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ORIGINAL RESEARCH

A cross-sectional study on the prevalence of bacterial vaginosis and it's impact on pregnancy outcome

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ABSTRACT

Background: Bacterial vaginosis (BV) is a common vaginal infection in women of reproductive age, with potential adverse effects on pregnancy outcomes. Despite its prevalence, the specific impacts of BV during pregnancy and the effectiveness of its treatment protocols need further elucidation. **Methods:** This cross-sectional study involved 200 pregnant women recruited from a tertiary care hospital. Participants were screened for BV using the Amsel criteria and Nugent score. Data were analyzed to examine the prevalence of BV and its association with pregnancy outcomes, including preterm birth and low birth weight. **Results:** The prevalence of BV in the study population was 36%. Women with BV showed a significantly higher incidence of preterm birth (27.8% vs. 14.1%, P=0.022) and low birth weight (25% vs. 9.4%, P=0.004) compared to those without BV. Treatment for BV was associated with substantial improvements in symptoms and reductions in adverse outcomes, with treated women experiencing lower rates of preterm births and low birth weight compared to untreated cases. **Conclusion:** The study underscores a significant association between BV and adverse pregnancy outcomes. Effective screening and treatment for BV could potentially mitigate these risks, emphasizing the importance of integrating BV management into prenatal care protocols to improve maternal and neonatal health outcomes.

Keywords: Bacterial Vaginosis, Pregnancy Outcomes, Preterm Birth.

INTRODUCTION

Bacterial vaginosis (BV) is a common vaginal condition that can affect women of reproductive age and has been linked to various adverse pregnancy outcomes, including preterm birth, low birth weight, and increased susceptibility to other sexually transmitted infections. BV is characterized by a disruption in the normal vaginal flora, leading to a decrease in typical lactobacilli and an increase in other types of bacteria, such as Gardnerella vaginalis and Mycoplasma hominis. This disruption can result in symptoms ranging from discharge and odor to asymptomatic presentations, which complicates its diagnosis and management.[1][2]

The relationship between BV and pregnancy outcomes has been a topic of ongoing research, with studies indicating that the presence of BV can increase the risk of preterm labor, preterm rupture of membranes, and postpartum infections. Despite this knowledge, there remains a need for more extensive studies to better understand the prevalence of BV in different populations and its direct impact on pregnancy and neonatal outcomes. Additionally, the mechanisms by which BV influences these outcomes are not fully understood but are thought to involve changes in the vaginal microbiota that affect the vaginal environment and local immunity.[3][4]

Research in this area is critical, not only for developing targeted interventions to reduce the incidence of BV among pregnant women but also for implementing guidelines for screening and treatment. Current treatment strategies for BV during pregnancy include the use of antibiotics like metronidazole or clindamycin, which have been shown to reduce some adverse outcomes, although the recurrence rates remain high. Furthermore, the timing of treatment relative to gestational age and the potential effects of

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antibiotics on the neonate also warrant further investigation.[5][6]

Aim

To assess the prevalence of bacterial vaginosis among pregnant women and its impact on pregnancy outcomes.

Objectives

1. To determine the prevalence of bacterial vaginosis in a sample of 200 pregnant women attending a tertiary care hospital.
2. To investigate the association between bacterial vaginosis and adverse pregnancy outcomes such as preterm birth and low birth weight.
3. To evaluate the effectiveness of current treatment protocols for bacterial vaginosis in improving pregnancy outcomes.

MATERIAL AND METHODOLOGY

Source of Data

Data was collected from pregnant women who presented to the antenatal clinic of a tertiary care hospital.

Study Design

This was a cross-sectional study designed to evaluate the prevalence of bacterial vaginosis and its impact on pregnancy outcomes.

Study Location

The study was conducted at the Department of Obstetrics and Gynecology, at tertiary care hospital.

Study Duration

The study was carried out over a period of 12 months from January to December 2024.

Sample Size

The study included 200 pregnant women based on the calculated sample size to achieve adequate power to detect significant associations between bacterial vaginosis and pregnancy outcomes.

Inclusion Criteria

Included were pregnant women aged 18-45 years, in any trimester of pregnancy, who consented to participate in the study.

Exclusion Criteria

Excluded were women with known chronic conditions affecting pregnancy outcomes (e.g., diabetes, hypertension), those on antibiotic treatment at the time of screening, and those with a history of cervical cerclage.

Procedure and Methodology

Participants were screened for bacterial vaginosis using the Amsel criteria which include homogenous vaginal discharge, vaginal pH >4.5, positive whiff test, and clue cells on wet mount. Information on pregnancy outcomes was collected from medical records.

Sample Processing

Vaginal swabs were collected from each participant and transported to the microbiology lab for analysis. The presence of bacterial vaginosis was confirmed based on the Nugent score from the Gram-stained vaginal smears.

Statistical Methods

Data analysis was performed using SPSS version 25. Descriptive statistics were used to summarize the data. The association between bacterial vaginosis and pregnancy outcomes was assessed using logistic regression models, adjusting for potential confounders.

Data Collection

Data on demographic characteristics, medical history, and outcomes of pregnancy were collected using a structured questionnaire and review of medical records. All data were anonymized and securely stored to maintain confidentiality.

OBSERVATION AND RESULTS

Table 1: Prevalence of Bacterial Vaginosis in demographic parameters

Variable	Total (N=200)	Bacterial Vaginosis Positive (n=72)	Bacterial Vaginosis Negative (n=128)	Test of Significance	95% CI for Difference	P-value
Age (years)						
Mean (SD)	28.3 (4.6)	27.8 (4.9)	28.6 (4.5)	t=1.22	-0.19 to 1.80	0.224
Gestational Age (weeks)						
Mean (SD)	24.5 (8.1)	23.4 (8.3)	25.1 (7.9)	t=1.44	-0.67 to 3.01	0.151
Preterm Birth						
Yes (n, %)	38 (19%)	20 (27.8%)	18 (14.1%)	χ^2=5.22	4.8% to 22.6%	0.022
No (n, %)	162 (81%)	52 (72.2%)	110 (85.9%)			
Low Birth Weight (<2500g)						
Yes (n, %)	30 (15%)	18 (25%)	12 (9.4%)	χ^2=8.36	5.3% to 26.3%	0.004
No (n, %)	170 (85%)	54 (75%)	116 (90.6%)			

Table 1 provides an overview of the prevalence of bacterial vaginosis (BV) among 200 pregnant women in relation to demographic parameters such as age and gestational age, as well as pregnancy outcomes like preterm birth and low birth weight. The average age of the participants was 28.3 years, with those testing positive for BV slightly younger on average (27.8 years) than those who tested negative (28.6 years); however, the difference was not statistically significant (p-value = 0.224). Similarly, the average

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gestational age was not significantly different between the BV positive and negative groups. Notably, the prevalence of preterm birth was significantly higher in the BV positive group (27.8%) compared to the BV negative group (14.1%), with a p-value of 0.022. Similarly, low birth weight was more prevalent among BV positive women (25%) than those without BV (9.4%), with this difference also being statistically significant (p-value = 0.004).

Table 2: Prevalence of Bacterial Vaginosis in Pregnant Women

Variable	Prevalence of BV (%)	95% CI for Prevalence	Test of Significance	P-value
Bacterial Vaginosis	36%	29.6% to 42.4%	Binomial test	<0.001

Table 2 highlights the overall prevalence of BV among the study cohort of pregnant women, recorded at 36%. The 95% confidence interval for this estimate ranges from 29.6% to 42.4%, indicating a relatively high prevalence rate. The significance of this finding is underscored by a p-value of less than 0.001, confirming that the observed prevalence is statistically significant and not due to random chance.

Table 3: Effectiveness of Treatment Protocols for BV in Improving Pregnancy Outcomes

Treatment Outcome	Treated BV (n=40)	Untreated BV (n=32)	OR (95% CI)	Test of Significance	P-value
Improvement in Symptoms	30 (75%)	8 (25%)	9.00 (3.01-26.92)	Fisher's Exact	<0.001
Preterm Birth Rate	4 (10%)	16 (50%)	0.12 (0.03-0.47)	Fisher's Exact	<0.001
Low Birth Weight Rate	3 (7.5%)	15 (46.9%)	0.10 (0.02-0.40)	Fisher's Exact	<0.001

In Table 3, the effectiveness of BV treatment protocols on pregnancy outcomes is examined. Among those treated for BV, 75% showed improvement in symptoms, significantly higher than the 25% improvement observed in the untreated group, with an odds ratio of 9.00 (95% CI: 3.01-26.92) and a p-value of less than 0.001. The rates of preterm birth and low birth weight were also notably lower in the treated group compared to those untreated. The preterm birth rate was 10% in treated women versus 50% in untreated, and the low birth weight rate was 7.5% in treated versus 46.9% in untreated, with both outcomes showing statistically significant differences (p-values < 0.001).

DISCUSSION

Table 1 details the prevalence of bacterial vaginosis (BV) among 200 pregnant women, focusing on demographic parameters and pregnancy outcomes. The mean age and gestational age do not show significant differences between those with and without BV. However, the prevalence of preterm birth and low birth weight is notably higher in the BV-positive group. This finding is consistent with other studies that have identified BV as a risk factor for adverse pregnancy outcomes. A study by Haahr T et al.(2019)[7] found that BV was significantly associated with preterm delivery. Another study by Ma X et al.(2022)[8] similarly reported that pregnant women with BV had a higher risk of delivering low birth weight infants.

Table 2 shows a BV prevalence of 36% among the cohort, which falls within the upper range observed in other populations. The findings are aligned with the global prevalence rates reported in various studies, which can vary widely from 10% to over 50% depending on the population studied. The high prevalence underscores the need for routine screening and treatment of BV in pregnant women, as suggested by Bitew A et al.(2017)[9], who emphasize the public health importance of managing BV to prevent its associated risks.

In Table 3, the effectiveness of treatment protocols for BV shows significant improvement in symptoms and reductions in adverse pregnancy outcomes, such as preterm birth and low birth weight, among those treated. The odds ratios are compelling, indicating a substantial protective effect of treatment against these outcomes. These results are supported by the work of Konadu DG et al.(2019)[10], who found that treatment of BV in pregnant women could reduce the incidence of preterm birth. Furthermore, the benefits of treating symptomatic BV to improve pregnancy outcomes are well documented in the literature, including a meta-analysis by Bautista CT et al.(2016)[11], which supports the routine treatment of symptomatic BV in pregnancy to reduce preterm delivery risk.

CONCLUSION

This cross-sectional study has provided significant insights into the prevalence of bacterial vaginosis (BV) among pregnant women and its subsequent impact on pregnancy outcomes. Our findings demonstrate a considerable prevalence rate of BV at 36%, which aligns with global observations and underscores the commonality of this infection among pregnant populations.

Crucially, the study highlights a clear association between BV and adverse pregnancy outcomes, particularly preterm birth and low birth weight. Women diagnosed with BV were significantly more likely to experience preterm deliveries and have infants with low birth weight compared to their BV-negative counterparts. These results are supported by the statistical significance of the observed differences,

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reinforcing the need for careful monitoring and management of BV during pregnancy.

The effectiveness of treatment protocols for BV was also notably demonstrated, with treated women showing significant improvements in symptoms and reduced rates of preterm births and low birth weights. This emphasizes the potential of targeted treatment strategies to mitigate the negative impacts of BV on pregnancy outcomes.

Given these findings, it is imperative that routine screening for BV be considered in prenatal care settings to identify and treat this condition promptly. Such measures could significantly improve maternal and neonatal health outcomes by reducing the incidence of associated complications. Future studies should focus on longitudinal data to track the long-term effects of BV treatment during pregnancy and its impact on both maternal and neonatal health. This study serves as a call to action for healthcare providers to integrate BV screening and treatment into standard prenatal care practices to enhance pregnancy outcomes and overall women's reproductive health.

LIMITATIONS OF STUDY

1. **Cross-Sectional Design**: One of the primary limitations of this study is its cross-sectional nature, which restricts the ability to establish causality between bacterial vaginosis (BV) and adverse pregnancy outcomes. While associations can be identified, determining whether BV directly causes outcomes such as preterm birth or low birth weight requires longitudinal research designs that track changes over time.
2. **Single-Center Study**: The data was collected from a single tertiary care hospital, which may limit the generalizability of the findings. The patient population at a tertiary care center may not accurately represent the broader population due to potential referral biases and the specific demographics of the area served by the hospital.
3. **Self-Reported Data**: Some of the data, particularly related to previous medical history and personal habits that could influence pregnancy outcomes, were self-reported. This reliance on self-reported data can introduce recall bias and may affect the accuracy of the findings.
4. **Lack of Repeated Measures**: The study did not include repeated measures of BV during pregnancy. BV status was assessed only once, and treatment efficacy was monitored without subsequent follow-ups to detect recurrence. Since BV can recur, the lack of repeated testing might have influenced the study's findings on the impact of treatment on pregnancy outcomes.
5. **Control of Confounding Variables**: While efforts were made to control for potential confounders, the impact of unmeasured confounding variables such as socioeconomic status, nutritional status, and other infections cannot be ruled out. These factors could have independent effects on pregnancy outcomes and may confound the relationship between BV and these outcomes.
6. **Diagnostic Criteria**: The study utilized specific criteria to diagnose BV, which might not capture all cases (e.g., subclinical infections). Different diagnostic approaches could potentially yield different prevalence rates and might affect the study's conclusions about the impact of BV on pregnancy outcomes.
7. **Sample Size**: Although the study included 200 participants, which provides a reasonable sample for statistical analysis, this number might still be too small to detect smaller effect sizes, especially in subgroup analyses. Larger studies could provide more precise estimates of the effects of BV on various pregnancy outcomes.

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