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**Research Article**

# Bacterial Vaginosis Prevalence: Is It Really Common?

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**ABSTRACT**
**Background:** Bacterial vaginosis is a common vaginal dysbiosis that may cause abnormal vaginal discharge, malodour and irritation, although some affected women remain asymptomatic. Clinical symptoms alone cannot reliably distinguish bacterial vaginosis from intermediate vaginal flora or other genital tract conditions.
**Objective:** To determine the prevalence and distribution of Nugent-defined bacterial vaginosis among symptomatic women and assess its association with age, pregnancy status and parity.
**Methods:** This retrospective, record-based cross-sectional study was conducted at a tertiary-care hospital in Riyadh, Saudi Arabia. Electronic clinical and laboratory records of symptomatic women undergoing vaginal swab examination from 1 September 2023 to 31 August 2024 were reviewed. Gram-stained vaginal smears were classified using the Nugent scoring system as normal flora (score 0–3), intermediate flora (score 4–6) or definite bacterial vaginosis (score 7–10). Data were analysed using IBM SPSS Statistics version 30. Categorical variables were compared using the Pearson chi-square test, with $p<0.05$ considered statistically significant.
**Results:** A total of 1,645 vaginal swab specimens were evaluated. The mean age of the women was 28 years, and 252 (15.3%) were pregnant. Definite bacterial vaginosis was identified in 196 women, giving a prevalence of 11.9% (95% CI: 10.4%–13.6%). Intermediate vaginal flora was observed in 920 (55.9%) women, while 529 (32.2%) had normal flora. Overall, 1,116 (67.8%) women had altered vaginal flora. Nugent score distribution differed significantly across age groups ($x^2=119.77$, $p<0.001$), with the highest prevalence of definite bacterial vaginosis among women aged 38.1–48 years (24.2%). Definite bacterial vaginosis was more frequent among pregnant than non-pregnant women (28.2% vs 9.0%), with a prevalence ratio of 3.14 (95% CI: 2.42–4.07; $p<0.001$). Parity was not significantly associated with Nugent score category ($p=0.273$).
**Conclusion:** Definite bacterial vaginosis was present in approximately one in eight symptomatic women, whereas intermediate vaginal flora was the predominant microbiological abnormality. Pregnancy and age were significantly associated with Nugent score distribution, while parity showed no significant association. Laboratory confirmation using Nugent scoring may improve diagnostic accuracy and reduce unnecessary empirical antimicrobial treatment.

**Keywords:** Bacterial Vaginosis, Nugent Score, Vaginal Flora, Pregnancy, Vaginal Dysbiosis.

## INTRODUCTION

Bacterial vaginosis (BV) is a common vaginal dysbiosis among women of reproductive age and may occur with vaginal discharge, malodour, irritation or no symptoms [1]. It is characterized by depletion of protective Lactobacillus species and replacement by a diverse community of anaerobic and facultative organisms, including Gardnerella, Prevotella, Fannyhessea and other BV-associated bacteria [2]. Rather than representing infection by a single pathogen, BV develops through complex interactions among the vaginal microbiota, epithelial barrier and local immune response [3]. Multi-omic evidence suggests that BV-associated microbial communities contribute to mucosal inflammation and epithelial dysfunction, providing a biological explanation for its reproductive and infectious sequelae [4]. The vaginal microbiome is dynamic and may be influenced by age, menstrual and hormonal status, sexual practices, pregnancy, antimicrobial exposure, ethnicity and hygiene-related behaviours [5]. BV has been associated

with increased susceptibility to sexually transmitted infections, pelvic inflammatory disease, endometritis and infertility [6]. During pregnancy, disruption of Lactobacillus-dominant flora has also been associated with miscarriage, premature rupture of membranes, preterm birth and low birth weight. However, evidence that screening and treating asymptomatic BV in an unselected obstetric population prevents preterm delivery remains inconsistent [7]. Accurate characterization of BV in symptomatic and pregnant women is therefore clinically relevant, whereas indiscriminate treatment based solely on symptoms may expose women to unnecessary antimicrobial therapy.

BV can be diagnosed clinically using Amsel criteria or microbiologically through Gram-stained vaginal smears. Nugent scoring remains a widely accepted reference method because it provides a standardized assessment of bacterial morphotypes [8]. Scores of 0–3 indicate normal Lactobacillus-predominant flora, scores of 4–6 indicate intermediate flora, and scores of 7–10 indicate definite BV. The intermediate category is particularly important because it does not represent confirmed BV; instead, it reflects a heterogeneous microbial state that may return to normal, persist or progress. Molecular profiling has shown that women with intermediate scores may harbour clinically relevant dysbiosis and pathogens that are not fully characterized by microscopy alone [9].

Reported BV prevalence varies markedly across countries and populations because of differences in age distribution, pregnancy status, sexual and reproductive characteristics, healthcare setting and diagnostic method. An individual-participant meta-analysis of more than 37,000 women enrolled in sub-Saharan African studies reported substantial regional heterogeneity, with BV prevalence among women aged 25–49 years commonly ranging from 33% to 44% [10]. Clinic-based estimates may be higher than community estimates because women presenting with discharge or irritation are selectively enrolled. Conversely, symptom-based diagnosis may overestimate BV because candidiasis, trichomoniasis, cervicitis and non-infectious conditions can produce similar complaints.

In Saudi Arabia, laboratory-confirmed data on BV remain limited, particularly from large symptomatic populations evaluated through standardized Nugent scoring. Vaginal discharge is frequently managed syndromically or empirically in resource-constrained clinical settings, although symptoms alone cannot reliably distinguish definite BV from intermediate flora or other genital tract disorders. Establishing the prevalence of definite BV and describing the broader burden of altered vaginal flora according to age, pregnancy and parity may improve diagnostic pathways, support antimicrobial stewardship and identify women requiring closer reproductive and antenatal assessment. The present study was therefore conducted to determine the prevalence and distribution of Nugent-defined BV among symptomatic women and to evaluate its association with age, pregnancy status and parity in the Saudi Arabia context.

## METHODOLOGY

This retrospective, record-based cross-sectional study was conducted at a tertiary-care hospital in Riyadh, Saudi Arabia. Electronic clinical and laboratory records were reviewed for a 12-month period from 1 September 2023 to 31 August 2024. The study population comprised symptomatic female patients who underwent vaginal swab examination for suspected bacterial vaginosis or other causes of abnormal vaginal discharge. A total of 1,645 vaginal swab results available in the hospital database during the study period were included in the analysis.

Relevant demographic, obstetric and laboratory information was extracted from the hospital database using a structured data-collection format. The variables evaluated included age, parity, pregnancy status and vaginal smear findings. Age was analysed both as a continuous variable and in predefined categories of 18–28, 28.1–38, 38.1–48 and more than 48 years. Pregnancy status was recorded at the time of vaginal swab collection, while parity was assessed according to the information available in the clinical records. Bacterial vaginosis was diagnosed through microbiological examination of Gram-stained vaginal smears using the standardized Nugent scoring system. The Nugent score was determined according to the relative abundance and morphological characteristics of Lactobacillus species, Gardnerella or Bacteroides species and curved Gram-variable rods. Scores ranging from 0 to 3 were classified as normal vaginal flora, scores from 4 to 6 as intermediate or altered vaginal flora, and scores from 7 to 10 as definite bacterial vaginosis. The primary outcome was the prevalence of definite bacterial vaginosis among symptomatic patients. Secondary analyses assessed the

distribution of Nugent-score categories according to age, parity and pregnancy status.
Data were entered, cleaned and analysed using IBM SPSS Statistics, version 30. Continuous variables were summarized as mean and standard deviation, whereas categorical variables were presented as frequencies and percentages. The independent-samples t-test was used for comparisons of continuous variables where applicable. Associations between categorical variables, including Nugent-score category, age group, parity and pregnancy status, were assessed using the Pearson chi-square test. Effect estimates and 95% confidence intervals were reported where appropriate. All statistical tests were two-sided, and a p value of less than 0.05 was considered statistically significant.

## RESULTS

The 1,645 vaginal swab specimens obtained from symptomatic women were evaluated using Nugent scoring. The reported mean age was 28 years. Most women were aged 18–38 years (1,508/1,645, 91.7%), and 252 (15.3%) were pregnant.
Definite bacterial vaginosis (BV; Nugent score 7–10) was identified in 196 women, corresponding to a prevalence of 11.9% (95% confidence interval [CI], 10.4%–13.6%). Intermediate vaginal flora (score 4–6) was observed in 920 (55.9%) women, whereas 529 (32.2%) had normal flora (score 0–3). Overall, 1,116 (67.8%) women had altered vaginal flora, defined as an intermediate score or definite BV (Table 1).
Nugent score category differed significantly across age groups ($\chi^2[6] = 119.77$, $p < 0.001$). Although 165 of 196 definite BV cases (84.2%) occurred among women aged 18–38 years, the age-specific prevalence of definite BV was highest among women aged 38.1–48 years (24.2%), followed by those aged 28.1–38 years (16.9%), those aged ≥48 years (7.7%), and those aged 18–28 years (6.0%). Among all women with altered vaginal flora, 1,033 of 1,116 (92.6%) were aged 18–38 years (Table 2).
Among the 252 pregnant women, 71 (28.2%) had definite BV, 117 (46.4%) had intermediate flora, and 64 (25.4%) had normal flora. In comparison, definite BV was detected in 125 of 1,393 non-pregnant women (9.0%). Nugent score distribution differed significantly according to pregnancy status ($\chi^2[2] = 75.06$, $p < 0.001$). Pregnant women had approximately three times the prevalence of definite BV compared with non-pregnant women (prevalence ratio, 3.14; 95% CI, 2.42–4.07) (Table 3).
Abnormal Nugent scores appeared to be most frequent among women with parity 2–3; however, parity was not significantly associated with Nugent score category ($p = 0.273$).

Table 1. Distribution of Nugent Score Categories among Symptomatic Women (N = 1,645)

| Nugent Category | Score | N | % | 95% CI |
|---|---|---|---|---|
| Normal Vaginal Flora | 0–3 | 529 | 32.2 | 29.9–34.5 |
| Intermediate Vaginal Flora | 4–6 | 920 | 55.9 | 53.5–58.3 |
| Definite Bacterial Vaginosis | 7–10 | 196 | 11.9 | 10.4–13.6 |
| Intermediate Or Definite BV* | 4–10 | 1,116 | 67.8 | 65.5–70.1 |
| *Combined Category; It Overlaps With The Intermediate And Definite BV Rows. CI Values Were Calculated Using The Wilson Method. | | | | |

Table 2. Nugent Score Distribution According To Age Group

| Age Group, Years | Total, N | Normal Flora, N (%) | Intermediate Flora, N (%) | Definite BV, N (%) |
|---|---|---|---|---|
| 18–28 | 827 | 332 (40.1) | 445 (53.8) | 50 (6.0) |
| 28.1–38 | 681 | 143 (21.0) | 423 (62.1) | 115 (16.9) |
| 38.1–48 | 124 | 44 (35.5) | 50 (40.3) | 30 (24.2) |
| ≥48 | 13 | 10 (76.9) | 2 (15.4) | 1 (7.7) |
| **Total** | **1,645** | **529 (32.2)** | **920 (55.9)** | **196 (11.9)** |
| Values Are Row Percentages. Pearson $X^2(6) = 119.77$; $P < 0.001$. | | | | |

Table 3. Nugent Score Distribution According To Pregnancy Status

| Pregnancy Status | Total, N | Normal Flora, N (%) | Intermediate Flora, N (%) | Definite BV, N (%) | Altered Flora*, N (%) |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Pregnant | 252 | 64 (25.4) | 117 (46.4) | 71 (28.2) | 188 (74.6) |
| Non-Pregnant | 1,393 | 465 (33.4) | 803 (57.6) | 125 (9.0) | 928 (66.6) |
| **Total** | **1,645** | **529 (32.2)** | **920 (55.9)** | **196 (11.9)** | **1,116 (67.8)** |
| *Altered Flora Includes Intermediate Flora And Definite BV. Values Are Row Percentages. Pearson $X^2(2) = 75.06$; $P < 0.001$. The Prevalence Ratio For Definite BV In Pregnant Versus Non-Pregnant Women Was 3.14 (95% CI, 2.42–4.07). | | | | | |

## DISCUSSION

The present study found definite bacterial vaginosis (BV) in 11.9% of 1,645 symptomatic women, whereas 55.9% had intermediate vaginal flora and 32.2% had normal flora. Thus, definite BV was not present in most participants, although 67.8% demonstrated altered vaginal flora when intermediate flora and definite BV were combined. The large sample and use of Nugent scoring strengthen the estimate and demonstrate the importance of separating confirmed BV from intermediate microbiological changes.

The prevalence of definite BV was considerably lower than the 46.5% reported by Mabugana et al. among symptomatic South African women evaluated using Nugent microscopy [11]. Gizat et al. reported BV in 20.7% of Ethiopian women suspected of sexually transmitted infections [12], while Bitew et al. observed a prevalence of 39.5% among reproductive-age women attending an Ethiopian referral hospital [13]. Dhabhai et al. documented BV in 37.0% of married women from low- and middle-income communities in North Delhi [14]. These differences may reflect variations in participant selection, sexual and reproductive characteristics, antimicrobial exposure, ethnicity and pregnancy status and laboratory definitions. The comparatively lower prevalence in the present study indicates that vaginal symptoms alone are not sufficiently specific for BV.

A major finding was the high prevalence of intermediate flora, which accounted for 55.9% of specimens. Sethi et al. demonstrated that increasing Nugent-score abnormality was associated with greater detection of sexually transmitted pathogens and found Mycoplasma hominis more frequently in women with intermediate flora than in those with definite BV [15]. Gizat et al. reported intermediate flora in 16.1% of participants [12], while Yalew et al. reported 17.5% among pregnant Ethiopian women [16]. These estimates were substantially lower than the present finding. Intermediate flora should not be classified as confirmed BV because Nugent scores of 4–6 represent a heterogeneous microbial state that may resolve, persist or progress. Nevertheless, its high frequency suggests an important burden of vaginal dysbiosis requiring clinical correlation rather than automatic antimicrobial treatment.

Nugent categories differed significantly across age groups, and the highest age-specific prevalence of definite BV occurred among women aged 38.1–48 years. Sethi et al. found that intermediate flora and BV were more frequent among women aged 21–35 years [15]. Roxby et al. reported an extremely low prevalence before sexual debut among Kenyan adolescents, followed by a rapid increase after first sexual intercourse [17]. Dhabhai et al. found that each additional year of age was associated with an 8% reduction in the odds of a laboratory-confirmed reproductive tract or sexually transmitted infection [14]. These findings suggest that the relationship between age and BV may be influenced by sexual exposure, hormonal status, contraceptive use and healthcare-seeking behaviour. The result for women aged 48 years or older should be interpreted cautiously because this subgroup included only 13 participants.

Pregnancy showed the strongest association with BV. Definite BV was present in 28.2% of pregnant women compared with 9.0% of non-pregnant women, corresponding to a prevalence ratio of 3.14. Yalew et al. reported BV in 20.1% of pregnant women [16], whereas Konadu et al. observed a prevalence of 30.1% during early pregnancy in Ghana [18]. In Pakistan, Asghar et al. identified BV in 56 of 168 pregnant women, corresponding to 33.3% [19]. Mukherjee et al. reported a higher prevalence of 50.0% among Indian women screened between 18 and 24 weeks of gestation [20]. In contrast, Tuddenham et al. found that pregnancy was associated with lower odds of molecularly defined BV among Indian women after adjustment for relevant covariates (adjusted odds ratio, 0.35; 95% CI, 0.14–0.87) [21]. Variation between studies may be related to gestational age, symptom-based recruitment, HIV status and the use of microscopy-based or sequencing-based definitions.

Parity was not significantly associated with Nugent category, suggesting that the apparent

concentration of abnormal scores among women with parity 2–3 may have reflected differences in age or pregnancy distribution. The cross-sectional design prevents assessment of progression from intermediate flora to definite BV, while the absence of detailed information on sexual behaviour, contraceptive practices, vaginal hygiene and recent antibiotic exposure limits causal interpretation. Nevertheless, the findings support laboratory confirmation of BV, particularly during pregnancy, and demonstrate that intermediate flora rather than definite BV represented the predominant microbiological abnormality.

## CONCLUSION

Definite bacterial vaginosis was detected in 11.9% of symptomatic women, while intermediate vaginal flora was considerably more common. Pregnancy was strongly associated with bacterial vaginosis, and significant variation was also observed across age groups. These findings support routine laboratory confirmation, particularly in pregnant women, rather than treatment based solely on clinical symptoms.

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