



The Role of Bacterial Vaginosis in Preterm Labour

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Abstract

Introduction: Preterm delivery is one of the major causes of perinatal mortality in India (26/1000 live birth). Bacterial vaginosis is said to be implicated as one of the causes of preterm labour.

Objective: To find out the association of bacterial vaginosis (BV) and preterm labour detected at 16-20 weeks and at 28-32 weeks of gestation.

Material and Method: Out of 810 pregnant women enrolled in the study in first trimester, 92 were excluded due to high risk factor for preterm labour. In the remaining 718 pregnant women, cotton wool swab was taken from posterior fornix and BV was detected. Diagnosis of BV was made by Neugent's scoring system at 16-20 weeks and again at 28-32 weeks of gestation by Ballard score.

Result: The prevalence rate of BV was 4.87% (35/718) at 16-28 weeks and 3.88% (27/670) at 28-32 weeks of gestation. The rate of preterm delivery among pregnant women with BV at 16-28 weeks was highest (19.75%, OR 1.9, CI 0.5-4.7) in comparison to BV detected at 28-32 weeks (15.38%, OR 1.4, CI 0.4-3.9).

Conclusion: Bacterial Vaginosis at 16-28 weeks is an independent risk factor for preterm labour (OR 1.9, 95%, CI 0.5-4.7).

Keywords: Pre-term labour, Bacterial vaginosis, Trans-vaginal Ultrasound.

Introduction

Preterm delivery is a major cause of perinatal mortality in India (26/1000 live birth).¹⁻⁴ Although preterm deliveries contribute to less than half of the total low birth weight incidence in India, the

accurate prediction, prophylaxis, and management of preterm babies has remained a unique challenge for every obstetrician. Though survival has improved with sophisticated neonatal care, the cost of therapy may not be affordable in

developing nation like ours. The aetiology of preterm labour is multifactorial. There is now well accepted evidence to implicate infection as a cause of preterm labour upto 40% of cases.^{5,6} Many organisms have been implicated in this process and bacterial vaginosis (BV) is one of its causal factors.⁷ It is characterized by a change from the normal lactobacillus dominated flora with a pH below 4.7 to a mixed anaerobic flora with pH above 4.7. Therefore this study was done to find out the association between preterm delivery and BV detected at 16 to 20 weeks of gestation and at 28 to 32 weeks of gestation.

Material and Methods

Total of 810 pregnant women seeking antenatal care at 16 to 20 weeks of gestation were included in this study. Gestational age was confirmed by last menstrual period and also on ultrasound (USG). At the same time information was collected on age, socioeconomic status, obstetric history, smoking, religion and literacy. Routine antenatal test and test for Syphilis (VDRL) was performed as a part of routine prenatal services. Neisseria gonorrhoea was sought by examination of Gram stained cervical smear and chlamydia by culture. Trichomonas vaginalis and candida infection were also excluded by microscopic examination of vaginal smear in 10% KOH and Saline solution respectively.

Out of 810 pregnant women 92 were excluded from the analysis because they exhibited the conditions associated with preterm delivery. The reasons for exclusion were as follows: 12 elective delivery before 37 weeks, Antibiotics taken after screening in 12, 2 lethal congenital malformations, 5 twins, 4 termination, 10 hypertension, 3 diabetes, 5 heart or kidney disease, 2 incompetent cervix and 37 had sexually transmitted disease. Frequent transvaginal ultrasound was done at 4 weekly intervals from 16 weeks of gestation to 28 weeks to exclude cervical incompetence. After excluding these women, only 718 women were enrolled finally in our study.

A cotton wool swab was taken from posterior vaginal fornix and it was rolled on a glass slide. Gram staining was done and the result was analysed according to Neugents scoring system for detection of BV.⁸ The total score was computed by adding the weighted quantitation of three morphotypes. A score of 7 to 10 was considered as an indicator of BV grade III, a score of 4-6 intermediate flora grade II and a score of 0-3 normal flora grade I.

All the patients were followed up with repeat gram staining of vaginal smear at 28 to 32 weeks of gestation for the persistence of infection with bacterial vaginosis. Diagnosis of preterm labour was defined as onset of labour before 37 completed weeks of gestation. The confirmation of gestational age was done according to Ballard Score⁹ (Ballard JL, 1991). Out of 718 women enrolled at 16 to 20 weeks of gestation, repeat smear was possible only in 670 pregnant women (48 women lost in follow-up) and complete delivery records were available only for 661 enrolled women.

Statistical Analysis

The statistical analysis used in this study is χ^2 test and multinomial logistic regression models for multivariable analysis. Regression analysis was adjusted according to age, parity and education of the mother, smoking during pregnancy, socioeconomic status and previous preterm delivery. Odds ratio with its 95% confidence interval were also calculated.

Observations

Demographic details of different grade of flora shows mean age for bacterial vaginosis positive cases to be 23.85 year, parity more >3 (34.29%), illiterate 65.7%, low socioeconomic status > 60%. The BV was detected in 4.87% (35/718) at 16 to 20 weeks of gestation and 3.88% (27/670) at 28 to 32 weeks of gestation. The rate of preterm delivery among women with BV at 16 to 20 weeks was higher (6/32, 18.75%, OR 1.9, CI 0.5-4.7) in comparison to the cases of BV

detected at 28 to 32 weeks of gestation (4/26, 15.38%, OR 1.4, CI 0.4-39) (Table 1). To further see the interaction of gestational age with BV and preterm delivery, the women were divided in 4 categories (Table 2) as follows:

1. Those who had BV both at first 16 to 20 weeks and second 28-32 weeks evaluation
2. Those who had BV at 16-20 weeks but absent at 28 to 32 weeks.
3. Those who were negative at 16 to 20 weeks but positive at 28 to 32 weeks

4. Those who did not have BV at either evaluation

The rate of preterm delivery was found to be more (3/16, 18.75%) in women who were positive for BV both at 16-20 weeks and 28-32 weeks of gestation. The risk remained same in women whose flora becomes negative for BV at 28-32 weeks of gestation (3/16, 18.75%). By multivariate logistic regression analysis, BV remained independently associated with preterm delivery (Odds ratio 1.59, 95% CI - 1.14-4.25) after adjustment for confounding variable (Table 3).

Table 1: Percent of preterm delivery among bacterial vaginosis positive mothers at 16 to 20 weeks and 28 to 32 weeks of gestation

Bacterial Vaginosis	Percent of Preterm delivery		Odds ratio and 95% CI	
	16 to 20 weeks	28 to 32 weeks	16 to 20 weeks	28 to 32 weeks
Present	18.75 (6/32)*	15.38 (4/26)**	OR 1.9 CI 0.5-4.7	OR 1.4 CI 0.4-39
Absent	10.96 (69/629)	11.96 (71/635)		

*out of 35 cases of BV, 3 cases were lost during follow up. ** out of 35 of BV, 9 cases were lost during follow up.

Table 2: Combined percent and number of preterm delivery (<37 week) in presence of Bacterial Vaginosis at 16 to 20 weeks and 28 to 32 weeks of gestation

Bacterial Vaginosis		No. of Women	Preterm delivery	
At 16 to 20 week	At 28 to 32 week		Number	Percent
Present	Present	16	3	18.75
Present	Absent	16	3	18.75
Absent	Present	10	1	10.00
Absent	Absent	629	68	10.81

Table 3: Multivariate analysis of risk factors for preterm delivery

Risk Factors	Odds ratio	95% CI
Bacterial Vaginosis	1.598	1.14-4.21
Age	0.567	0.38-0.84
Parity	0.870	0.70-1.07
Previous preterm	2.681	1.43-5.00
Poor Socioeconomic status	0.845	0.55-1.28
Literacy	1.844	1.02-3.32

Discussion

Bacterial vaginosis in clinical practice is usually diagnosed if at least three of the four composite

criteria described by Amsel et al (1983) are fulfilled, but this approach leads to inter-observer error, as most of the criteria are subjective.^{10,11}

The gram stained smear offers the advantage of being inexpensive and providing a sample which can be verified independently. The incidence of bacterial vaginosis in the population under study was 4.87% (35/718) at 16 to 20 weeks gestation and 3.88% (26/670) at 28 to 32 week gestation by Nugent's scoring.

Hillier et al and Carely et al found a higher prevalence rate of 16% and 29.77% respectively for BV by vaginal pH and gram staining^{7,12}. In another study, Riduan et al found a prevalence rate of BV of 17% and 15% of 16 to 20 week and 28 to 32 week respectively by Gram stain.¹³ Similarly Goffinet et al in a tertiary reference centre at Paris found a prevalence rate of 6.8% in women with preterm labour by Neugents scoring, which is quite comparable to our study.¹⁴ The difference in rate of detection of BV may be due to racial disparity and difference in demographics of population. Racial disparity is seen to occur more frequently in women of Afro-Caribbean origin living in UK compared to Caucasian women.¹⁵

The rate of preterm delivery among women with bacterial vaginosis at 16 to 20 weeks was 18.75% (6/32) compared with 10.96% (69/629) in women without bacterial vaginosis. In this study significant association was found between BV and preterm labour at 16 to 20 weeks (Odds ratio 1.9, 95% CI: 0.5-4.7) but less with bacterial vaginosis at 28 to 32 week gestation (Odds ratio 1.4, 95% CI: 0.4-39).

Logistic regression was used to study the association between bacterial vaginosis and preterm delivery in our pregnant mothers. BV remained independently associated with preterm delivery (Odds ratio 1.59, 95% CI: 1.14-4.21) after adjustment for confounding variables like age, parity, previous preterm delivery literacy and smoking. In multivariate analysis, significant risk of preterm delivery was found with previous preterm delivery (Odds ratio 2.681, 95% CI: 1.4-5.0).

The increased risk of preterm delivery found in this study with bacterial vaginosis at 16-20 week of gestation (Odds ratio 1.9, 95% CI: 0.5-4.7) is consistent with a possible process of infection ascending to chorioamnion early in pregnancy

leading to preterm delivery. Although we could not study the organism found in intra-amniotic fluid in cases of BV, several studies have proved that BV has been associated with two to three fold increase in infection of amniotic fluid.^{7,16}

Russell found that the incidence of chorioamnionitis declined as the gestational age increased¹⁷. The risk of chorioamnionitis in his study was 94.4% for women who delivered at a gestational age of 21 to 24 week, 39.6% at 25 to 28 week, 35.4% at 29 to 32 week and 10.7% at 33 to 36 week, which supports our observation that BV in early pregnancy is a risk factor for preterm delivery.

Conclusion

The bacterial vaginosis infection is an independent risk factor for preterm delivery if detected at 16 to 20 weeks of gestation. Therefore, women should be screened and treated for BV early in the second trimester of pregnancy and a prophylactic approach is required as by the time a woman is admitted in preterm labour, there may be irreversible changes in uterine cervix which makes it impossible to reverse the process of labour.

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