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Original Research Article

Study on bacterial vaginosis in pregnant women and associated factors on maternal and fetal outcome

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ABSTRACT

Background: Bacterial vaginosis (BV) is a condition in which the normal, lactobacillus-predominant vaginal flora is replaced with anaerobic bacteria, *Gardnerella vaginalis* and *Mycoplasma hominis*. It is one cause of vaginitis among pregnant and non-pregnant women and an extremely prevalent vaginal condition.

Methods: The present study was conducted on all antenatal women attending OPD satisfying the inclusion criteria was taken during the study period 1st October 2012 to 30th June 2014 in GSL General Hospital, Rajahmundry was examined for bacterial vaginosis using Nugent score. All pertinent obstetric and neonatal data covering antenatal events during the course of pregnancy, delivery, puerperium and condition of each newborn at the time of birth was collected. BV was detected by both Gramstain (Nugent criteria) and gold standard clinical criteria (Amsel's composite criteria).

Results: In this study bacterial vaginosis is seen in 313 cases of educated women (62.6%) as most of them have got primary education and 187 (37.4%) cases are uneducated. In this study, symptomatic bacterial vaginosis is more common in multigravida (Bladder -23; Discharge -50) 73 (22%) when compared with primigravida 11 (6.5%) probably because of longer period of marital life. In this study antenatal risk factors like previous IUCD (4.2%) use, H/O STD's (1.4%), husband having h/o of multiple sexual partners (1.8%) are 7.4%. No cases of smoking, alcohol, drug abuse, douching were reported.

Conclusions: Both primigravida and multigravida asymptomatic cases are more when compared to symptomatic cases leading to the need for routine screening. Routine screening of antenatal women resulted in the decrease of adverse pregnancy outcome.

Keywords: Antenatal risk factors, Bacterial vaginosis, Nugent score, Pregnant women

INTRODUCTION

Bacterial vaginosis (BV) is a condition in which the normal, lactobacillus-predominant vaginal flora is replaced with anaerobic bacteria, *Gardnerella vaginalis* and *Mycoplasma hominis*.¹ It is one cause of vaginitis among pregnant and non-pregnant women and an extremely prevalent vaginal condition.² Bacterial vaginosis has been associated with missed abortion,

premature rupture of membranes preterm delivery, intrauterine growth retardation, infection of the chorion and amnion, histologic chorioamnionitis, infection of amniotic fluid.³⁻⁷ Anaerobic gram-negative rods, *G.vaginalis*, and *M.hominis*, have been linked to above complications.

This suggests that it may be possible to prevent above complications by early detection and treatment for

bacterial vaginosis and eradicating it early in pregnancy. BV is detected by Gram stain (Nugent criteria) and accepted Gold standard criteria (Amsel's composite criteria). Currently, very few studies, that have been conducted among pregnant women to describe the changes in vaginal flora or BV prevalence during gestation. Of interest would be the assessment of bacterial vaginosis in all pregnant women.

Objective of this study was to determine bacterial vaginosis in all pregnant women and associated factors on maternal and fetal outcome.

METHODS

The present study was conducted on all antenatal women attending OPD satisfying the inclusion criteria was taken during the study period 1st October 2012 to 30th June-2014 in GSL general hospital, Rajahmundry was examined for bacterial vaginosis using Nugent score.

All pertinent obstetric and neonatal data covering antenatal events during the course of pregnancy, delivery, puerperium and condition of each newborn at the time of birth was collected. BV was detected by both Gramstain (Nugent criteria) and gold standard clinical criteria (Amsel's composite criteria).

Inclusion criteria

- All antenatal women attending antenatal O.P. in GSL general hospital.

Exclusion criteria

- Women in active labour
- History of leaking per vaginam
- Bleeding per vaginam
- Antibiotic therapy in last one month.

A detailed history was taken regarding age, parity, period of gestation in weeks, medical history, history of vaginal symptoms like vaginal discharge, malodour, obstetric

history of previous preterm deliveries, abortions, history of leak PV in the present pregnancy. Gestation age was calculated from first day of the last menstrual period and was confirmed by ultrasound examination.

Baseline parameters like pulse, BP, temperature were recorded. Weight and height of the patient were recorded. Presence of pallor, and pedal edema, was noted. Cardiovascular and respiratory systems were examined.

Abdominal examination was performed to see height of uterus, presentation, position, lie of fetus, liquor volume, and fetal heart sounds were recorded. Speculum examination was done and any discharge and leak were noted. Length, position, dilatation of cervix, presence or absence of membranes, was noted.

The vaginal pH was measured using pH strips. Cotton swabs were used to obtain the vaginal discharge from posterior vaginal fornix and smear was done on a slide. Amine test was done to know the presence or absence of amine odour by addition of 10% KOH for the characteristic fishy smell, also known as Whiff test.

Smear was gram stained and scores for BV as proposed by Nugent et al were assigned.

Treatment

In this study patients positive for Bacterial Vaginosis are treated by Tab. Metronidazole 500 mg orally for 7 days.

Statistical analysis

Ms excel was used for data entry and SPSS version 21 was used for analysis. Values were presented as percentages; chi square test was used for analysis of categorical data. For all statistical analysis $P < 0.05$ was considered as statistically significant.

RESULTS

The present study bacterial vaginosis was found 19.57%.

Table 1: Age wise distribution and gestational age.

Gestational age	17-19 years	20-24 years	25-29 years	30-35 years	Above 35 years
<28 weeks	0.8%	1.4%	0%	2.4%	0%
29-36 weeks	1%	5.4%	2%	0.2%	0%
37-40 weeks	7.4%	57.6%	15.4%	2%	0.2%
>41 weeks	0.4%	4.4%	1.6%	0%	0%

In present study out of 500 positive cases, majority i.e. 89.6% (448 out of 500) of them were delivered at 37-40 weeks. This is probably due to routine screening and management of the positive cases (Table 1).

In this study, symptomatic bacterial vaginosis is more common in low socio-economic status (24.8%) compared to middle and upper class. In low socioeconomic status group 8.7% had bladder complaints and 16.1% had

discharge complaints which counts to 24.8%. There was statistically significant association was found ($p < 0.0001$).

In this study bacterial vaginosis is seen in 313 cases of educated women (62.6%) as most of them have got primary education and 187 (37.4%) cases are uneducated.

Symptomatic bacterial vaginosis is seen in only 30 (9.9%) cases of educated women. This low incidence may be due to their good hygiene practices. In uneducated 54 (28.9%) had bacterial vaginosis. There was statistically significant association was found ($p < 0.0001$) (Table 2).

Table 2: Relation of symptomatic bacterial vaginosis with socio-economic status (SES) and education status.

Characteristics	Bladder (%)	Vaginal discharge (%)	No complaints (%)
SES			
Low	20 (8.7%)	37 (16.1%)	173 (75.2%)
Middle	5 (2.4%)	15 (7.2%)	187 (90.3%)
High	1 (1.6%)	6 (9.5%)	56 (88.9%)
Education status			
Educated	7 (2.2%)	23 (7.3%)	283 (90.4%)
Uneducated	19 (10.2%)	35 (18.7%)	133 (71.1%)

Table 3: Relation of symptomatic bacterial vaginosis.

Parameters	Bladder (%)	Vaginal discharge (%)	No complaints (%)
Parity			
Primi	3 (1.8%)	8 (4.7%)	158 (93.5%)
Multi	23 (6.9%)	50 (15%)	258 (77.9%)
Gestational age			
Abortion	0 (0%)	5 (8.6%)	4 (1%)
Preterm	4 (15.4%)	21 (36.3%)	5 (1.2%)
Full term	22 (84.6%)	31 (53.4%)	395 (95%)
Prolonged pregnancy	0 (0%)	1 (1.7%)	12 (2.9%)
Urinary tract infection			
Abnormal urine report	26 (39.4%)	31 (47%)	9 (13.6%)
Normal urine report	0 (0%)	27 (6.2%)	407 (93.8%)
Recurrent bacterial vaginosis			
Recurrent BV	12 (16.7%)	47 (65.3%)	13 (18%)
BV (single episode)	14 (3.3%)	11 (2.5%)	403 (94.2%)

In this study, symptomatic bacterial vaginosis is more common in multigravida (Bladder -23; Discharge-50) 73 (22%) when compared with primigravida 11 (6.5%) probably because of longer period of marital life. There was statistically significant association was found ($p < 0.0001$) (Table 3).

82 (16.4%) pregnant women were symptomatic out of which a significant number i.e 30 (60.3%) went into spontaneous abortion and spontaneous preterm labour. Out of remaining 416 asymptomatic bacterial vaginosis cases, 9 (2.2%) went into spontaneous abortion and spontaneous preterm labour. There was statistically significant association was found ($p < 0.0001$) (Table 3).

Urinary tract infection was seen in 66(13.2%) pregnant women. There was statistically significant association was found ($p < 0.0001$) (Table 3).

Table 4: Bacterial vaginosis and antenatal risk factors.

Risk factors	No. of cases	Percentage
H/o exposure to std	7	1.4%
Husband with multiple sexual partners	9	1.8%
IUCD	21	4.2%
Nil	463	92.6%

Out of 66 pregnant women who had puerperal complications, 26 (39.4%) had bladder complaints, 31 (47%) had vaginal discharge; 9 (13.6%) had no complaint.

In present study recurrent bacterial vaginosis was seen in 72 (14.4%) antenatal women. Out of 72 cases of recurrent bacterial vaginosis (H/o bacterial vaginosis in previous

pregnancy) majority (82%) are symptomatic. There was statistically significant association was found ($p < 0.0001$) (Table 3).

In this study antenatal risk factors like previous IUCD (4.2%) use, H/O STD's (1.4%), husband having h/o of multiple sexual partners (1.8%) are 7.4%. No cases of smoking, alcohol, drug abuse, douching were reported (Table 4).

DISCUSSION

The prevalence rate of bacterial vaginosis in this study is 19.57%. Prevalence of bacterial vaginosis among pregnant women varies from 6 to 32 percent in various studies.⁸ In Asia, the prevalence of BV during pregnancy is 13.6% in Japan and reported prevalence in Thailand is about 15.9%. The reported prevalence in pregnant women ranges from 14% to 21% in Western countries which were comparable to present study.

In Iran, the prevalence of bacterial vaginosis (BV) ranges from 4 to 64%, depending on the racial, geographic and clinical characteristics of the study population.⁹

In asymptomatic women, the prevalence varies from 12 to 25%, and similar percentages are observed in pregnant women.

In a study conducted by Mathew R et al in Chennai, out of 200 antenatal women BV was diagnosed in 38.5% of symptomatic antenatal women.¹⁰

Kurki et al, in their study of 790 unselected healthy nulliparous between 8-17 weeks of gestation, using Schnadig's criteria, a combination of gram stain, papnicolaou smears and culture for *G. vaginalis*, for diagnosis of bacterial vaginosis.¹¹ And they reported a prevalence of 27.5%. They found no difference in terms of age, parity and gestational age. Gram stain could predict 167 of 169 bacterial vaginosis positive and only 5 women was gram stain positive where culture was negative. Papanicolaou smear predicted bacterial vaginosis in 77.2% of culture positive women and in 1.5% pap suggested vaginosis where culture was negative ($r=0.97$, $p=0.001$). Bacterial vaginosis in early pregnancy was associated with a 2.6 fold risk (95% CI, 1.3-4.9) for preterm labour, a 6.9 fold risk (95% CI, 5-18.8) for preterm birth and 7.3 fold risk for preterm premature rupture of membranes (95% CI 1.8-29.4). Since bacterial vaginosis was detected in 19-30% of women in early gestation, 19% in mid gestation and 14-18% in later gestation, they concluded that vaginal bacterial milieu as assessed in early pregnancy, represented that throughout pregnancy if no therapy or no interventions were done. They also concluded that gram stain and pap smear is sufficient to diagnose bacterial vaginosis in early pregnancy.

Purwar et al, in a cohort study of 1006 asymptomatic pregnant women between 16-28 weeks of gestation using Nugent criteria, reported a prevalence of 11.6%.¹² They also reported a significant increase in preterm birth ($P=0.001$) and preterm premature rupture of membranes ($P=0.001$).

Jacobsson et al, in their cohort study of 924 patients in a Swedish population using clue cells in papsmear as diagnosing criteria for bacterial vaginosis, reported prevalence of 15.6%.¹³ The risk of postpartum endometritis was tripled among women with bacterial vaginosis (RR=3.26, 1.36-7.71). They observed no statistical significance for spontaneous preterm birth among women with bacterial vaginosis although the risk of preterm birth was doubled in women with bacterial vaginosis.

Gravett et al, in their study of 582 women in the second and third trimesters of pregnancy at university hospital, Seattle, using gas liquid chromatography (GLC) for diagnosis of bacterial vaginosis, reported a prevalence of 19%.¹⁴ They did not find any difference with respect to demographic or socioeconomic factors and parity. However first trimester spontaneous abortion was significantly higher among those women with Bacterial vaginosis. Gas liquid chromatography as a method of diagnosis had a sensitivity of 92%. They also reported a significantly increase of preterm labour ($P < 0.01$), preterm premature rupture of membranes ($P < 0.01$), low birth weight and chorioamnionitis among bacterial vaginosis positive women ($P < 0.05$).

Pastore et al, in their cohort study of 913 pregnant women in USA using Nugent criteria between 25-29 weeks reported prevalence of 17%.¹⁵ Approximately 80% of bacterial vaginosis were asymptomatic.

In the study by Mathew et al, of 200 antenatal women (150 symptomatic and 50 asymptomatic) they reported a prevalence of 38% using Nugent criteria, and also reported that incidence of preterm labour is higher in Bacterial vaginosis patients.¹⁰

In a study conducted by Ibrahim SM et al the prevalence of BV in pregnant women in Maiduguri North Eastern Nigeria is 17% which is comparable to a similar study in South East Nigeria in contrast to 21-29% reported in some studies among pregnant women in Kenya and South Africa and 11-15% from industrialized countries.¹⁶

Prevalence of bacterial vaginosis in non-pregnant women is comparable to pregnant women.

In a study conducted by Bhalla et al, in Delhi in 2005 bacterial vaginosis was diagnosed in 70 (32.8%) non-pregnant women. A high percentage though asymptomatic (31.2%) were found to have bacterial vaginosis.¹⁷

In a study conducted by Madhivanan P et al in Mysore in 2005-2006, the prevalence of bacterial vaginosis in non-pregnant women was 19%. Co-infection with *T.vaginalis*, however was common.¹⁸ BV was independently associated with concurrent *T.vaginalis* infection and partner's alcohol use.

In present study out of 169 primigravida cases symptomatic cases of bacterial vaginosis is seen in 11 (2.2%) and asymptomatic bacterial vaginosis is seen in 158 (31.6%). Out of 331 multigravida symptomatic bacterial vaginosis is seen in 73 (14.6%) and asymptomatic cases are seen in 258 (51.6%).

In present study bacterial vaginosis is positive in 169 (33.8%) primigravida out of 500 cases. Remaining 331 (66.2%) patients were multigravida.

In a study conducted in South East Nigeria by Ibrahim et al, multigravida constituted the highest group, 53 (77%) out of 69 with BV which is comparable to our study 331 out of 500 (66.2%).¹⁶ This was probably due to increased coital frequency resulting in reduction in the physiological barrier in the vagina, resulting in overgrowth of normal commensals.

In present study, pregnant women of age between 20-24 are more 345 out of 500 (69%). p value is significant (0.003); where as in a study conducted by Ibrahim et al prevalence of BV decreased with increasing age from 20 years up to the age of 42 years and more pregnant women aged 20-24 years 32 out of 69 (46.3%) had BV than those in other age groups.¹⁶ In present study 472 (94.4%) out of 500 pregnant women are between age group 17-29 years where as in a study conducted by Ibrahim et al 59 (85.7%) out of 69 BV positive pregnant women are in the age group of 17-29 years which is comparable to our study.¹⁶

In present study out of 500 positive cases, majority of them were delivered at 37-40 weeks. This is probably due to routine screening and management of the positive cases.

In this study, bacterial vaginosis is more common in low socio-economic group (24.8%) compared to middle and upper class. In low socioeconomic status group 8.7% had bladder complaints and 16.1% had discharge complaints which counts to 24.8%. 'p' value is also significant (0.000). Where as in a study conducted by Anjum M et al majority of the pregnant women suffering from bacterial vaginosis were of low socioeconomic class as compared to bacterial vaginosis negative pregnant women and the difference was statistically significant.¹⁹

In this study bacterial vaginosis is seen in 313 (62.6%) cases of educated women as most of them have got primary education and 187 (37.4%) cases are uneducated. Symptomatic bacterial vaginosis is seen in only 30/313 (9.9%) (bladder-2.2%; discharge - 7.3%) cases of

educated women. This low incidence may be due to their good hygiene practices. In uneducated 54/187(28.9%) had bacterial vaginosis. 'P' value also showed significance (0.000). Similarly in a study conducted by Ibrahim et al pregnant women who got primary education were more 37 (54%) out of 54 pregnant women and women who are uneducated were 17 (25%) out of 54 patients.¹⁶

Similarly antenatal risk factors are high in case of uneducated when compared with educated women and 'P' value showed significance (0.018).

In present study past history of bacterial vaginosis (recurrent bacterial vaginosis) is seen more in uneducated women when compared with educated women for the same reasons. 'P' value showed significance (0.001).

In present study of 500 bacterial vaginosis positive cases, 82(16.4%) pregnant women were symptomatic out of which a significant number i.e 30(60.3%) went into spontaneous preterm labour and spontaneous abortion. Out of remaining 416 asymptomatic bacterial vaginosis cases, 9 (2.2%) went into spontaneous preterm labour and spontaneous abortion. 'p' value is also significant (0.000). Where as in a study conducted by Lata I et al, out of 164 women who were followed till the final outcome of delivery, 65 were having adverse outcome and the rest 99 were delivered without any complications.²⁰ Adverse outcomes such as preterm labor, PROM and fetal complications (prematurity, low birth weight) were found more in pregnant women with bacterial vaginosis (N=41), bacterial vaginosis with UTI (N=14) as compared to those without bacterial vaginosis.

In present study of 2554 antenatal women, 500 women were positive for bacterial vaginosis and 82 (16.4%) pregnant women were symptomatic out of which a significant number i.e 30 (60.3%) went into spontaneous preterm labour and spontaneous abortion. Out of remaining 416 asymptomatic bacterial vaginosis cases, 9 (2.2%) went into spontaneous preterm labour and spontaneous abortion. 'p' value is also significant (0.000).

A case control study performed by Hiller et al in 10397 pregnant women between 23 to 26 weeks of gestation showed that BV was detected in 16% of these women. Women with BV were more likely to be unmarried, to have low income and to have previously delivered low birth weight infants.⁶ In this study the presence of BV was related to preterm delivery of LBW infants with an odds ratio of 1.4. Other risk factors were the loss of an earlier pregnancy, smoking and black race.

Svare et al, studied the outcome of pregnancy of 3262 singleton pregnancy women included before 20 weeks of gestation.²¹ The prevalence of BV was 16% and the rate of preterm delivery was 5.2%. Univariate analysis showed that BV was marginally associated with preterm

delivery but significantly associated with LBW and clinical chorioamnionitis.

The study conducted by Demba et al, showed 47.6% prevalence of BV by Nugent's score and 30.8% by Amsel's criteria. Presence of H₂O₂ producing lactobacilli was associated with significantly lower prevalence of *G.vaginalis*, anaerobes and Chlamydia trachomatis.²²

Diejomaoh et al, studied 123 pregnant women with preterm labour.²³ BV was diagnosed clinically and bacteriologically in 34 women giving a prevalence rate of 28%. There was a positive correlation between BV, preterm labour (21%) and PROM (21%) and concluded BV is significantly associated with prematurity.

Shahgeibi et al, did a cohort study in 2006 with 136 women who had BV, diagnosed before 28th week of gestation and 397 pregnant women without BV, as non-exposure group.²⁴ In their study the incidence for abortion, IUD, preterm labour and PROM were 1.3%, 0.9%, 3.6% and 1.3% respectively. They did not find statistical relationship between BV and abortion but there was a significant relationship between BV and IUD, preterm labour and PROM.

Dhawane et al, did a cross sectional study of 515 patients delivered in district general hospital Wardha. In their study the frequency of preterm labour was 10.2%, PROM was 13.2% and idiopathic preterm deliveries was 35.8%.The incidence of BV in cases of idiopathic preterm labour and PROM was 70.07%.²⁵

A meta-analysis done by Letich et al, showed that BV increased the risk of preterm delivery more than two fold with an odds ratio 2.19. It also significantly increased the risk of spontaneous abortion and maternal infection with an odds ratio of 9.91 and 2.53 respectively. There were no significant results for outcome of neonatal infection or perinatal death. They concluded that BV early in pregnancy is a strong risk factor for preterm delivery and spontaneous abortion.²⁶

In present study urinary tract infection was seen in 66/500 (13.2%) pregnant women. Out of 66 pregnant women who had puerperal complications; 26 (39.4%) had Bladder complaints; 31 (47%) had vaginal discharge; 9 (13.6%) had nil complaints. 'p' value is significant (0.000). Whereas in a study conducted by Lata I et al.²² The incidence of UTI with bacterial vaginosis 14 out of 41. The incidence of UTI with bacterial vaginosis is higher (34.1%) than without bacterial vaginosis (23.3%). The incidence of poor pregnancy outcome was higher in bacterial vaginosis with UTI.

CONCLUSION

Both primigravida and multigravida asymptomatic cases are more when compared to symptomatic cases leading to the need for routine screening. Routine screening of

antenatal women resulted in the decrease of adverse pregnancy outcome.

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