Study of association of bacterial vaginosis and preterm labour in a tertiary care hospital

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ABSTRACT

Introduction: Bacterial vaginosis (BV) is a condition characterized by a change in microbial echo system of vagina. This is a polymicrobial disorder with decrease in the number of Hydrogen peroxide (H2O2) producing lactobacillus and overgrowth of several facultative anaerobic bacteria. Treating bacterial vaginosis may prevent preterm labour and improve the perinatal outcome.The present study was done to know the association of bacterial vaginosis with preterm labour and to evaluate perinatal outcome.

Materials and methods: A prospective case control study of 100 pregnant women (with 50 preterm and 50 term pregnancies), were evaluated for bacterial vaginosis and perinatal outcome was observed.

Results: Preterm labor (PTL) was seen in 64% of unbooked cases and majority cases (48%) were at 32-34 weeks gestational age. The test for bacterial vaginosis was positive for 24% of cases and 8% of control (P<0.05, Odds ratio=3.63,95%CI,1.08-12.18), showing its association with preterm labour. Neonatal complication was more in preterm with bacterial vaginosis.

Conclusion: From this study it is clearly evident that BV is one of the most important causes of PTL leading to various neonatal mortality, morbidity and even permanent disability. Its detection and early treatment may improve the perinatal outcome.

Key words: Bacterial vaginosis, Preterm labour, Nugent's test, Amsel test

INTRODUCTION

Bacterial vaginosis is a polymicrobial disorder characterized by decrease in the number of H2O2 producing lactobacillus and overgrowth of several facultative anaerobic bacteria like Gardnerella vaginalis, Haemophillus vaginalis, Mycoplasma, or anaerobes like Bacteriods spp., Prevotella spp and Mobiluncus spp[1,2,3]. Recently, new molecular methods have identified Atopobium vaginae as a BV associated microbe [4].

In vaginal echo system, under physiologic condition the H2O2 producing lactobacillus accounts for 95% of flora and it acts against proliferation of other microbes by maintaining acidic PH[5]. In normal condition the ratio of anaerobe to aerobe is 2:1 to 5:1.In presence of bacterial vaginosis, there is a shift of this ratio to 100:1 and 1000:1, with subsequent decrease in acid producing lactobacillus[6]. Bacterial vaginosis is one of the common genital infections in pregnancy. 50% patients are asymptomatic and when the symptoms do occur, they are usually mild, and the common mode of presentation is malodorous vaginal discharge[7]. Prevalence is high in population having risk factors like, black race, smoking, use of vaginal douching, sexual activity, contraceptive practice[3,8]. Apart from other infectious causes, in recent years, increase attention has been given to relationship between altered vaginal bacterial flora and low birth weight (LBW), preterm birth (PTB) and premature rupture of membrane (PROM).Specifically numerous reports indicate an association between BV and bacterial vaginosis associated micro-organisms, with PTL and PROM[9,10,11]. Preterm labour is regular preterm uterine contraction at least 4 contractions in 20 minutes or 8 contractions in 60 minutes lasting more than 40 seconds with progressive change in the cervical score in the form of effacement more than 80% and dilatation of cervix >1 cm occurring after 28 weeks but before 37 completed weeks of gestation[15].

Bacterial vaginosis is believed to be the risk factor for preterm delivery as well as being associated with preterm premature rupture of membrane (PPROM), chorioamnionitis, and postpartum endometritis[16, 17,22].

As bacterial vaginosis is not an infection caused by single pathogen, microbiological culture, which is considered as gold standard in diagnosis of other infection, cannot reliably predict the presence of Bacterial vaginosis[6]. It is a syndrome that can be diagnosed both clinically and microbiologically. Two diagnostic tests are used for bacterial vaginosis. One is Amsel criteria[12] and other is gram stain using Nugent's criteria[13,14].

AMSEL CRITERIA (1983): the diagnosis of bacterial vaginosis is made if 3 of the following tests are positive.

a. An adherent and homogenous vaginal discharge, with fishy odour
b. Vaginal PH>4.5
c. Detection of clue cells(mature vaginal squamous epithelial cells coated with bacteria) on wet mount
d. An amine odour after addition of KOH (whiff test)

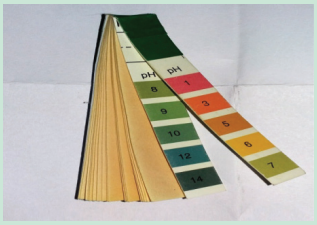

Figure 1:P H stick : for detection of vaginal P H

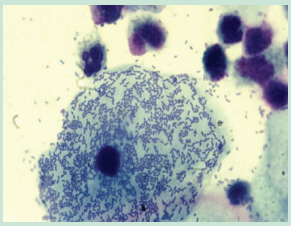

Figure 2: Clue cells: Mature vaginal squamous epithelial cells coated with bacteria. [H&E,x40].

NUGENTS CRITERIA:

This diagnosis involves gram stain of vaginal fluid and use Nugent's criteria (scoring system). Vaginal swab is obtained, spread on glass slide, air dried and later Gram stained. The amount of 3 morphotypes observed are quantified and scored. The Nugent criteria is the most often used in epidemiologic studies.

Scoring system of Nugent's criteria:

Score	Organism morphotypes per average high power field		
	Lactobacillus£	Gardenella / Bacteriods¥	Mobiluncus¶
0	>30	0	0
1	5-30	<1	1-5
2	1-4	1-4	>5
3	<1	3-30	-
4	0	>30	-

£ Parallel sided, Gram +ve rods

¥ Tiny, Gram variable coco-bacilli & rounded pleomorphic rods

¶ Curved Gram -ve rods

0-3 is considered negative of bacterial vaginosis

4-6 is considered intermediate

7-10 is considered indicative of bacterial vaginosis

MATERIALS AND METHODS

This study was undertaken from September 2009 to august 2011, 50 cases of preterm labour admitted to this hospital without any apparent detectable causes were selected as study group and 50 cases of term pregnancy were selected as control group. Cases with cervical insufficiency, placenta previa, abruptio placenta, preterm rupture of membrane, uterine anomaly, multiple pregnancy and medical disease are excluded from study. A detail history, obstetrical examination, speculum and per vaginal examination done. Appearance of vaginal discharge if any noted and pH was measured [Figure 1]. Smear from posterior fornix was taken for wet mount, KOH (amine) test and Gram stain. Nugent's score>7 was considered as positive for bacterial vaginosis. These cases were studied and followed up and data analyzed. We compare the categorical data using chi square test and for continuous variables student's t - test was used. 'P' values < 0.05 was considered significant. The association of bacterial vaginosis with preterm labour was expressed as odds ratio (OR), its standard error and 95% confidence interval (CI), calculated according to Altman method, 1991.

RESULTS

The incidence of preterm labour was 10.2% in our study and is is more in age group of 20-30years in both preterm and term group(76% Vs 40%).The incidence is significantly higher among unbooked cases [(64%) ,P=0.015]. Incidence of Preterm labour is high in Low Socio-Economic Classes (60%), which is significant (P=0.001). [Table 1]

Table 1: Demographic Charecteristics		Preterm (N=50)	Term (N=50)
Age (Years)	<20	8(16%)	16(32%)
	20-30	38(76%)	20(40%)
	>30	4(8%)	14(28%)
Socio Economic Status	Lower	30(60%)	17(34%)
	Middle	18(36%)	25(50%)
	Higher	2(4%)	8(16%)
Booking Status	Booked	18(36%)	34(68%)
	UnBooked	32(64%)	16(32%)

Table 1 showing Incidence of preterm labour with age, socioeconomic status and booking status.

In our study most of mothers in preterm group are second gravida (50%) followed by primigravida (32%). Also in term group most of cases are second gravida (44%) followed by primigravida (38%). No significant difference observed between both groups (P>0.05). Among preterm group maximum number of cases belongs to gestational age 32-34weeks (48%). 24% of women with PTL had previous history of preterm labour as compared to 2% of term pregnancy, which was statistically significant in our study(P=0.001). Both group had comparable history of abortion [Table 2]. Amsel test is positive in 22% cases of preterm group and 6% cases in term group. Nugent test is positive in 24% of cases in preterm group and 8% in term group (OR=3.63, 95% CI, 1.08-12.18). Both are statistically significant (P<0.05). So our study was showing significant association of bacterial vaginosis with preterm labour. We considered Nugent's criteria to confirm diagnosis of bacterial vaginosis in our study. [Table 3]

Table 2: Obstetrical Charecteristics		Preterm (N=50)	Term (N=50)
Gravidity	PRIMI	16(32%)	19(38%)
	G2	25(50%)	22(44%)
	=G3	9(18%)	9(18%)
Gestational Age (in Weeks)	28-30	4(8%)	-
	30-32	16(32%)	-
	32-34	24(48%)	-
	>34	6(12%)	-
Previous Pregnancy Outcome	Abortion	13(26%)	15(30%)
	Previous PTL	12(24%)	1(2%)

Table 2 showing Obstetrical characteristics.

Maximum number of PTL with BV+ve cannot be arrested (i.e. onset of labour to delivery interval less than 24hours), by means any tocolytic therapy [Table 4]. In the present study it is clear that low birth weight and low APGAR score and NICU admission rate was more in preterm neonates delivered to mother with bacterial vaginosis [Table 5]. In our study 11(92%) out of 12 cases of preterm with bacterial vaginosis had poor perinatal outcome in comparison to 3(75%) out of 4 cases of term with bacterial vaginosis. In preterm group, 42% newborn delivered from mother with bacterial vaginosis died in comparison to 13% neonate died from mother without bacterial vaginosis and 50% neonate delivered from mother with bacterial vaginosis suffered from adverse perinatal event like neonatal septicemia, RDS and hyperbilirubinemia in comparison to 34% without bacterial vaginosis [Table 6]

Table 3: Result of Diagnostic Test		Preterm (N=50)	Term (N=50)
Amsel Test	+VE	11(22%)	3(6%)
	-VE	39(78%)	47(94%)
Nugents Test	+VE	12(24%)	4(8%)
	-VE	38(76%)	46(92%)

Table 3 showing Amsel and Nugnet test results.

TABLE 4: INTERVAL BETWEEN ONSET AND DELIVERY OF PTL		
Interval	BV(+VE) (N=12)	BV(-VE) (N=38)
<24 Hours	7(58%)	10(26%)
< 1 Weeks	3(25%)	13(34%)
1-2 Weeks	2(17%)	13(34%)
>2 Weeks	0(0%)	2(5%)

Table 4 showing time interval between onset and delivery of preterm labour.

Birth Weight (in Kg)	Preterm		Term	
	BV(+VE) (N=12)	BV(-VE) (N=38)	BV(+VE) (N=4)	BV(-VE) (N=46)
<2.5	9(75%)	21(55%)	0(0%)	10(22%)
≥2.5	3 (25%)	17 (45%)	4 (100%)	36 (78%)
APGAR <7	10(83%)	22 (58%)	3 (75%)	12(26%)
APGAR ≥7	2(17%)	16 (42%)	1 (25%)	34 (74%)
NICU Admission Yes	11(92%)	24 (63%)	3 (75%)	9(20%)
No	1(8%)	14 (37%)	1 (25%)	37 (80%)

Table 5 showing perinatal outcome.

Neonatal Complications	Preterm		Term	
	BV(+VE) (N=12)	BV(-VE) (N=38)	BV(+VE) (N=4)	BV(-VE) (N=46)
Neonatal Death	5(42%)	5(13%)	1(25%)	2(4%)
Septicemia	3 (25%)	3 (8%)	1 (25%)	3 (7%)
RDS	2(17%)	5 (13%)	1 (25%)	1(2%)
Hyperbili rubinemia	1(8%)	5 (13%)	0 (0%)	3 (7%)

Table 6 showing Neonatal complications

DISCUSSION

Although the introduction of new pharmacological agents to treat preterm labour has given some optimism for several decades, prematurity rate has remained relatively constant at approximately 7-10% of all births in developing countries like India. The incidence of preterm labour in our study was 10.2%. This incidence is within the global range of 5-21 %[20].

PTL was found to be more in age group 20-30years which is 76% as compared to 60% in term labour(P=0.001), this was statistically significant in our study. Fertility is maximum in this age; hence the pregnancy as well as preterm labour may be more prevalent in this age. Stainer[19] and co-worker identified that age <19years or >40years are also important risk factor for PTL.

The incidence of PTL is higher among unbooked cases (64%), which was found to be statistically significant. Unbooked cases are deprived of getting medical care for risk factors, which may affect the outcome of pregnancy leading to PTL[3].

PTL was found to be more in low SES group (P=0.015).Low SES means poor nutrition and hypoproteinemia. Low socioeconomic status is associated with low maternal education, poor childhood nutrition, lack of access to proper health care and long duration of stressful work[20]. Newton's study reported that, bacterial vaginosis had direct relationship with low cultural level[21]. In our study preterm birth was common in gestational age of 32-34 weeks.

The maximum number of cases (50%) occurs in second gravida, followed by 32% in primigravida. The cause of preterm labour in primigravida cannot be explained clearly. However the tendency for PTL in multigravida may be explained by increased incidence of cervical trauma due to repeated child birth, anemia, and malnutrition[11]. We found history of preterm labour had a statistically significant association (P=0.001)with preterm labor than term group (24% vs. 2%). Similar observation noted Nejad VM et al[7].

The association of bacterial vaginosis and preterm labour was first studied by Eschenbach and coworker[22]. Their study showed bacterial vaginosis in 49% and 24% ,in preterm and term groups respectively. Nejad et al in their study found bacterial vaginosis in 25% and 11% of preterm and term group respectively(OR=2.63, 95%CI, 1.03-6.85,P=.024).7 Our study was showing significant association of bacterial vaginosis with preterm labour (OR=3.63, 95% CI ,1.08-12.18).Maximum number of PTL with BV+ve(58%) cases could not be arrested by tocolytics once labour process had started compared to only 26%in BV-ve cases (p<0.05)

In this study perinatal outcome in premature birth with BV+ve are discouraging. Bacterial vaginosis associated with higher rate of perinatal morbidity and mortality in preterm cases. As evident by various study timely treatment of bacterial vaginosis may alter the perinatal outcome[9,10].

CONCLUSION

From this study it is clearly evident that BV is one of the most important causes of PTL leading to various neonatal mortality, morbidity and even permanent disability.

Methods and materials to detect bacterial vaginosis is very simple, can be carried out as outdoor procedure. If diagnosed in the early part of pregnancy and treated with antimicrobial therapy, then perhaps we can decrease the burden of prematurity which will be great benefit for society and Nation.

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