

Prevalence of Bacterial Vaginosis among Symptomatic Pregnant Women in Bundelkhand Region: A Cross-Sectional Study

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ABSTRACT: Vaginal infections during pregnancy can cause serious difficulties for both the mother and the new born, leading to gynaecologic and obstetric issues. BV may be classified as a sexually enhanced disease (SED) rather than sexually transmitted diseases (STD), with the frequency of intercourse playing an important role. As a result, greater emphasis should be placed on investigating primary preventive strategies. However, no study has assessed the prevalence of BV among pregnant women in Uttar Pradesh's Bundelkhand region. As a result, this study was conducted to investigate the prevalence of BV among pregnant women. **Material and methods:** This cross-sectional study was conducted among the symptomatic pregnant women lying in any gestational week, attending the OPD/IPD of Obstetrics and Gynecology Department of MLB Medical College of Jhansi with universal safety precautions during the period of 2 years from January 2021 to December 2022. A total 250 samples were randomly collected. The vaginal swabs were taken for all the pregnant woman. Amsel's clinical criteria for bacterial vaginosis diagnosis were used in this study. Data were analyzed in SPSS v- 24. Chi-square test was applied. p value <0.05 was considered statistically significant. **Results:** The prevalence of BV among pregnant women in this study was 28%. Women in the first trimester of pregnancy had a higher proportion of BV than those in later trimesters, and this difference was statistically significant. Women who were multiparous, had a history of miscarriage, had a low socioeconomic status, and were using oral contraceptives were more likely to have BV. **Conclusion:** BV is prevalent among pregnant women in the Bundelkhand region, and early detection is critical for favourable pregnancy outcomes and reducing complications. As most of the participants were from rural backgrounds, it was a challenge to make them understand the need for such study and taking participation consent. Primary preventive strategies should be emphasized, particularly for women who are multiparous, have a history of miscarriage, have a low socioeconomic status, and are using oral contraceptives.

Keywords: Prevalence, Bacterial Vaginosis, Pregnant woman, Amsel's criteria, Multiparous.

INTRODUCTION

Bacterial vaginosis, the most common gynecological condition in reproductive aged women worldwide, characterized by a shift from healthy Lactobacilli to a polymicrobial, anaerobic overgrowth of numerous species such as Gardnerella vaginalis, Bacteroides spp., and Mobilincus spp (Hay 2017; Feng and Zheng Ai 2013).

BV is a clinical condition defined by a thin, grey/off-white, homogeneous, malodorous adherent vaginal discharge with a pH greater than 4.5, that is particularly noticeable after intercourse and menstruation. When 10% potassium hydroxide is added to the vaginal fluid (whiff test), a fishy odour is detected, and there is the

presence of clue cells, a few or no lactobacilli, and a small number (1/hpf) of polymorphonuclear leucocytes (PMNs) (Begum *et al.*, 2010).

Pregnancy is associated with various physiological events that have the potential to affect the structure and composition of the vaginal microbial community. Increased sex steroid hormone levels, altered immunophysochemical properties of the cervical mucus, and modulation of the host immune response are some of the factors that could influence the vaginal microbiome during pregnancy (Filho *et al.*, 2010). However, the detailed mechanisms by which these factors influence the vaginal microbiome are not completely understood (Ahmed *et al.*, 2001; Verstraelen *et al.*, 2010). Limited

culture-independent studies have compared the vaginal microbiome of non-pregnant women with healthy pregnant women. Overall, the microbiomes of pregnant women are less varied and less rich compared to those of non-pregnant women; they also have higher abundance of *Lactobacillus* spp. and are more stable (Kenyon *et al.*, 2013).

Vaginal infections during pregnancy can cause serious difficulties for both the mother and the new born, leading to gynaecologic and obstetric issues. BV may be classified as a sexually enhanced disease (SED) rather than a sexually transmitted disease (STD), with the frequency of intercourse playing an important role. As a result, greater emphasis should be placed on investigating primary preventive strategies (Hillier and Holmes 1999; Lewis *et al.*, 2017).

Several observational studies have found that women who use hormonal contraception have a lower risk of recurrence of BV (Vodstrcil *et al.*, 2013). However, no study has assessed the prevalence of BV among pregnant women in Uttar Pradesh's Bundelkhand region. As a result, this study was conducted to investigate the prevalence of BV among pregnant women.

MATERIAL AND METHODS

This cross-sectional study was conducted among the symptomatic pregnant women lying in any gestational week, attending the OPD/IPD of Obstetrics and Gynaecology Department of MLB Medical College of Jhansi with universal safety precautions during the period of 2 years from January 2021 to December 2022. A total 250 samples were randomly collected. The vaginal swabs were taken for all the pregnant woman.

Resident doctors took vaginal swabs from the lateral and posterior vaginal fornices while looking for consistency and colour in the vaginal discharge. Amsel's clinical criteria for bacterial vaginosis diagnosis were used in this investigation. The clinical criteria included pH measurement (using a Whatman pH strips to measure pH from 1–14), saline wet mount (for clue cells), and a whiff test (to look for fishy or amine odour) as one indicator of BV by the addition of 10% KOH. Amsel's criteria for bacterial vaginosis require at least three out of four of the following criteria to be met: homogenous thin grey or white vaginal discharge, positive whiff test, high vaginal pH >4.5, and presence of a clue cell (Amsel *et al.*, 1983).

Data were analysed in SPSS v- 24. Chi-square test was applied. p value <0.05 was considered statistically significant.

RESULTS

The mean age of the participants was 28.4± 5.1 years. The median age was 28 years with IQR of 24-32 years. Majority of the participants, 151 (60.4%) were in the age group of 20-29 years. The average number of pregnancies in each woman was 2.1± 0.8. The median value was 2 with an IQR of 1-3. Majority, 175 (70%)

had up to 2 pregnancies and 75 (30%) had more than 2 pregnancies. The number of pregnancies for each woman ranged from 1 to 4. About, 66(26.4%) of the women were primi (Table 1). Majority of the participants 93 (37.2%) were in their first trimester of pregnancy, followed by 81 (32.4%) in the second trimester and 76 (30.4%) in the third trimester.

The diagnosis of bacterial vaginosis was made based on Amsel's criteria based on pH of vaginal secretion, presence of clue cells and whiff's test. It was seen that the prevalence of BV was 70 (28%) (Fig. 1). In the 1st trimester of pregnancy, 37(39.8%) of women were positive for bacterial vaginosis.

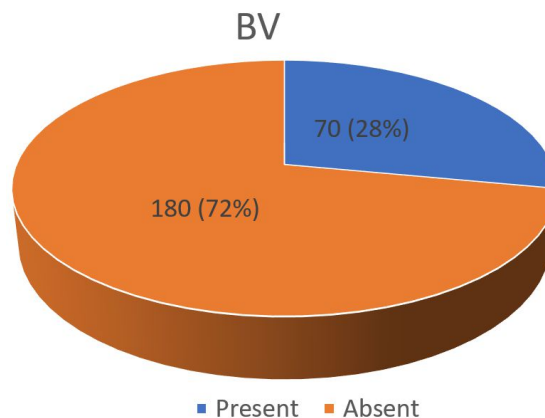


Fig. 1. Prevalence of BV.

Table 1: Clinical profile of study participants (N=250).

Variables	Frequency	Percent (%)
Age (Mean±SD)	28.4± 5.1 years	
Age:		
20-29years	151	60.4
30-39years	95	38.0
40-49years	4	1.6
No. of pregnancies		
≤2pregnancies	175	70.0
>2pregnancies	75	30.0
Trimester:		
1st Trimester	93	37.2
2nd Trimester	81	32.4
3rd Trimester	76	30.4
Amsel's criteria:		
Homogeneous thin gray or white vaginal discharge	89	35.6
Vaginal pH >4.5	76	30.4
Whiffstest-Fishyodor	81	32.4
Clue cells	76	30.4

Table 2: Association of bacterial vaginosis with various sociodemographic factors.

Factors	Negative (n=180)	Positive (n=70)	Total (N=250)	P value
20-29years	108(71.5%)	43(28.5%)	151(60.4%)	0.09
30-39years	71(74.7%)	24(25.3%)	95(38%)	
40-49years	1(25%)	3(75%)	4(1.6%)	
Trimester				
1st Trimester	56(60.2)	37(39.8)	93	0.002
2nd Trimester	68(84)	13(16)	81	
3rd Trimester	56(73.7)	20(26.3)	76	
Number of pregnancies:				
≤2pregnancies	124(70.9%)	51(29.1%)	175	0.500
>2pregnancies	56	19(25.3%)	75	

*Chi-Square test

In the 2nd trimester of pregnancy 13 (16%) were positive for bacterial vaginosis and in the 3rd trimester of pregnancy 20 (26.3%) were positive for bacterial vaginosis. Higher proportion of women were positive for bacterial vaginosis in the 1st trimester of pregnancy and this was statistically significant (Table 2).

DISCUSSION

Bacterial vaginosis, a condition which develops due to the disruption of the normal vaginal flora. In the normal physiological state, Lactobacillus is predominantly found in the vaginal flora. The overgrowth of anaerobic organisms replacing the normal flora leads to the causation of bacterial vaginosis. There are two main criteria's for diagnosing bacterial vaginosis i.e. Nugent score and Amsel criteria (Gad *et al.*, 2014). Studies have shown that using Amsel's criteria diagnosis of bacterial vaginosis can be simplified by using a combination of the two criteria, vaginal pH and clue cells, in settings where time or Gram staining is not available. The current study was conducted on 250 pregnant women of reproductive age. The prevalence of BV was found out to be 28% in the current study. A similar study was undertaken by Kamga *et al.* (2019) and reported a prevalence of BV of 26.2% in pregnant women, which supports the current study; however, in contrast to the current study, Kulkarni and Wagh (2020) discovered a prevalence of bacterial vaginosis among pregnant females of 11.38%. According to SM Ibrahim *et al.* (2014) the prevalence of BV among pregnant women found out to be 17.3%. Such variations are most likely due to various socio-economic settings the study populations have chosen from.

In women of reproductive age, bacterial vaginosis (BV) is prevalent in leading cases with symptom of foul-smelling vaginal discharge. The majority of the individuals in the current study (55.2%) have experienced malodorous discharge per vaginum. The foul-smelling discharge was observed in 48.37% of pregnant women in the study by Kulkarni and Wagh (2020). In the study by SM Ibrahim *et al.* (2014), most patients with BV had a yellow, watery, and malodorous discharge. There are some discrepancies in the characteristics of the discharge in the effected patients. Some have reported the traditional description of thin, grey, homogeneous, and foamy discharge (Gad *et al.*

2014), while others recorded white and yellow discharge. The most common cause of vaginal discharge or odour is due to bacterial vaginosis.

Hence, in the year 2010 the US Center for Disease Control have made most recent recommendations for the treatment of symptomatic bacterial vaginosis which was aimed to relieve these vaginal symptoms. In the current study, 35.6% reported history of excess vaginal discharge. In the study by Hillier *et al.* (2021), higher proportion of about 68% reported to have abnormal white discharge per vaginum. Though the study group was comparable in terms of mean age of participants to our study, the study by Hillier *et al.* (2021) had included only participants those who had any symptoms suggestive of vaginitis. This explains the large differences in proportion of participants experiencing excess white discharge between both the groups.

Measurement of pH in the vagina varies by whether the sample is taken from a vaginal wall, the vaginal fornix, or the cervical os, because the cervix having a higher pH than the vagina. Bacterial vaginosis is characterised by the alkalinization of vaginal fluid (vaginal pH > 4.5) prompting some authors to propose correcting the vaginal pH in order to treat bacterial vaginosis. The diagnosis of bacterial vaginosis according to Amsel's criteria may be simplified using a combination of the two criteria, i.e. the vaginal pH and amine test. As a single predictor the most sensitive individual criterion was vaginal pH, but with lowest specificity. Hence, it is suggested to combine vaginal pH with amine test. In the current study, majority, 32.8% had a pH more than 4.5. In the study by Bhujel *et al.* (2021), a majority of about 80.8% had a pH more than 4.5.

Whiff's test is one of the major clinical criteria employed in the diagnosis of bacterial vaginosis since historical times. Varied results with the specificity of Whiff's test can be seen due to factors like, the test-related factors might be the use of KOH bottles of differing potency, any delay in performance of the test, use of insufficient quantity of discharge by one observer, or interference with the test by use of absorbent material (such as a cotton swab). Observer related factors like degree of skill in performing the test and the ability to smell also influence the results of Whiff's test. But it still remains to be one of the moderately reliable clinical tool in the diagnosis of bacterial vaginosis even if carried out under less than

ideal circumstances such as clinical settings. On Whiff's test, majority 32.4% had fishy odour in the current study. In accordance with the current study, Hemalatha *et al.* (2013) also reported that 35.5% were positive on Whiff's test. In the study by Bhujel *et al.* (2021) lower proportion of only 14.2% had fishy odour in the Whiff's test.

As a single individual criterion for predicting the gram stain result, clue cells detection from wet mount microscopic examination is the single most reliable predictor of bacterial vaginosis. Though clue cells from individual criterion by its own is sufficient to diagnose bacterial vaginosis, it was seen that modified Amsel's criteria by using a combination of any two criteria, increased the specificity. Hence the current study employed the modified version. In the current study, majority 30.4% had clue cells on microscopic examination. In the study by Bhujel *et al.* (2021) a lower proportion of only 9.2% had clue cells on microscopy. Bhujel *et al.* (2021), did not include pregnant women and conducted the study on women attending gynaecological OPD with history of abnormal white discharge. The study by Hemalatha *et al.* (2013), reported a higher proportion of about 58.8% having clue cells. The higher value might be because of the difference in study population. This study had included those having symptoms of vaginitis.

CONCLUSIONS

According to Amsel's criteria, almost one-third of the pregnant women in our study had bacterial vaginosis. Bacterial vaginosis is more common in first-trimester pregnant women. As BV is common in pregnant women, early detection of pregnant women with the aforementioned characteristics should be a key element of the laboratory inquiry, as it is critical for favourable pregnancy outcomes and reducing problems.

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Conflict of Interest. None.

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