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Research Article

Bacterial Vaginosis and Its Associated Factor Among Pregnant Women Receiving Prenatal Care at Bonga Gebretsadik Shoawo General Hospital, South West Ethiopia

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Abstract

One of the most frequent causes of irregular vaginal discharge in pregnant women is bacterial vaginosis (BV), which is characterized by a rise of various anaerobic bacteria and a decrease in important bacteria, the lactobacilli. The variation in the prevalence and its contributing causes among various populations, and nations is well known. Hence, in this study, the prevalence and characteristics associated with BV in pregnant women were determined. Descriptive cross-sectional study was conducted on pregnant women who visited the obstetric and gynecological units at Bonga general hospital in Bonga, south west Ethiopia. Nugent's scoring method was used for the diagnosis of BV. The prevalence of BV was 19.7% (48/244) [95% CI 17.2–23.2]. Vaginal douching with soap was significantly linked to BV in women (AOR, 3.6; 95% CI: 1.4–9.1). Pregnant women with vaginal discharge and with a foul-smelling odor were four times more likely to have BV (AOR, 4.2; 95% CI: 1.7–10.3; p = 0.001). Furthermore, women who had multiple sexual partners were three times more likely to get BV. It was noted that pregnant women in this study had a high prevalence of BV. We revealed that the majority of women with BV had vaginal discharge and an unpleasant odor. We were able to verify the association between BV in pregnant women with multiple sexual partners and women who practiced vaginal douching with soap. Therefore, additional research may be required to validate and assess the reason for this correlation. Planning a preventive approach for BV that discourages vaginal douching with soap and multiple sexual partners during pregnancy may reduce the prevalence of BV.

Keywords

BV, The Nugent's Score, Pregnant Women, Southern Ethiopia

1. Introduction

An imbalance of the normal genital tract microbiota results in bacterial vaginosis (BV). It is one of the most frequent causes of abnormal vaginal discharge in women of reproductive age, particularly in pregnant women [1]. It results from an imbalance in the vaginal microbiota characterized depletion of hydrogen-peroxide producing lactobacilli and replaced by

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anaerobic microorganisms, mainly Gardnerella vaginalis, Mobiluncus, Bacteroides spp, and Mycoplasma hominis [2]. It is thought that BV is essential to the spread of sexually transmitted infections (STIs). Even though up to 80% of women had no symptoms, typical symptoms of a consistent, grey, malodorous discharge and itching are still present, highlighting the importance of objective risk assessment for pregnant women [3]. Therefore, investigations recommended creating a clinical risk score to check for pregnant women BV regardless of symptoms [4].

Bacterial vaginosis is frequent among sexually active women and has been associated with adverse outcomes, including an increased risk of spontaneous abortion, preterm birth, stillbirth, low birth weight, chorioamnionitis, postpartum endometritis, increased risk of pelvic inflammatory disease and it facilitates the transmission of sexually transmitted infection [5]. Further more recently studes have shown that in women with BV neonatal morbidity was significantly higher, higher rate of neonatal intensive care unit admission, increased intubation for respiratory support and respiratory distress syndrome [6].

The public health significance of these infections is largely due to infection during pregnancy with the potential transmission to the developing fetus. In fact, reported BV to represent only the “tip of the iceberg” because most infections for women are asymptomatic or (if symptoms exist) unrecognized due to poor health care system for BV, unlike HIV and syphilis. Furthermore, adequate data are not available in Ethiopia to even analyse reporting rates. Even when symptoms exist, the social stigma associated with BV in virtually every society contributes to their under-detection [7].

Bacterial vaginosis accounts for around half of all vaginal infections globally [8]. The prevalence of BV varies globally, with higher rates observed in Southeast Asia and Africa, influenced by factors such as age, hygiene practices, and sexual behavior [9, 12]. It is reported that prevalence of BV ranged from 28.5% in Eastern Africa to 52.4% in Southern Africa [9, 12]. Pregnancy-related BV studies have been carried out in a number of countries, however information on prevalence and associated factors related to BV among pregnant women in southern Ethiopia is lacking. Due to a lack of resources, pregnant women in Ethiopia are usually only tested for syphilis and HIV, and BV is rarely tested. Knowing the prevalence of BV and the associated risk factors is essential for developing treatment and preventative plans in order to prevent complications during pregnancy and unfavourable outcomes. This study was carried out at one of the hospitals in southern Ethiopia to ascertain the prevalence of bacterial vaginosis and related risk factors among pregnant women receiving antenatal care (ANC) follow-up.

2. Material and Method

2.1. Study Area and Design

Descriptive cross-sectional study was conducted at bonga gebretsadik shoawo general hospital in bonga, south west Ethiopia. The hospital is in Bonga town, Kaffa Zone, around 470 kilometers south of Addis Ababa and at an elevation of 1714 meters above sea level. It is the only hospital in the area and continues to provide medical care to a significant number of patients every year, with approximately one million clients seeking treatment annually. The hospital currently has more than 300 active beds and serves both outpatients and inpatients. Each year, over 10,000 patients are admitted, including those who require less than 48 hours of care and those who need more extended hospitalization. The hospital also provides routine ANC follow-up services to nearly 500 pregnant women each month.

2.2. Study Participant and Sample Size

Pregnant women who visited the obstetric and gynaecological units for ANC follow-up and provided written consent or assent were the study participants. This study did not include pregnant women on antibiotic therapy, bleeding, or those for whom informed consent was not obtained.

Sample Size Determination was done using the formula to estimate a single population proportion is used to calculate the sample size. The sample size is determined under the premise that: $n = Z^2 p (1-p) / w^2$ where z= standard normal value at 95% confidence interval which was 1.96 n= the desired sample size, p= previous study on this subject in the near area which is 20.1% (Yalew et al., 2022) = 0.201., w= the absolute precision/margin of error which was 5% = 0.05 and, n= $(1.96)^2$ 0.201 (0.799)/ $(0.05)^2$ = 247. Since there are 2,000 people in the source population, the necessary minimum sample was calculated from the preceding estimate by making certain adjustments using the correction formula, nf= n/ (1+n/N), where n was the sample from an infinite population and N was the overall population. In light of this, nf = 247 / (1 + (247 /2,000)) = 220. Adding 10% for the non-response rate =, or 244 women.

2.3. Sampling Technique and Data Collection

A pre-tested, structured questionnaire was used to gather information on participant demographics, gynecological and obstetric features from February to April of 2023. The study used the convenient sampling method. Socio-demographic data including the participant’s age, place of residence, level of education, marital status, and occupation. Gynaecological data included history of STIs and genital tract infections, gestational age, and obstetric data included gravidity, parity, and previous pregnancy outcomes. The questionnaire used to collect was translated into Amharic and back-translated to English by independent translators to ensure the appropriate meaning of each item. Then each participant underwent a clinical examination that included an assessment of signs and symptoms associated with infections, such as itching, pain in the vagina, and foul-smelling discharge. The primary nurses

attending the ANC conducted the assessment and recorded the clinical details. All methods were performed in accordance with the microbiology laboratory guidelines Then vaginal swabs were collected by gently inserting one swab at a time approximately 2 inches into the vaginal opening and rotating it twice to ensure contact with the vaginal wall. The vaginal walls were swabbed with sterile cotton swabs, and the samples were appropriately labeled and immediately transported to laboratory.

2.4. Sample Transportation, Processing, and Examination

The vaginal swab was then smeared by rolling the swab onto a microscope glass slide and air-dried, heat fixed, Gram stained, and examined under a microscope using a X40, X100 objectives. The Nugent scoring system was used to evaluate the presence of BV. Women with a Nugent score of 7-10 and discharge were diagnosed as BV-positive and treated accordingly. Women with a Nugent score of 7-10 but no discharge were classified as BV-negative [10]. Prior to the investigation, two laboratory technologists received training on Nugent scoring. This was done to ensure accurate and consistent preparation and reading of gram stains. Then, using established methods, the two trained laboratory technologists read the Nugent score [10].

2.5. Analysis and Interpretation of Data

In this study, Epidata was used for programmed data entry and documentation. Epi Info was used to design the questionnaire, enter data, and validate the results. Data analysis was conducted using the social science statistical package SPSS version 25. Bivariable and multivariable logistic regression was employed to assess factors associated with BV. P-values less than 0.05 were considered statistically significant.

2.6. Ethical Consideration

This research project was approved by 'The Institutional Research Ethics Review Board (IRB)' of the College of Medicine and Health Science of Hawassa University, with reference number (IRB/173/15) on 09/03/2023. An official letter from Hawassa University's review committee was delivered to Gebretsadik Shawo General Hospital, providing a comprehensive overview of the study's objectives. Subjects were only enrolled after giving informed consent and being made aware of the purpose and goals of the study. All confirmed positive results were reported to the subjects' responsible physician.

3. Results

3.1. Socio-Demographic Characteristics of the Participants

This study involved 244 pregnant women, resulting in a 100% response rate. Over half of the participants, 53.3% were 25 years or older age groups. The majority of the participants 82.8% were married, 59.8% resided in urban areas. In terms of literacy levels, 39.8% of pregnant women were unable to read and write. Additionally, 11.1% were engaged in farming activities, and 17.6% were involved in daily labor work. Again about half of participants have irregular ANC follow-up, 30.3% had symptom and a 52% were multigravida (Table 1).

3.2. Prevalence of BV Among Pregnant Women

In this study a total of 244 slides were scored according to Nugent. The interrater agreement between the two independent readers after the first reading was 0.88 which is very good. BV was indicative in 48 individuals whereas 23 had an intermediate BV score and the rest 173 were negative for BV. Hence, in this study the overall prevalence of bacterial vaginosis by Nugent grade scoring system was 19.7% (48/244) (Table 1).

Table 1. *Socio-Demographic Characteristics and Associated Factors with BV in Pregnant Women.*

Characteristics	Total (N=244) n (%)	BV indicated (n=48) (19.7%)
Age of the participants		
≤ 25	114 (46.7%)	29 (11.9%)
Above 25	130 (53.3%)	19 (7.8%)
Marital status		
Unmarried	28 (11.5%)	3 (1.2%)
Married	202 (82.8%)	42 (17.2%)
Divorced	10 (4.1%)	2 (0.8%)
Widowed	4 (1.6%)	1 (0.4%)
Residence		

Characteristics	Total (N=244) n (%)	BV indicated (n=48) (19.7%)
Urban	146 (59.8%)	33 (13.5%)
Rural	98 (40.2%)	15 (6.1%)
Educational status		
Unable to read and write	97 (39.8%)	23 (9.4%)
Read and write only	96 (39.3%)	18 (7.4%)
Secondary school	23 (9.4%)	4 (1.6%)
College and above	28 (11.5%)	3 (1.2%)
Occupation		
Housewife	124 (50.8%)	20 (8.2%)
Farmer	27 (11.1%)	2 (0.8%)
Daily laborer	43 (17.6%)	15 (6.1%)
Others	50 (20.5%)	11 (4.5%)
Number of pregnancy		
Primigravida	117 (48%)	32 (13.1%)
Multigravida	127 (52%)	16 (6.6%)
ANC visit		
Irregular follow-up	127 (52%)	36 (14.8%)
Regular follow-up	117 (48%)	12 (4.9%)
Symptom		
Symptomatic	74 (30.3%)	29 (11.9%)
Asymptomatic	170 (69.7%)	19 (7.8%)
Observation: Vaginal discharge with a foul-smelling odor		
Yes	47 (19.3%)	25 (%)
No	197 (80.7%)	23 (%)
Vaginal douching using soap		
Yes	138 (56.6%)	37 (15.2%)
No	106 (43.4%)	11 (4.5%)
Number of the sexual partner		
One	35 (14.3%)	12 (4.9%)
More than one	209 (85.7%)	36 (14.8%)

3.3. BV and Associated Factors

In a bivariable analysis (Table 2), certain variables were found to be significantly associated with BV at a P<0.05 level. Women aged less than or equal to 25 years old were more likely to have BV (OR: 2.6; 95% CI: 1.7–8.24). The odds of having BV was approximately three time as high for primigravida women (OR: 2.60; 95% CI: 1.66–5.13). The highest OR for BV was found for irregular ANC follow-up or pregnant women (OR: 4.35; 95% CI: 1.21–15.66). Women who used daily vaginal douching had higher odds of having BV (OR: 2.5; 95% CI: 1.76–3.93).

However, in multivariable logistic regression analysis as shown in Table 2, pregnant women with irregular ANC follow-up were found to be three times more likely to have BV compared to those on regular follow-up (AOR, 3.1; 95% CI 1.3–7.5; p = 0.011). Women with vaginal discharge and with a

foul-smelling odor were four times more likely to have BV (AOR, 4.2; 95% CI: 1.7–10.3; p = 0.001). Women who use soap for vaginal Douching was strongly associated with BV (AOR, 3.6; 95% CI: 1.4–9.1). In addition women who had more than one sexual partner were three times at risk of acquiring BV. However, factors such as age, residing area, educational status, occopation, and marital status were identified as potential predictors of BV in the bivariable analysis but did not show significance in the multivariable analysis.

Table 2. *Bivariable and Multivariable Analysis of Socio-Demographic Characteristics and Associated Factors with BV in Pregnant Women.*

Characteristics	BV indicated (n=48) (19.7%)	Bivariate analysis		Multivariate analysis	
		COR	P-value	AOR	P-value
Age of the participants					
≤ 25	29 (11.9%)	2.6 (1.3-5.0)	0.004	2.2 (0.9-5.1)	0.067
Above 25	19 (7.8%)	1		1	
Residence					
Urban	33 (13.5%)	1.6 (0.8-3.1)	0.160	2.0 (0.8-4.8)	0.120
Rural	15 (6.1%)	1		1	
Educational status					
Unable to read and write	23 (9.4%)	1			
Read and write only	18 (7.4%)	1.8 (0.7-4.7)	0.23		
Secondary school	4 (1.6%)	1.6 (0.4-7.7)	0.55		
College and above	3 (1.2%)	2.5 (0.5-11.8)	0.26		
Occupation					
Housewife	20 (8.2%)	1			
Farmer	2 (0.8%)	3.58 (0.6-21.8)	0.12		
Daily laborer	15 (6.1%)	0.87 (0.3-2.4)	0.68		
Others	11 (4.5%)	0.71 (0.3-2.0)	0.52		
Number of pregnancy					
Primigravidia	32 (13.1%)	2.6 (1.3-5.0)	0.004	2.2 (0.9-5.1)	0.067
Meltiravidia	16 (6.6%)	1		1	
ANC visit					
Irregular follow-up	36 (14.8%)	3.4 (1.7-7.0)	0.000	3.1 (1.3-7.5)	0.011
Regular follow-up	12 (4.9%)	1		1	
Symptom					
Symptomatic	29 (11.9%)	2.2 (1.1-4.4)	0.015	1.6 (0.6-4.0)	0.264
Asymptomic	19 (7.8%)	1		1	
Observation: Vaginal discharge with a foul-smelling odor					
Yes	25 (10.2%)	8.5 (4.1-17.6)	0.000	4.2 (1.7-10.3)	0.001
No	23 (9.4%)	1		1	
Vaginal Douching using soap					
yes	37 (15.2%)	3.1 (1.5-6.5)	0.001	3.6 (1.4-9.1)	0.011
No	11 (4.5%)	1		1	

Characteristics	BV indicated (n=48) (19.7%)	Bivariate analysis		Multivariate analysis	
		COR	P-value	AOR	P-value
Number of the sexual partner					
one	12 (4.9%)	2.5 (1.1-5.4)	0.019	3.0 (1.1-8.0)	0.023
More than one	36 (14.8%)	1		1	

4. Discussions

In this study the prevalence of BV was 19.7% which is lower compared the global systematic review, which varies by area from 23% to 29%. And 25% in sub-Saharan Africa [11]. More specifically the systematic review report in sub-Saharan Africa was also indicated a higher prevalence of BV, 28.5% in Eastern Africa [12]. In addition, our prevalence was lower than a similar studies like in central Ethiopia 32% [13], in other African countries 26% [14] and 24% [15] in Cameroon, 26.3% in the Democratic Republic of Congo [16], 30.9% in Gana [17], 28.5% [18], and 26.7% in Tanzania [34], 49.8% [19] and 60% [20] and, 17.2% [32] among Sudanese pregnant women and 64% in Nigeria [21]. There are several possible reasons for this, including as variations in the research populations, variances in the diagnostic techniques used, possible temporal fluctuations in the prevalence of BV, regional or local factors, sampling variability, and study design. In fact, it is widely documented that black women are known to experience BV more frequently than white women, although there is no conclusive reason for this racial disparity, socioeconomic factors may be the suggested contributory [22].

On the other hand, the current prevalence in this study is closely aligns with the study conducted in different place in Ethiopia; 19.4% in central Ethiopia [23], 20.1% in northern Ethiopia [24] 21.4% in Eastern Ethiopia [25] and also with South Africa 17.7% [26] and Kenya 19.3% [27]. However, there are some studies that reported a lower prevalence of BV compared to our finding, 2.9% in Kenya [28], 8.6%) in India [29], 11.9% in Nigeria [30] and 12.3% in Burkina Faso [31]. This could be brought on by variations in exposures across different geographic regions as well as behavioral, environmental, healthcare infrastructure, socio-cultural factors and socioeconomic factors.

The study found no statistically significant correlation between the presence of BV and participant characteristics including age, marital status, educational level, occupation, gravidity, and BV complaints (P>0.05). This is consistent with Sudan [32], Ghana [17], Senegal [33], and Eastern Ethiopia [25]. Nonetheless, a lot of studies found a relationship between BV and attributes like age, occupation, marital status, and level of education [34]. This could be due to of variations in sociodemographic factors and hygiene habits that affect the prevalence of bacterial vaginosis within the population. This study like to that of a report from central Ethiopia [25], has found an association between BV and irregular vaginal discharge as well as an unpleasant odour. However study from Sudan and Tanzania have shown no evdence of association [32, 18]. Abnormal vaginal discharge, however, is not a reliable or sensitive sign of the presence of BV.

There is no known cause for bacterial vaginosis, and there are no effective long-term treatments to stop this often recurrent illness. As a matter of fact, observational studies have suggested a connection between bacterial vaginosis and vaginal douching. This correlation, however, might be the result of confounding by indication, or confounding caused by women vaginal douching in reaction to symptoms linked to bacterial vaginosis [35]. According to this study, women who used intra-vaginally soap had a nearly three- to four-fold increased risk of developing BV this might because of a lack of knowledge about the health risks associated with this wrong practice. The study also showed that women who have multiple sexual partners were significantly associated with BV. The results of this study are in line with a study that looked at pregnant women in Eastern Ethiopia [25], India [36], Democratic Republic of Congo [16], Tanzania [34], Nigeria [37], and in Cameron [38]. This is because a positive association between disturbances of the healthy vaginal microbiota and intra-vaginal cleaning with soap [39].

5. Conclusions

In conclusion, it was noted that pregnant women had a high prevalence of BV. We were able to verify the association between BV in pregnant women with multiple sexual partners and women who practiced vaginal douching with soap. Therefore, additional research may be required to validate and assess the reason for this correlation. Planning a preventive approach for BV that discourages vaginal douching with soap and multiple sexual partners during pregnancy may reduce the prevalence of BV.

Abbreviations

BV	Bacterial Vaginosis
STIs	Sexually Transmitted Infections
ANC	Antenatal Care

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Ethical Approval

Ethical approval for this study was obtained from IRB OF COLLEGE OF MEDICINE AND HEALTH SCIENCE OF HAWASSA UNIVERSITY (Ref. No. IRB/0173/15).

Ethical Considerations

First, an ethical approval letter for this study was obtained from the Institutional Review Board (IRB) of the College of Medicine and Health Science of Hawassa University (Ref. No. IRB/0173/15), in line with the codes of the Declaration of Helsinki for Ethical Principles for Medical Research Involving Human Subjects (World Medical Association Declaration of Helsinki: November 27, 2013). Then, Support letters of collaboration were obtained from the HUCSH clinical and academic director offices and the Gebretsadik Shawo General Hospital. In addition, written informed consent was obtained from each study participant before the start of data collection. Furthermore, the investigators had no access to information that could identify individual participants during or after data collection. Individuals were informed about their full right to withdraw from the study at any point in the study period.

Author Contributions

Sintayehu Kochito: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing

Yibeltal Nigatu: Conceptualization, Formal Analysis, Investigation, Methodology, Supervision, Visualization, Writing – original draft, Writing – review & editing

Demissie Asegu: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Visualization, Writing – original draft

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Data Availability Statement

The datasets supporting the conclusions of this article at the PI will be presented upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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