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Incidence of bacterial vaginosis and associated risk factors in pregnant women attending the antenatal clinic in a district headquarters hospital in south India

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Abstract
Introduction: Bacterial vaginosis (BV) is a condition of vaginal flora imbalance, in which the typically plentiful Lactobacillus are scarce and other bacteria, such as Gardnerella vaginalis, and anaerobes (e.g. Mobiluncus, Bacteroides), are overly abundant. BV has been related to many complications of pregnancy including PID, endometritis, amniotic fluid infection, preterm delivery (up to 40 percent of premature births), preterm labour, PROM, and, possibly, spontaneous abortion. Certain factors or behaviours that increase a woman's risk of BV during pregnancy include race, sexual activity, socio-economic status, maternal stress. The present study aimed to screen both symptomatic and asymptomatic pregnant women for BV and to determine any associated risk factors.
Materials and methods: In this descriptive cross-sectional study, a total of 160 pregnant women at various periods of gestation were screened for bacterial vaginosis by simple random sampling during their routine antenatal visits in District Headquarters Hospital, Chittoor. Informed consent was obtained and a pair of high vaginal swabs was collected aseptically from the study subjects, which was examined by direct wet mount and Gram-staining. The smears were then assessed according to Nugent scoring. A diagnosis of bacterial vaginosis was made based on the Nugent scoring and the gold standard clinical criteria (Amsel's composite criteria).Statistical analysis was done using Chi square test and Fischer's exact test by SPSS version 21.
Results: Out of 160 patients, 28 pregnant women were found to have bacterial vaginosis (17.5%), out of which 67.8% were symptomatic. Significant proportion of these women belonged to low socio-economic status (P=0.1303) and were multigravida (P= 0.0003). However there were no significant differences in results with respect to age and trimester of pregnancy. Positive cases of BV correlated with women who gave history of contraceptive use other than condom.
Discussion & Conclusion: The incidence of BV in this study was found to be 17.5% which correlates with the reported prevalence rate of 10-35%.Women of lower socioeconomic status have shown significantly higher rate of BV probably due to psychosocial stress as has been reported previously. Multigravida have been found to have higher incidence of BV as with previous studies, which is probably due to increased sexual exposure and increased contraceptive use. Condom usage is known to have decreased risk for BV which correlates with the findings of this study. As prevention of BV is cost effective to minimize the pregnancy-related complications. We recommend all antenatal patients should be screened for the presence of bacterial vaginitis and a follow up of these pregnant women to determine the consequences on Maternal/Fetal Outcome.

Keywords: Bacterial vaginosis, lactobacillus, gardnerella vaginalis, vaginitis

1. Introduction
Bacterial vaginitis (BV), in the past referred to as nonspecific vaginitis, is a condition of vaginal flora imbalance. It is defined as a polymicrobial condition characterized by replacement of normally dominant lactobacilli by an overgrowth of anaerobic commensals in the vagina which includes microaorganisms like Gardner Ella Vaginitis, Mobil incus, Mycoplasma Hominis, Urea plasma [1, 2]. The term bacterial vaginitis was adopted to reflect the polymicrobial alteration in vaginal flora causing an increase in vaginal pH, sometimes associated with a homogenous discharge, but in the absence of a demonstrable inflammatory response [3].
Previously considered a benign condition, BV has been related to many gynaecologic conditions and complications of pregnancy including pelvic inflammatory disease, post hysterectomy vaginal cuff cellulitis, endometritis, and amniotic fluid infection, preterm

delivery (up to 40 percent of premature births), preterm labor, premature rupture of the membranes, and, possibly, spontaneous abortion [4, 6].

The microecologic condition that characterizes bacterial vaginosis includes replacement of normal protective vaginal flora (*Lactobacillus crispatis*, *Lactobacillus jensenii*) with an overgrowth of numerous bacteria with high potential for tissue invasion and inflammatory response. Co-infection with sexually transmitted infection leads to further activation of immune responses. The process of tissue invasion and inflammation produces enzymes and immune stimulators (cytokines) in the vagina and uterus that may promote cervical ripening and weakening of foetal membranes. Stimulation of the immune protection response also results in prostaglandin production that increases uterine contractions [2, 7, 8].

Women with symptomatic bacterial vaginosis usually present with a thin, gray-white, homogeneous discharge that tends to adhere to the vaginal wall Vulvar pruritis and/or irritation is not common with BV; however, it may occur. The characteristic fishy odour results primarily from metabolic by-products of anaerobic bacteria. The odour is usually more noticeable after menses and intercourse due to the alkalinity of blood and semen [2, 4, 5].

In whiff test the amine release that produces the sharp or fishy odour associated with bacterial vaginosis can be reproduced in the clinic by the addition of potassium hydroxide (KOH) to vaginal fluid [9, 10].

Certain factors or behaviours that increase a woman's risk of BV during pregnancy include race, sexual activity, socio-economic status, maternal stress and the influence of sociocultural practices such as vaginal douching among other whereas certain factors like use of condom is known to decrease the risk of BV [11, 13].

The role of asymptomatic, compared with symptomatic, BV in both gynecologic and pregnancy related conditions has been less studied, although research emphasis is shifting toward determining these independent relations [14].

Keeping in view the high complication rate associated with preterm birth and the importance of recognizing and diagnosing intrauterine infection, this study was designed and conducted to screen both symptomatic and asymptomatic pregnant women for Bacterial vaginosis and to determine any associated risk factors.

2. Methodology

This descriptive cross-sectional study was conducted at the Department of Medical Microbiology of the Apollo Institute of Medical Sciences and Research, Chittoor, South India, for a period of four months from June 2018- September 2018. The study subjects included pregnant women of all gestational age, both symptomatic as well as asymptomatic who were attending the antenatal clinic of the District Headquarters Hospital (AIMSR-DHH) which is a 537 bedded tertiary care hospital as part of their routine antenatal check-up.

Prior verbal and written consent was obtained from the women before sample collection, and the study was approved by the Institutional ethics committee.

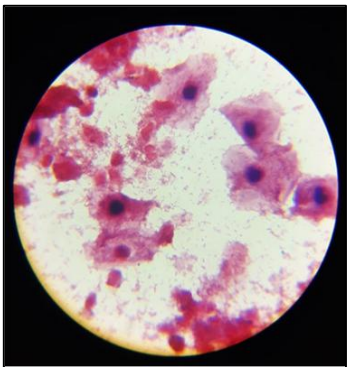
Demographic information like age, parity and gravidity were recorded. The socio demographic data of the patients and relevant clinical history including vaginal and urinary symptoms if present, gestational diabetes mellitus, antibiotic use, past contraceptive history were obtained using a pre-structured study proforma.

A total of 160 samples were collected during the study period from the pregnant women at various periods of gestation by simple random sampling.

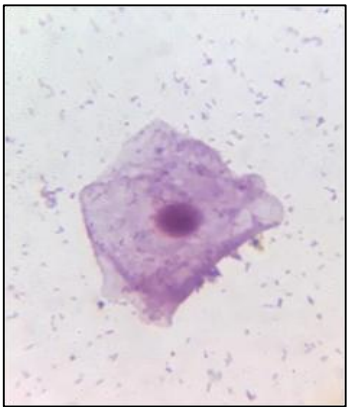
Any vaginal discharge was noted by exposing the vagina with a sterile non lubricated vaginal speculum. An objective diagnosis of the type of discharge was made. The vaginal pH was measured half way down the lateral vaginal wall by means of a narrow range pH strip.

Under aseptic precautions, a pair of high vaginal swabs was obtained by rotating a sterile cotton swab over the lateral vaginal wall. The specimens were labelled, marked and were immediately transported to the microbiology laboratory for processing A wet smear of the vaginal secretions was made and seen under the microscope for the presence of clue cells. Whiff test was performed by placing a few drops of 10% KOH on a glass slide mixed with the discharge; a rotten fish odour rendered the amine test (Whiff test) positive. Gram-stained smears were then assessed according to Nugent scoring [14]. The findings were recorded in the pre-designed proforma. Three of four criteria were met to establish accurate diagnosis of bacterial vaginosis i.e. homogeneous vaginal discharge, the "whiff test", presence of clue cells (greater than 20%) and vaginal pH greater than 4.5, according to gold standard clinical criteria (Amsel's composite criteria) [14].

A diagnosis of bacterial vaginosis was made based on the Amsel's criteria and Nugent scoring. Statistical analysis of the collected data was performed using the SPSS IBM version 21 (IBM Corp., Armouk, NY, USA). The results were expressed in means, percentages, tables, figures and charts. The Chi-square test and Fisher's exact test was used for association at P = 0.05 at 95% confidence interval.



Picture 1: Gram stained smear positive for BV (Nugent score=9)



Picture 2: Gram-stained smear showing Clue cell

3. Results

A total of 160 pregnant women were enrolled in the study, out of which bacterial vaginosis was detected by Amsel's criteria and Nugent scoring criteria in 17.5%(28/160).

Table 1: The total number of study subjects was classified according to Nugent criteria as follows:

n= (%)	Interpretation	Nugent score
121 (75.6%)	Normal vaginal flora	0-3
11 (6.9%)	Intermediate	4-6
28 (17.5%)	Bacterial Vaginosis	7-10

The ages of the women ranged from 18-35 years with a mean age of 28.24 SD±6.14 years. Of 160 patients, 104 (65%) were between the ages of 18-25 and remaining 56 (35%) were between 26-35 years. There was no significant difference with respect to age group (p=0.265).However, BV was found to be more prevalent in the younger age group of 18-25 (75%) (Table 2).

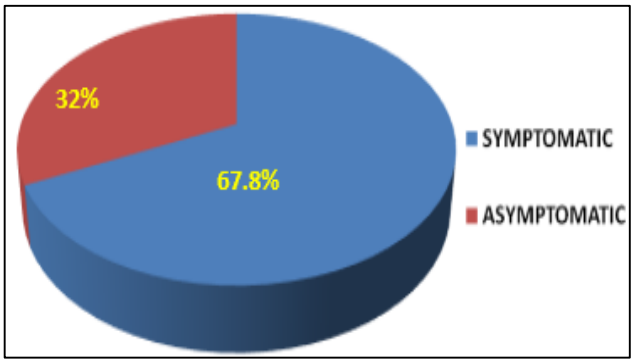
Table 2: Demographic and obstetric characterization of the study subjects (n=160)

VARIABLE	GROUP	n= (%)	BV positive n = (%)	BV negative	P value
AGE	18-25 26-35	104 (65%) 56 (35%)	21 (75%) 07 (25%)	83 49	P= 0.2219
SE status	Low Middle	106 (66.2%) 54 (33.7%)	21 (75%) 07 (25%)	65 67	P=0.1303
Symptoms	Present Absent	53 (33.1%) 107 (66.9%)	19 (67.8%) 09 (32%)	34 98	
PARITY	Primigravida Multigravida	71 (44.4%) 89 (55.6%)	04 (14.2%) 24 (85.7%)	67 65	P= 0.0003
Trimester of pregnancy	I II III	36 (22.5%) 51 (31.9%) 73 (45.6%)	03 (10.7%) 09 (32.1%) 16 (57.1%)	33 42 57	P= 0.223
Contraceptive history (119 patients)	Condom Other	32 (26.9%) 87 (73.1%)	0 28 (100%)	32 59	P =0.0001

The parity distribution showed that 71 (44.4%) were primigravidae while 89 (55.6%) were multigravidae. A significant relationship between the parity of the study subjects and the prevalence of BV was seen as shown in Table 2, with multigravida showing higher prevalence rate of 85.7% than the primigraviadae 14.2% (P = 0.0003)

BV prevalence showed a progressive increase with the duration of pregnancy. A very high prevalent rate of 57.1% (16/28) was observed in the 3rd trimester of pregnancy compared to a rate of 10.7% (03/28) and 32.1% (09/28) in the 1st and 2nd trimesters, respectively. However, this was not found to be statistically significant at P = 0.1. (Table 2)

Amongst the 160 pregnant women, 53 (33.1%) present with one or more of the characteristic symptoms of Bacterial vaginosis or vaginitis, while the remaining 107 (66.9%) were asymptomatic. (Graph 1). Vaginal discharge was the most common symptom (85.9%), followed by Pruritus (66.1%), soreness (31.1%) and dyspareunia (5.0%). 67.8% (n=19) of the positive cases of BV were symptomatic whereas 32% (n=9) did not present with any symptoms which is statistically significant at P= 0.000017.



Graph 1: Present or absence of symptoms in BV positive cases

Past history of contraceptive practices could be obtained only from 119 of the study subjects. 73.1% (87/119) of these women reported to have been using either OCP or an IUCD and only 26.9% (32/119) gave history of using condoms. All the positive BV cases (100%) were found to belong to the proportion of women who had practiced non-condom methods of contraception which is highly significant (P=0.0001).

Among the total number of cases, 66.2% (106/160) of the patients belonged to low socio-economic status and 33.75% (54/160) were of middle socio-economic status. Out of these, 21 (75%) positive for BV were from the low socio-economic group and only 07 (25%) positive BV cases were from the middle socio-economic.

4. Discussion

In the present study, the incidence of Bacterial vaginosis (BV) in pregnant women was found to be 17.5% (28/160) by Amsel criteria and Nugent scoring criteria. Two well described diagnostic methods for bacterial vaginosis are clinical or wet smear diagnosis (*Amsel criteria*) and Gram stain diagnosis (Nugent criteria) [2].

The reported prevalence rate of BV in pregnant women is 10-35% [14]. Whereas the prevalence of bacterial vaginosis among no pregnant women ranges from 15 percent to 30 percent; up to 50 percent of pregnant women have been found to have bacterial vaginosis [1]. Incidence of bacterial vaginosis in obstetric patients could be quite as high as 68% like that observed by Tariq N [15]

67.8% of the BV cases in the current study were symptomatic whereas 32% presented with no symptoms. Women with bacterial vaginosis are often asymptomatic but can present with the complaints of malodorous vaginal discharge. In a study by Sami S and Baloch S[16], bacterial vaginosis was diagnosed in 30.7% of both symptomatic and asymptomatic patients.

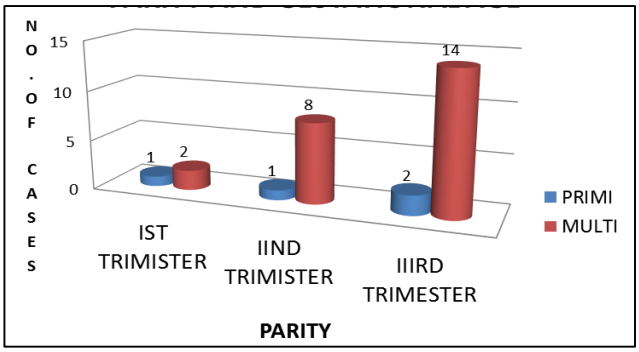
Preterm labour (PTL) and preterm premature rupture of membranes (PROM) have strongly been linked with bacterial vaginosis. Similarly chorioamnionitis, a complication of 1% of all pregnancies, has also been linked with bacterial vaginosis and so is postpartum endometritis, which is 10 times higher in patients with bacterial vaginosis than in women with normal flora. Pregnant women with bacterial vaginosis are likely to deliver low birth weight babies [2].

In 2003 meta-analysis of studies involving 20232 women showed that bacterial vaginosis doubles the risk of preterm delivery [17] It is possible that variations in the degree of virulence of the microorganisms exist and more likely a difference in the immune response, by the host against the infection may determine the severity of the condition [18].

The prevalence of bacterial vaginosis in high risk pregnant women has been estimated to be as high as 45%. The treatment of these high risk, BV positive pregnant women has resulted in reduction of PTB by 37-50% [2].

In our study we noted younger age group, 18-30 years, and multigravida suffered significantly more. These may be due to early marriages in our population and by the time they reached 30 years of age, they become the multigravida.

Increased incidence of BV in multigravida and increasing trimester of pregnancy was noted in the present study (Graph 2) which correlates with previous studies [6, 10, 14]. These findings may be attributed to multigravida having longer sexual history and also number of pregnancies that make them more prone to develop vaginal infections than primigraviadae who have less sexual exposure. Although, no significant relationship was seen with respect to age and trimester of pregnancy, it was observed that most of the women were in their third trimester of pregnancy. This could be attributed to higher levels of pregnancy related hormones which reduce the vaginal defence mechanisms and encourage growth of yeast cells.



Graph 2: BV Positive Cases in Relation with Parity and Gestational age

Currently, we know of no 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 BV prevalence by gestational age and the correlation between increasing sex hormone levels and BV presentation. The presence of BV at a particular gestational age may be a factor in the subsequent development of pregnancy complications, and the risk for disease may change based on BV positivity during different stages of gestation [14].

Women of lower socioeconomic status have shown significantly higher rate of BV probably due to psychosocial stress associated with inadequate knowledge, poor personal hygiene, limited diagnostic facilities, poor dietary habits as has been reported previously by several studies.[6,13,14.] Condom usage is known to have decreased risk for BV which correlates with the findings of this study [12, 14, 20].

5. Conclusions

Prevention of BV is cost effective to minimize the pregnancy-related complications and preterm labor to decrease in perinatal and maternal mortality and morbidity. Symptomatic bacterial vaginosis is prevalent among pregnant women. However, true magnitude is not known because more than half of bacterial vaginosis cases are asymptomatic. Patients with history of preterm labour and preterm birth should be screened for bacterial vaginosis and if positive, treated. Screening and treatment of bacterial vaginosis in high-risk women is advocated in early pregnancy. Low risk group requires treatment if abnormal genital flora are present. In future, it may be appropriate to screen low risk women if trials demonstrate some benefit of early treatment.

6. Recommendations

We recommend all antenatal patients should be screened for the presence of bacterial vaginosis. This study further recommends a follow up of these pregnant women to determine the consequences on Maternal/Fetal Outcome.

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8. References

1. Claudia Holzman, Judith M. Leventhal *et al*. Factors Linked to Bacterial Vaginosis in Nonpregnant Women.

2. American Journal of Public Health, 2001, 91(10).
3. Aliya Islam, Anjum Safdar, Ayesha Malik. Bacterial Vaginosis. J Pak Med Assoc. 2009; 59(9):601-4.
4. Gusie JM, Mohan SM, Aickin M, Helfand M, Periport JF. Screening for bacterial vaginosis in pregnancy. Am J Prev Med. 2002; 20:62-72.
5. Thorsen P, Jensen IP, Jeune B, *et al.* few microorganisms associated with bacterial vaginosis may constitute the pathologic core: a population-based microbiologic study among 3596 pregnant women. Am J Obstet Gynecol. 1998; 178:580-587.
6. Rosenstein IJ, Morgan DJ, Sheehan M, Lamont RF, Taylor Robinson D. Bacterial vaginosis in pregnancy: distribution of bacterial species in different gram-stain categories of the vaginal flora. J Med Microbiol. 1996; 45:120-126.
7. Samina Azaz, Abeera Chaudry, Farhat Kareem. Bacterial vaginosis in patients at MH Rawalpindi. A Journal of Army Medical & Dental Corps. 2005; 55(1):18-23.
8. Abner KP, Hessol NA, Padian NS, *et al.* Risk factors for plasma cell endometritis among women with cervical Neisseria gonorrhoeae, cervical Chlamydia trachomatis, or bacterial vaginosis. Am J Obstet Gynecol. 1998; 178:987-90.
9. Meis PJ, Goldenburg RL, Mercer B, *et al.* The preterm prediction study: significance of vaginal infections. Am J Obstet Gynecol. 1995; 173:1231-5.
10. Hillier SL, Martius J, Krohn M, *et al.* A case-control study of chorioamniotic infection and histologic chorioamnionitis in prematurity. N Engl J Med. 1988; 319:972-8.
11. Kurki T, Sivonen A, Renkonen OV, *et al.* Bacterial vaginosis in early pregnancy and pregnancy outcome. Obstet Gynecol. 1992; 80:173-7.
12. Hay PE, Lamont RF, Taylor-Robinson D, *et al.* Abnormal bacterial colonization of the genital tract and subsequent preterm delivery and late miscarriage. BMJ. 1994; 308:295-8.
13. Mbizuo ME, Musya EE, Stray-Pedersen BF, Chinenje Z, Hussein A. Bacterial vaginosis and intravaginal practices: Association with HIV. Cent Afr J Med. 2004; 50:41-6.
14. Brotman RM, Klebanoff MA, Nansel TR, Andrews WW, Schwebke JR, Zhang J, *et al.* A longitudinal study of vaginal douching and bacterial vaginosis–A marginal structural modeling analysis. Am J Epidemiol. 2008; 168:188-96.
15. Deborah B. Nelson1 and George Macones. Bacterial Vaginosis in Pregnancy: Current Findings and Future Directions. Epidemiol Rev. 2002; 24:102-108.
16. Tariq N. Rapid diagnostic tests for BV and its incidence in Obstetrics. Pak Armed Forces Med J. 2002; 52:159-63.
17. Sami S, Baloch S. Vaginitis and sexually transmitted infections in a hospital based study. J Pak Med Assoc. 2005; 55:242-4.
18. Leitich H, Bodner-Adler B, Brunbauer M, Kaider A, Egarter C, Husslein P. Bacterial vaginosis as a risk factor for preterm delivery: a meta-analysis. Am J Obstet Gynecol. 2003; 189:139-47.
19. Guashino S, De Seta F, Piccoli M, Maso G, Alberico S. Aetiology of preterm labour; bacterial vaginosis. BJOG. 2006; 113(3):46-51.
20. Barbone F, Austin H, Louv WC, *et al.* A follow-up study of methods of contraception, sexual activity and rates of trichomoniasis, candidiasis and bacterial vaginosis. Am J Obstet Gynecol. 1990; 163:510-14.
21. Moi H. Prevalence of bacterial vaginosis and its association with genital infections, inflammation and contraceptive methods in women attending sexually transmitted disease and primary health clinics. Int J STD AIDS. 1990; 1:86-94.