Original Article

Prevalence of Bacterial Vaginosis in Females Presenting in Preterm: A Cross-Sectional Study

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Abstract

Objective: To determine the frequency of bacterial vaginosis in females presenting in preterm labor.
Methodology: This cross sectional study was conducted in Department of Obstetrics/Gynecology, PAEC General Hospital, Islamabad from 21st June 2021 to 21st Dec 2021, involved 100 participants of 18 to 40 years of age. Demographics like age, gestational age, parity, BMI, previous history of sexually transmitted infection, were noted. Patients were admitted in the obstetrics ward. One vaginal swab was utilized for the pH of vaginal discharge, the KOH test (whiff test), and the wet mount for clue cell detection. Gram staining was performed using the second vaginal swab. Without any delay, these two vaginal swabs were taken and forwarded to the microbiology lab. Findings will be recorded and Amsel's criteria were noted. If three out of four criteria were positive, then bacterial vaginosis was labeled.
Results: Age distribution shows that the majority (58%) were between 20-30 years. Gestational age distribution of 100 patients with preterm labor showed that 58% of participants were between 28-32 weeks pregnant, while 42% were in the >32-36 week range. Regarding history of sexually transmitted diseases (STD), 23% reported having a history, whereas 77% did not. Lastly, 33% of participants tested positive for bacterial vaginosis, while 67% tested negative. Age, BMI, gestational age were not statistically correlated with bacterial vaginosis while history of sexually transmitted diseases (STD) was significantly associated with BV (p = 0.002).
Conclusion: From our study we conclude that bacterial vaginosis is present in significant no of patients with preterm labor and has been found to be significantly associated with previous history of STDs and parity.
Keywords: Preterm labor, parity, bacterial vaginosis, Amsel criteria, sexually transmitted diseases

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Introduction

Any secretion coming from the vagina, except blood, is referred to as a vaginal discharge. There are two types of vaginal discharge: pathogenic and physiological. Pathological vaginal discharge can appear in a variety of colors, such as brown, yellow, green, white, or red. It can also occasionally be asymptomatic or cause genital itching and a bad odor[1]. Preterm labor and prematurity, which are major causes of infant mortality worldwide, are predisposed to by pathological vaginal discharge. The most frequent reasons for women to seek medical attention are vaginal discomfort. Pregnancy-related vaginal discharge can be caused by infections, primarily bacterial vaginosis, vaginal candidiasis, and Trichomonas vaginalis.[2]

Normally, billions of bacteria live in the human vagina. Lower incidences of bacterial vaginosis have been linked to colonization with Lactobacillus species that generate hydrogen peroxide (H2O2).[3] A frequent medical condition in women, bacterial vaginosis can cause serious problems and morbidity for both the mother and the unborn child.[4]

There is evidence of maternal and fetal morbidity in 10–41% of women who have bacterial vaginosis. Because it can cause major issues, it requires an early and correct

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diagnosis. It is characterized by an imbalance in the vaginal microbiota during pregnancy, which may be symptomless or may be accompanied by increased vaginal discharge.[5] One of the major risk factors for premature labor is the existence of intrauterine infections[6]. In a Pakistani study, the frequency of bacterial vaginosis was reported in 25% females with preterm labour.[7] Preterm delivery is mostly caused by chorioamnionitis, which has been linked to a history of bacterial vaginosis in several prior cases.[8] After causing vaginitis or cervicitis, BV promotes inflammation of all amniotic membranes, which can lead to premature membrane rupture and delivery.[9] Therefore, in order to avoid premature delivery, it is crucial to control BV initially. The best antibiotic for BV is metronidazole.[10]

Rationale of this study is to find the frequency of bacterial vaginosis in females presenting in preterm labor. Through literature varied data has been observed regarding the occurrence of bacterial vaginosis in females presenting in preterm labor.

Methodology

This cross-sectional study was conducted at department of Obstetrics/Gynecology, PAEC General Hospital, Islamabad from 21st June 2021 to 21st Dec 2021 over a course of six months after due approval by the institutional ethical review (Ethical committee approval number: PGHI-IRB(DMe)-RCD-06-015. The sample size was calculated using the WHO sample size calculator with non-probability consecutive sampling.

The required sample size was determined to be 100 participants. The calculation was based on a confidence level of with 95% confidence level, 9.5% margin of error and taking expected percentage of bacterial vaginosis i.e. 6% in females with preterm labor[11], respectively. Patients were admitted in the obstetrics ward. One vaginal swab was utilized for the pH of vaginal discharge, the KOH test (whiff test), and the wet mount for clue cell detection. Gram staining was performed using the second vaginal swab. Without any delay, these two vaginal swabs were taken and forwarded to the microbiology lab. Findings were recorded and Amsel's criteria was noted. Amsel's criteria includes clue cells on wet mount, vaginal pH >4.5, amine odor when vaginal fluid is exposed to 10% potassium hydroxide, and abnormal foul smelling greenish vaginal discharge. If three out of four criteria were positive, then bacterial vaginosis was labeled.

Operational definition: Preterm labor is defined as regular uterine contractions associated with cervical changes (cervical dilatation ≥2 cm and effacement) that start before 37 weeks of gestation.[29]

Bacterial vaginosis is operationally defined as a condition resulting from a disrupted vaginal microbiome balance, characterized by symptoms such as itch, dysuria, and a thin, grey discharge with a "fishy" odour, particularly after sexual intercourse.[30]

Inclusion Criteria: Females of age 18-40 years of were included in this study with Parity<5 and in preterm labor (as per operational definition) were the part of this study.

Exclusion Criteria: Women on Use of antibiotics in the preceding two weeks, Cervical cerclage (on medical record). Multiple gestation, fetal anomalies, Structural uterine abnormalities (on ultrasound). Prior use of tocolytics or corticosteroids in current pregnancy (on medical record). Hypertension (BP ~140/90mmHg), diabetes (OGTT>186mg/dl on 2-hours), renal disease (creatinine> 1.5 mgdl), thyroid disorders (TSH>5mIU), cardiac disorders (on medical record). Preterm labor or delivery in previous pregnancy, recurrent bacterial vaginosis in current pregnancy after treatment (on medical record).

Demographics like age, gestational age, parity, BMI, previous history of sexually transmitted infection, will be noted. Patients will be admitted in the obstetrics ward. Two vaginal swabs were taken from the vaginal wall's posterior fornix using a sterile vaginal speculum. One vaginal swab was utilized for the pH of vaginal discharge, the KOH test (whiff test), and the wet mount for clue cell detection. Gram staining was performed using the second vaginal swab. Without any delay, these two vaginal swabs were taken and forwarded to the microbiology lab. Findings were recorded and Amsel's criteria was noted. If three out of four criteria were positive, then bacterial vaginosis will be labeled (as per operational definition). Females with bacterial vaginosis and preterm labor will be managed as per standard protocol.

The data was entered and analyzed by using SPSS Version 22. Shapiro-Wilk test was applied to check the distribution of data. Descriptive statistics were calculated for all variables. For continuous variables such as age, gestational age, and BMI, results were expressed as mean ± standard deviation if normally distributed; if the data were not normally distributed, median and interquartile range (IQR) were reported instead. For categorical variables, including parity, previous history of

sexually transmitted infection (STD) and bacterial vaginosis, results were presented as frequencies and percentages.

Effect modifiers, including age, gestational age, parity, BMI, and previous STD history, were controlled through stratification. Post-stratification, a chi-square test was applied to compare the prevalence of bacterial vaginosis across each stratified group. A p-value of ≤ 0.05 was considered statistically significant

Results

A total of 100 cases of women with pre-term labor included in this study. The descriptive statistics for key demographic and clinical variables among the study participants (n=100) are shown in Table I.

Table I: Descriptive Statistics for Key Demographic and Clinical Variables. (n=100)

Variables	Median, IQR
Age	30.00 (35.00-23.00)
BMI	25.50 (29.98-21.30)
Gestational Age	32.00 (33.00-29.00)
Parity	2.00 (3.00-1.00)

The frequency distribution of demographic and clinical characteristics among the study participants is shown in Table II. Age distribution shows that the majority (58%) were between 20-30 years, while 42% were in the 31-40 age range. For BMI, 52% of participants had values between 20 and 25.5, indicating a normal weight range, whereas 23% had BMI between >25.5-29.9 (overweight), and 25% were in the >29.9-32 range (borderline obese). Parity data reveals that 24% of participants were nulliparous (no previous pregnancies), while 76% had between 1 and 4 previous pregnancies.

Table II: Frequency Distribution of Demographic and Clinical Characteristics.

Variables		n (%)
Age	20-30 years	58 (58.0%)
	31-40 years	42 (42.0%)
BMI	20-25.5	52 (52.0%)
	>25.5-29.9	23 (23.0%)
	>29.9-32	25 (25.0%)
Parity	Nulliparous	24 (24.0%)
	1-4	76 (76.0%)
Gestational Age	28-32 weeks	58 (58.0%)
	>32-36 weeks	42 (42.0%)
History of STD	Yes	23 (23.0%)
	No	77 (77.0%)
Bacterial Vaginosis	Yes	33 (33.0%)
	No	67 (67.0%)

Gestational age distribution shows that 58% of participants were between 28-32 weeks pregnant, while 42% were in the >32-36 week range, indicating that most participants were in the later stages of pregnancy. Regarding history of sexually transmitted diseases (STD), 23% reported having a history, whereas 77% did not. Lastly, 33% of participants tested positive for bacterial vaginosis, while 67% tested negative. This table provides an overview of the participants' demographic and clinical profiles.

The association between demographic and clinical variables and bacterial vaginosis (BV) status is shown in Table III. Age and BMI showed no statistically significant association with BV, with p-values of 0.073 and 0.076, respectively. Parity demonstrated a significant association with BV (p = 0.039), suggesting that parity status may influence BV occurrence. Gestational age did not show a significant association (p = 0.239). However, a history of sexually transmitted diseases (STD) was significantly associated with BV (p = 0.002), indicating that STD history is a relevant factor for BV status.

Table III: Association of Demographic and Clinical Variables with Bacterial Vaginosis Status.

Variables		Bacterial Vaginosis		Total	p-Value
		Yes	No		
Age	20-30 years	23 (39.7%)	35 (60.3%)	58 (58.0%)	0.073
	31-40 years	10 (23.8%)	32 (76.2%)	42 (42.0%)	
Total		33 (33.0%)	67 (67.0%)	100 (100%)	
BMI	20-25.5	12 (23.1%)	40 (76.9%)	52 (52.0%)	0.076
	>25.5-29.9	11 (47.8%)	12 (52.2%)	23 (23.0%)	
	>29.9-32	10 (40.0%)	15 (60.0%)	25 (25.0%)	
Total		33 (33.0%)	67 (67.0%)	100 (100%)	
Parity	Nulliparous	12 (50.0%)	12 (50.0%)	24 (24.0%)	0.039
	1-4	21 (27.6%)	55 (72.4%)	76 (76.0%)	
Total		33 (33.0%)	67 (67.0%)	100 (100%)	
Gestational Age	28-32 weeks	17 (29.3%)	41 (70.7%)	58 (58.0%)	0.239
	>32-36 weeks	16 (38.1%)	26 (61.9%)	42 (42.0%)	
Total		33 (33.0%)	67 (67.0%)	100 (100%)	
History of STD	Yes	14 (60.9%)	9 (39.1%)	23 (23.0%)	0.002
	No	19 (24.7%)	58 (75.3%)	77 (77.0%)	
Total		33 (33.0%)	67 (67.0%)	100 (100%)	

Discussion

In normal pregnancies, bacteria like Lactobacillus lactis exert an intravaginal cleansing action that reduces the presence of common bacterial species.[12] In 718 pregnant patients' vaginal bacterial condition was examined in one study, which found that about 50% of BV in the early gestation of pregnancy had improved and returned to normal.[13] The higher amount of glycogen in the vaginal epithelium, which raises the Lactobacillus count, may be the cause of this improvement.[14] The presence of side effects that prevent premature birth following metronidazole therapy in BV patients in the EGP has been examined in a number of papers; however, the majority of them involved oral administration. There are effects that prevent premature delivery, according to certain research[15], although numerous recent, large-scale, randomized, comparative studies have found no effects.[16] On the basis of vaginal flora data, several studies have reported therapeutic benefits following oral or vaginal metronidazole therapy.[17]

The role of particular vaginal bacteria as a risk factor for spontaneous preterm birth differs depending on the study's region, ethnic group, and study methodology.[18] 33% of pregnant women have bacterial vaginosis, one of the main reproductive tract illnesses linked to vaginal discharge (prevalence 10-15%). The majority of these pregnancy-related illnesses are asymptomatic and go undetected unless checked.[19] Few studies have found a link between BV and poor socioeconomic position and improper vaginal hygiene habits, such as wearing clothing during periods.[20]

The study group's mean gestational age, maternal age, and parity were comparable to those of Chawanpaiboon S et al., who found nearly identical results for parity and gestational duration[21]. In the literature, Trichomoniasis was the commonest STD associated with preterm labour and findings of Leitch H et al.[22] However, the results of the Azargoon A et al. study showed no meaningful correlation between trichomoniasis and premature labor, which was in contrast to the findings of the Leitch H et al investigation.[23]

Findings in the study of Paulo. CG et al have demonstrated that lower genital tract infections are highly common among apparently healthy looking pregnant women with an overall prevalence of 40-54%.[24] Several studies have suggested a 20–30% prevalence of BV during pregnancy. Based on positive Amsel's criterion, the current study calculated that 33% of the preterm labor group had BV, which is consistent with the findings of Mittal et al and Svare et al.[25] Results from studies by Hiller and colleagues and Subtil et al. showed a stronger correlation between bacterial vaginosis and premature delivery.[26]

Although several researches have linked other factors to BV as a cause of increased newborn problems, the findings of Hay AE et al. support our findings.[28]

Limitations: Limitation of this study is the difficulty of distinguishing bacterial vaginosis from other abnormalities in the vaginal microbiome because similar symptoms or microbial compositions may compromise the precision of the diagnosis. Furthermore, the study might have overlooked connections unique to behavioral or environmental factors by failing to take into consideration genetic or epigenetic characteristics that could predispose some people to both bacterial vaginosis and premature birth.

Conclusion

Bacterial vaginosis is present in significant number of patients with preterm labor and has been found to be significantly associated with previous history of STDs and parity. Since our sample size was small and other effect modifiers were not included, we suggest more analytical studies to determine the risk factors of BV in women with preterm labor and interventions to control its effect on labor and its outcome.

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