# Role of bacterial vaginosis in preterm labor

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**OBJECTIVE(S) :** TO determine the prevalence of bacterial vaginosis in pregnant women and its role in causing preterm labor and to determine the most significant test of Amsel's criteria.

**METHOD(S) :** A prospective study of laboratory diagnosis of bacterial vaginosis by applying Amsel's criteria to 100 subjects between 28 to 37 weeks of gestational age with preterm labor and 100 controls with same gestational age. The accuracy of different tests of bacterial vaginosis were also compared.

**RESULTS:** Bacterial vaginosis was associated with 44% cases of preterm labor, wherein other causes of preterm labor were excluded, compared to 23% of controls. The reletive risk of preterm labor due to bacterial vaginosis was 1.9 and P value was 0.0016. The detection of clue cells in vaginal smear and Whiff test, when applied independently, had high sensitivity and high positive and negative predictive values.

**CONCLUSION(S):** Bacterial vaginosis is an important cause of preterm labor. The detection of clue cells in vaginal smear is the most accurate laboratory test and Whiff test is the most accurate bed side test, when applied independently for diagnosis of bacterial vaginosis.

**Key words :** bacterial vaginosis, preterm labor, Amsel's criteria

## Introduction

The dream of every woman is to deliver a healthy and mature baby capable of adapting satisfactorily to the extrauterine life. In human beings, the gestational period of 280 days or 40 weeks from the last menstural period is the time required for the fetus to attain complete growth and maturity. Unfortunately, almost 8-10% pregnancies end in preterm labor (PTL) [1] which has both maternal and fetal consequences. The effect of preterm labor on the baby are devastating and are responsible for about 35% of neonatal deaths [2]. The old dictum "Prevention is better than cure" applies very well to the management of preterm births. For prevention, it is important to identify the high risk factors for PTL. The

causes of PTL could be maternal, fetal, placental or idiopathic. It is known that, infection is one of the most important maternal factor reponsible for preterm labor [3]. Almost 40% cases of preterm labor are due to infections. Ascending infections have been identified as the most important preventable cause of PTL. Amongst the ascending infections, bacterial vaginosis is a major cause of preterm labor. In it the normal vaginal flora is replaced by anerobic organisms. These organisms are Gardenerella vaginalis, bacteroides, mobiluncus, Mycoplasma hominis, peptostreptococcus, fusobacterium and prevotella. Bacterial vaginosis (BV) can be detected by applying Amsel's criteria [4] and when treated with antibiotics, can prevent upto 70-80% cases of preterm labor [5].

## Method

One hundred pregnant women, with gestational age between 28-37 weeks, admitted with complaints of preterm labor were selected as subjects. Hundred pregnant women with same gestational age, attending the antenatal clinic without preterm labor, were selected as controls.

Women with obvious causes of preterm labor like multiple pregnancy, polyhydramnios, ruptured membranes, cervical surgery, incompetent cervix, fetal malformations, medical disorders like heart disease, diabetes requiring regular drug therapy, pregnancy induced hypertension, antepartum hemorrage, fever, antibiotic use in last 4 days and blood transfusion within last 7 days were excluded from the study.

The tests of Amsel's criteria to detect bacterial vaginosis were applied over the study group and controls. These were -

1. Vaginal pH more than 4.5 : Vaginal pH was detected with the help of pH indicator paper (pH range 2 - 10.5) with color scale.

2. Thin greyish white homogenous discharge

3. Whiff test : In this test few drops of 10% solution of KOH were mixed with vaginal secretions and presence of fishy odor was taken as positive Whiff test.

4. Presence of clue cells in vaginal smear : Presence of more than 20% clue cells in wet preparation was considered a positive test.

When any three of the above tests were positive, the woman was considered as having BV.

## Result

The demographic characteristics for BV+ve study group and BV + ve controls are given in Table 1.

The four tests as per Amsel's criteria were applied over a total of 200 pregnant women (100 subjects and 100 controls). The results of various tests for diagnosis of BV are given in Table 2.

After evaluating the results by Amsel's criteria, 44% of the subjects and 23% of the controls were found positive for BV. The reletive risk of preterm labor due to BV was 1.9 (CI 1.2 - 3.0) and P value was 0.0016, which is highly significant.

## Discussion

BV is comman in women. Bhalla and Kamshika [7] report the prevalence of BV to be 50% in symptomatic women and 21.8% in asymptomatic women. Bhalla et al [8] report 32.8% prevalence of BV in women in Delhi and 31.2% of women with BV to be asymptomatic.

Bacterial endotoxins cause activation of decidual cells / macrophages / lukocytes / monocytes which in turn cause the secretion of cytokines, chemokines and phospholipase $A_2$ that activate cascades leading to labor (ILI, 6 and 8, TNFa).Inflamation, prostaglandin release and preterm activation of fetal hypothalamo-pituatry-adrenal (HPA) endocrine cascade occurs as a result. The cummulative effect of this results in preterm labor [9]. Karat et al [10] find BV to be significantly associated with premature rupture of membranes.

The direct cost of PTL, preterm delivery, low birth weight

**Table 1. Demographic characteristics.**

| Parameter | Bacterial vaginosis positive | | |
| --- | --- | --- | --- |
| | Study group n=100 | Control group n=100 | P value |
| Maternal age (years) | 23.84 ± 3.23 | 23.69 ± 2.91 | 0.38 |
| Gestational age (weeks) | 31.73 | 30.52 | 0.085 |
| Nulliparas (percent) | 45.45 | 26.09 | 0.004 |
| Low socio-economic status (percent) | 52.27 | 78.26 | 0.002 |
| Uneducated (percent) | 45.45 | 56.52 | 0.13 |

**Table 2. Tests for bacterial vaginosis (n=200).**

| Parameters | Vaginal pH <4.5 | Discharge | Whiff test | Clue cells |
| --- | --- | --- | --- | --- |
| Positive cases (number) | 153 | 140 | 88 | 68 |
| Sensitivity (percent) | 100 | 100 | 100 | 82.6 |
| Specificity (percent) | 35.3 | 44.7 | 84.2 | 90.2 |
| Positive predictive value (percent) | 43.8 | 47.9 | 76.7 | 81.4 |
| Negative predictive value (percent) | 100 | 100 | 100 | 90.9 |

and other pregnancy related complications associated with BV was estimated at $1 billion in 1993 and was projected to reach $1.4 billion by the year 2000 [11]. The widespread use of effective screening and treatment have the potential to significantly reduce the health costs / economic burden associated with BV in pregnant women. Based on an assumption of 15% BV rate in a population, identification and treatment of BV early in pregnancy should prevent one preterm birth per 150 pregnant women.

All women planning pregnancy should be aware of the association of BV with adverse pregnancy outcomes. Making a test for BV available to pregnant women is appropriate because BV is a common problem with serious and costly personal and social consequences, and is easy and inexpensive to diagnose, and safe and inexpensive to treat during pregnancy to reduces preterm birth (P=0.0016) (RR of preterm labor 1.9; 95% CI 1.2.-3.0).

Apart from various tests of Amsel's criteria, gram staining, oligonucleotide probes and culture of organisms of bacterial vaginosis are other tests which can be applied but are comparatively more time consuming and costly.

Amsel et al [4] described the clinical criteria for diagnosis of BV in 1983. In our study, the diagnosis of BV in PTL cases and controls was also based on Amsel's clinical criteria. Iftikhar [6] evaluated Amsel's criteria for diagnosis of BV in reproductive age group and found them to be accurate for diagnosis.

Prevalence of BV is found to be 35-40% in reproductive age group [13]. In our study, the overall prevalence of BV was 30.35%. Amongst the subjects, 44% had BV compared to 23% in controls (P=0.0016). The relative risk for PTL and preterm birth ranged from 1.9 (95% CI 1.2 - 3.0) to 6.9 (95% CI 2.5 - 18.8) [13]. In our study, the relative risk for preterm labor was 1.9 (95% CI 1.2 - 3.0). The incidence of BV is almost double in the subjects as compared to controls.

BV is more prevalent in young women between 20 and 30 years. In our study the mean age of women with PTL having BV, was 23.84 ± 3.23 years and in controls, it was 23.69 ± 2.91 years. The gestational age at which BV screening was done by us did not influence the risk of PTL. The mean gestational age of women with PTL and BV in our study group was 31.73 weeks and in controls it was 30.52 weeks.

BV is an important cause of preterm labor in nulliparous women. In the study group with BV, we found 45.45% cases were nulliparous compared to 21.74% in controls (P=0.004) while 52.27 belonged to low socioeconomic group compared to 78.26% in the controls (P=0002). Some studies show that

there is no effect of soico-economic and educational status as a risk for bacterial vaginosis. [14]. Asluraf -Ganjoei [15] finds BV to be more prevalent in low socioeconomic and uneducated class [12]. We found the socioeconomic status of 52.27% cases of PTL with BV was low and 45.45% cases were uneducated compared to 78.26% and 56.52% of the controls respectively.

The four tests of Amsel's criteria were applied to a total of 200 pregnant women and evaluation of individual tests was done to detect the most accurate test when applied independently. In a previous study it was found that, simultaneous use of both Whiff test and detection of clue cells in vaginal smear was very useful as a screening procedure and a negative result of both tests predicts a negative culture result in 99% cases [16]. We found that, the detection of clue cells in the vaginal smear, when applied alone, apeared to be the most significant laboratory test for diagnosis of BV as this test has high sensitivity and high positive and negative predictive values. The Whiff test is the most significant bed side test when applied alone for detection of bacterial vaginosis (Table 2).

## Conclusion

BV is a very important cause of PTL. The presence of clue cells in vaginal smear is the most specific laboratory test with maximum positive predictive value. The Whiff test is the most significant bed side test with high sensitivity, high specificity and high negative predictive value for diagnosis of bacterial vaginosis.

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