

**Original Research Article****Screening for bacterial vaginosis in pregnant women and its outcome on pregnancy**Anup Kumar Shetty,<sup>1</sup> Brigit Davis<sup>2</sup><sup>1</sup>Department of Microbiology, Father Muller Medical College, Mangalore, India<sup>2</sup>Father Muller Medical College, Mangalore, India**Abstract**

Bacterial vaginosis is a condition in women of reproductive age (pregnant and non-pregnant) where the normal balance of bacteria in the vagina is disrupted and replaced by an overgrowth of pathogenic bacteria like Gardnerella vaginalis, Mobiluncus species and Bacteroides species. It is known to be a strong independent risk factor for adverse pregnancy outcomes such as preterm labour, premature rupture of membranes, spontaneous abortion, chorioamnionitis, postpartum endometritis. Early screening, diagnosis and treatment of bacterial vaginosis in pregnant women are helpful in preventing complications resulting out of it. The aim of this study was to screen bacterial vaginosis in pregnant women in our set up and to find out if a regular screening process should be evolved on regular basis in patients with high risk.

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**1. Introduction**

Bacterial vaginosis (BV) is a condition in women where the normal balance of bacteria in the vagina is disrupted and replaced by an overgrowth of pathogenic bacteria.<sup>1</sup> BV is the most common lower genital tract disorder among women of reproductive age (pregnant and non-pregnant) and the most prevalent cause of vaginal discharge, itching and malodour.<sup>1,2,3</sup> Normal vaginal flora consists of both aerobic and anaerobic bacteria, with Lactobacillus species being the predominant microorganism and accounting for greater than 95% of all bacteria present.<sup>3,4</sup> Lactobacilli are believed to provide defense against infection, partly by maintaining an acidic pH (< 4.5) in the vagina.

When the normal vaginal pH is disrupted due to various causes like urinary tract infection (UTI), sexual activity or vaginal douching, the pH of the vagina increases and leads to an increase in pathogenic bacteria, mainly anaerobic or microaerophiles.<sup>3,4,5</sup> These organisms include Gardnerella vaginalis, Mobiluncus species, Bacteroides species, Prevotella species and Mycoplasma species.<sup>2,3</sup> These bacteria thrive in higher vaginal pH resulting in vaginosis. Vitamin D and folate deficiency is also known to be associated with BV.<sup>6</sup> Gardnerella vaginalis is a short Gram variable bacilli, commonly transmitted by sexual route.<sup>4,5</sup> Mobiluncus species is a Gram negative curved anaerobic bacillus with a characteristic 'sea gull' appearance in Gram's staining. Gardnerella

vaginalis is the most common causative agent of bacterial vaginosis, followed by *Mobiluncus* species and other anaerobes.<sup>4,5</sup>

Bacterial vaginosis is known to be a strong independent risk factor for adverse pregnancy outcomes.<sup>2</sup> It has been associated with a significant number of obstetric and gynaecologic complications such as preterm labour, premature rupture of membranes, spontaneous abortion, chorioamnionitis, postpartum endometritis, post-Caesarean delivery wound infections, and subclinical pelvic inflammatory disease.<sup>3,4</sup> Embryofoetal infections have been reported to cause recurrent spontaneous abortions at a rate lower than 4%.<sup>7</sup> Early screening, diagnosis and treatment of bacterial vaginosis in pregnant women is helpful in preventing complications resulting out of it.<sup>3</sup>

The aim of this study was to screen bacterial vaginosis in pregnant women in our set up and to find out if a regular screening process should be evolved on regular basis in patients with high risk. The study also aims at finding if bacterial vaginosis can have adverse outcome in pregnancy and if it can be prevented by initiating early treatment.

## 2. Materials and methods

The study sample size was 35. Pregnant women of more than five months (>20 weeks) of pregnancy, of any age group attending as outpatients or inpatients to Father Muller Medical College Hospital, Mangalore, with symptoms of discharge per vagina, itching, history of recent sexual activity and history of recent urinary tract infection were included in the study. Non-pregnant women and pregnant women with less than five months (<20 weeks) of gestation were excluded from the study.

After obtaining consent, two vaginal swabs were collected under aseptic precautions and were immediately transported to the laboratory for

examination. The vaginal swabs were processed in the microbiology laboratory by wet mount examination, Gram's staining, Whiff's test and pH determination.<sup>8</sup> One swab was used for wet mount and Gram's staining and the other for Whiff's test and pH determination. For wet mount examination, the secretion from the swab was smeared on a clean glass slide and was later covered with a coverslip. The slide was examined for evidence of 'clue cells'.<sup>4</sup> For Gram's staining the swab was smeared on another clean glass slide, air dried and fixed with gentle heat. It was stained later by Gram's staining method.<sup>5</sup> After staining the smear was screened for short Gram negative or Gram variable bacilli (resembling *Gardnerella vaginalis*), curved Gram negative bacilli (resembling *Mobiluncus* species), pleomorphic Gram negative bacilli (resembling anaerobes), epithelial cells with heavy coating of Gram negative bacilli on the periphery (clue cells) and thick, long, Gram positive bacilli (*Lactobacilli*).<sup>4</sup> The smears were graded and interpreted by Nugent's score as illustrated in table 1 and table 2, respectively.<sup>8</sup> The pH was determined by rubbing the vaginal swab against a commercial pH paper (Merck specialties Private Limited, Mumbai, India). The pH was interpreted as per manufacturers instructions. Whiff's test was performed by adding two drops of 10% potassium hydroxide on the swab. Development of an amine fishy odour was considered as a positive test. Other than fishy odour were considered negative.<sup>4,8</sup> The diagnosis of bacterial vaginosis was made as per Amsel's criteria, when three of the four criteria were satisfied i.e., an adherent and homogenous vaginal discharge, vaginal pH greater than 4.5, presence of clue cells and positive Whiff's test.<sup>5,6,8,9</sup> The patients were followed up till delivery and the outcome of pregnancy and post-partum events were noted. Patients with BV were treated as per standard methods.<sup>10</sup>

Table 1: Nugent's scoring of vaginal swabs (Number based on average of 10 fields)

Morphotype	Number of organisms per oil immersion field				
	None	<1	1-4	5-30	>30
Lactobacillus species	4	3	2	1	0
Gardnerella & anaerobic Gram negative bacilli	0	1	2	3	4
Curved Gram negative bacilli (Mobiluncus species)	0	1	1	2	2

Table 2: Interpretation of Nugent's score

Nugent's score	And	Interpretation
0-3	No clue cells	Normal vaginal flora
4-6	No clue cells	Intermediate or Not consistent with Bacterial vaginosis
4-6	Clue cell present	Indicative of bacterial vaginosis
≥ 7	Clue cell present or absent	Indicative of bacterial vaginosis

Table 3: History details

History	Number Present (%)	Number Absent (%)
WDPV <sup>#</sup>	20 (57.14)	15 (42.86)
Other discharge	10 (28.57)	25 (71.43)
Itching	11 (31.43)	24 (68.57)
Recent sexual activity	1 (2.86)	34 (97.14)
Recent UTI <sup>#</sup>	6 (17.14)	29 (82.86)

<sup>#</sup>WDPV-White discharge per vagina; UTI-Urinary tract infection

### 3. Results

Out of 35 patients screened 10 (28.57%) were out-patients and 25 (71.43%) were in-patients. Table 3 shows the history details of the patients illustrating the number of patients who had discharge per vagina, itching, history of recent sexual activity and UTI. White discharge per vagina (WDPV) was the commonest complaint and was present in 20 (57.14%) patients. Only one patient (2.86%) gave recent history of sexual activity. Majority of the patients, 19 (54.29%) were in the age range of 21-25 years. The age ranges and the number of patients have been illustrated in Table 4. Table 5 shows the number of patients presenting with symptoms at different gestational periods. Twenty-four

(68.57%) patients presented with symptoms at 36-40 weeks of gestation. Out of 35 patients examined, ten (28.57%) patients fulfilled the diagnostic criteria for BV. Twenty-five (71.43%) patients did not fulfill the criteria of BV. Out of the 10 patients with BV one (2.85%) gave history of recent sexual activity and six (17.5%) gave history of recent UTI. The details of the ten patients with BV and their outcomes in pregnancy are illustrated in Table 6. Three (8.57%) patients with BV had adverse outcomes. The 25 (71.43%) patients who did not have BV had no adverse outcomes during delivery or in post-partum period.

Table 4: Age of the patients examined

Age range	18-20 years	21-25 years	26-30 years	31-35 years	35-40 years
Number (%)	5 (14.29)	19 (54.29)	5 (14.29)	3 (8.57)	3 (8.57)

Table 5: Weeks of gestation

Gestational age in weeks	20-25	26-30	31-35	36-40	>40
Number (%)	2 (5.71)	2 (5.71)	7 (20)	24 (68.57)	Nil

Table 6: Events in patients with bacterial vaginosis

Gestation at time of presentation of symptoms	Whether received treatment for vaginosis	Gestation at delivery term/preterm	Mode of delivery	Outcome and postpartum events
37 weeks, 1 day	Yes	Term	Normal	Uneventful
35 weeks, 3 days	Yes	Term	Normal	Uneventful
35 weeks, 4 days	Yes	Term	Normal	Uneventful
38 weeks, 3 days	Yes	Term	Normal	Uneventful
39 weeks, 3 days	Yes	Term/PROM	Normal	Uneventful
33 weeks, 2 days	Yes	Preterm	Normal	Uneventful
34 weeks, 3 days	Yes	Preterm	Normal	Uneventful
35 weeks, 4 days	No	Preterm	LSCS <sup>#</sup>	Twins IUD <sup>#</sup> and IUGR <sup>#</sup>
20 weeks, 3 days	No	Preterm	Normal	Abortion, spontaneous expulsion of fetus
24 weeks, 1 day	No	Preterm	Normal	Abortion, spontaneous expulsion of fetus

<sup>#</sup>PROM-Premature rupture of membranes; LSCS-Lower segment Caesarean section; IUD-Intra uterine death; IUGR-Intra uterine growth retardation

#### 4. Discussion

Bacterial vaginosis is a condition in women where the balance of normal bacterial flora in the vagina is disrupted and replaced by an overgrowth of pathogenic bacteria like *Gardnerella vaginalis*, *Mobiluncus* species,

*Bacteroides*, *Prevotella* species etc.<sup>2,3</sup> Studies have shown that prevalence of BV ranges from 4% to 17%, while in gynaecology clinics it has been 23%. In college students, the prevalence has ranged from 4% to 25%, while it has been as high as 61% in women attending sexually transmitted disease clinics. It is also documented

that similar prevalence rates in pregnant women, to those seen in non-pregnant populations, ranging from 6% to 32%.<sup>2,3</sup> Other studies have indicated a prevalence of 9% to 23% pregnant women.<sup>11</sup> BV is a strong independent risk factor for adverse pregnancy outcomes and has been associated with a significant number of obstetric and gynaecologic complications, such as preterm labour and delivery, preterm premature rupture of membranes (PROM), spontaneous abortion, chorioamnionitis, postpartum endometritis, post-Caesarean delivery wound infections, postsurgical infections, and subclinical pelvic inflammatory disease.<sup>12</sup> Risk factors like smoking, sexual activity, poor hygiene and vaginal douching have been constantly associated with BV in pregnant women.<sup>5</sup>

In this study though all 35 patients had some kind of discharge per vagina, or itching, only ten patients fulfilled Amsel's criteria for BV. Out of the 10 BV pregnant patients, seven could receive treatment for BV, as they presented earlier and three of them did not receive any treatment. Out of the seven patients who received treatment five of them had full term delivery while two had preterm delivery. One patient, who gave history of recent sexual activity (table 3), received the treatment for BV and had term delivery with an uneventful postpartum period. Even with treatment one patient who had term delivery had premature rupture of membranes (PROM). It was not known if BV contributed PROM. All patients who received treatment had an uneventful postpartum period. The findings were similar in studies done earlier, indicating the necessity for early treatment and preventing any postpartum complications.<sup>12</sup> The three patients with BV who did not receive treatment presented late and with preterm labour. Hence, treatment could not be initiated earlier. One patient among the three underwent lower segment caesarean section (LSCS) for twin gestation. One of the twins had intrauterine growth retardation (IUGR) and the second twin

had undergone intrauterine death (IUD). The other two patients had spontaneous abortions. In our study out of the 10 patients who had BV, six had UTI. Two of the three patients who had complications in postpartum period also had a history of recent UTI apart from BV. In the study done by Lata et al. similar observations were made, where the adverse outcome of pregnancy higher in patients in patients with BV and UTI.<sup>12</sup> Four patients were treated for UTI as well as BV and did not have any adverse outcome, indicating that early initiation of treatment for BV can minimize the adverse outcomes, if not completely prevent.

As this study had a small sample size and included only pregnant women above 20 weeks, the true magnitude of the problem could not be evaluated. A larger sample size and inclusion of pregnant women of all gestational age may bring forward the true picture. It would be beneficial if a routine screening for BV in all pregnant women is evolved so that early treatment can be initiated and adverse outcomes may be prevented.

## 5. Conclusion

Bacterial vaginosis in pregnant women can contribute to adverse outcomes in pregnancy. Screening for BV pregnant women at regular intervals or when symptomatic may be advisable and an early treatment can reduce adverse outcomes. A large scale study is necessary to evaluate the true magnitude of the problem so that necessary guidelines can be formulated for screening and treating BV in pregnancy.

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