BV Positive (n)	Percentage (%)
Secondary (SE)	46	3	7%
Higher Secondary (HSE)	27	5	19%
Undergraduate	35	1	3%
Postgraduate	12	2	17%
Total	120	11	9.2%

A higher prevalence of BV was observed among Christian women compared to other groups. (Table 10)

Table 10: BV Distribution According to Religion

Religion	Total (n)	BV Positive (n)	Percentage (%)
Hindu	92	8	9%
Christian	16	3	19%
Muslim	12	0	0%
Total	120	11	9.2%

BV prevalence increased with longer duration of cohabitation. (Table 11)

Table 11: BV Distribution by Duration with Partner

Duration (years)	Total (n)	BV Positive (n)	Percentage (%)
<1	4	0	0%
1–5	55	5	9%
5–10	42	5	12%
10–15	13	0	0%
15–20	6	1	17%
Total	120	11	9.2%

DISCUSSION:

In the present hospital-based cross-sectional study, the prevalence of bacterial vaginosis (BV) was found to be **9.2%**. This prevalence is relatively lower compared to several international and Indian studies, where reported rates range from 10% to 50% depending on the population studied (15,16). The variation in prevalence may be attributed to differences in study settings, diagnostic criteria, and socio-demographic characteristics of the study population.

The highest prevalence of BV in this study was observed in women aged **25–35 years**, which corresponds to the most sexually active period of reproductive life. Similar findings have been reported in other studies, suggesting that sexual activity plays an important role in the pathogenesis of BV (17). Increased exposure to sexual activity, multiple partners, and hormonal factors during this age group may contribute to the disruption of normal vaginal flora.

In the present study, BV was more common among symptomatic women (14%) compared to asymptomatic women (6%). However, a significant proportion of asymptomatic cases was identified, highlighting the silent nature of the disease.

Previous studies have reported that nearly half to three-fourths of BV cases are asymptomatic, emphasizing the importance of routine screening even in the absence of symptoms (18).

A higher prevalence of BV was observed among women not using any contraceptive methods (14%), whereas no cases were reported among users of barrier methods or IUCD. This finding is consistent with previous studies suggesting that barrier contraception may have a protective effect by reducing exposure to pathogenic organisms, while certain contraceptive practices and sexual behaviors may influence vaginal flora (19). Hormonal contraceptives have also been reported to reduce the risk of BV by stabilizing vaginal microbiota.

The present study demonstrated a strong association between clue cells and BV, with all patients showing clue cells being BV positive. This finding supports the role of clue cells as one of the most reliable diagnostic indicators of BV, as reported in earlier studies (20). Similarly, the amine (whiff) test showed high specificity, with all positive cases being associated with BV, which is in agreement with previous research (21).

An important observation in this study was that all BV-positive cases had vaginal pH greater than 4.5, confirming the strong association between elevated vaginal pH and BV. This finding is consistent with established literature, which recognizes vaginal pH as a simple and reliable screening tool for BV, particularly in low-resource settings (22).

The most common clinical presentation among BV-positive patients in this study was watery grey vaginal discharge, which is considered a classical feature of the condition. Similar observations have been reported in previous studies, reinforcing the importance of clinical evaluation in diagnosis (23).

Candidiasis was found to be slightly more prevalent (10%) than BV (9.2%) in the present study, while no cases of trichomoniasis were identified. This variation may reflect differences in regional epidemiology and emphasizes the need for differential diagnosis in patients presenting with vaginal discharge (24).

The study also demonstrated an increasing trend of BV with longer duration of cohabitation, suggesting a possible cumulative effect of sexual exposure and behavioral factors. Similar associations have been reported in earlier studies, indicating that sexual practices and partner-related factors play a significant role in the development of BV (25).

Although the present study provides valuable insights, it has certain limitations. The sample size was relatively small, and the study was conducted in a single hospital setting, which may limit generalizability. Additionally, advanced diagnostic methods such as Nugent scoring were not used, which could have improved diagnostic accuracy.

CONCLUSION:

Bacterial vaginosis is a common condition among reproductive-aged women, with a prevalence of 9.2% in the present study. It was more frequently associated with the sexually active age group, presence of symptoms, lack of contraception, and longer duration of cohabitation.

The presence of asymptomatic cases highlights the need for routine screening. Amsel's criteria remain a simple, cost-effective, and reliable method for diagnosis in outpatient settings.

Early detection and appropriate management, along with awareness and preventive strategies, are essential to reduce the burden and complications associated with bacterial vaginosis.

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