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Bacterial vaginosis in women treated at a hospital in Nazca, Peru: An observational study

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Abstract

Background. Bacterial vaginosis (BV) is the most common cause of abnormal vaginal discharge in women of reproductive age and has been associated with adverse gynecological and obstetric outcomes. Its occurrence is influenced by multiple sociodemographic and behavioral factors that vary by region. **Methods**. A cross-sectional analytical study was conducted at the "Ricardo Cruzado Rivarola" Hospital in Nazca (Peru) between July and December 2021. The study included 296 sexually active women aged 18 to 45. BV was diagnosed using Amsel's clinical criteria and Nugent's scoring system. Data were collected through a validated structured form, and associations were analyzed using the chi-square test ($p<0.05$). **Results**. BV was significantly associated with younger age, low educational attainment, single marital status, overweight or obesity, inadequate intimate hygiene, early sexual debut, multiple sexual partners, and the use of alcohol, tobacco, or drugs. **Conclusion**. In this semi-urban population, BV was associated with modifiable sociodemographic and behavioral characteristics. These findings provide insight into the local epidemiology of BV and may inform future research on context-specific preventive strategies.

Keyword: bacterial vaginosis, reproductive health, risk factors, women's health.

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Introduction

Vaginal infections are a common health issue among women of reproductive age. Beyond the physical discomfort they cause -such as foul-smelling vaginal discharge, itching, burning, and pain during sexual intercourse- these infections can negatively impact emotional well- being and intimate relationships(1). Despite their high frequency, many women do not recognize the symptoms or tend to minimize them, allowing the condition to worsen or recur over time(2).

Bacterial vaginosis (BV) is one of the most prevalent vaginal infections worldwide among women of reproductive age. It is characterized by an imbalance in the vaginal microbiota, with a reduction in lactobacilli and an overgrowth of anaerobic bacteria such as *Gardnerella vaginalis*, *Prevotella* spp.(3), and *Mobiluncus* spp. . This imbalance leads to symptoms like foul -smelling discharge, itching, irritation, or discomfort during intercourse. However, in many cases, the infection is asymptomatic, which complicates timely detection and treatment(4).

Globally, it is estimated that between 20% and 62% of women of reproductive age experience vaginal infections at some point, with BV accounting for a significant proportion of cases. Prevalence varies widely depending on geographic location and population characteristics(2). In Peru, a study conducted in 20 cities found a 23.7% prevalence of BV among women aged 18 to 29, associated with factors such as having multiple sexual partners, not using condoms, and living in highland regions(5).

Although BV is not strictly classified as a sexually transmitted infection (STI), evidence shows that sexual activity plays a key role in its development. Factors such as early sexual debut, a high number of sexual partners, and inconsistent condom use are strongly linked to the condition(6). Additionally, practices like frequent vaginal douching, wearing tight or synthetic underwear, and self-medicating with antifungals or antibiotics can disrupt the vaginal environment and increase the risk of BV(7).

The impact of BV goes beyond local symptoms. It has been associated with an increased risk of acquiring other STIs, including HIV, human papillomavirus (HPV), chlamydia, and gonorrhea(8). In pregnant women, BV can lead to

complications such as premature rupture of membranes, preterm birth, or postpartum infections. In recurrent or untreated cases, it may affect fertility and reduce quality of life(9).

Several studies have explored the factors associated with this infection. The most frequent findings point to the use of hormonal contraceptive methods, history of previous vaginal infections, obesity, lack of adequate intimate hygiene, and risky sexual behaviors as risk variables(5,10,11). It has also been reported that many women are unaware of warning signs or tend to downplay symptoms, contributing to the persistence and recurrence of the infection(12).

Despite its high prevalence and clinical implications, BV remains underdiagnosed and often poorly managed. Therefore, this study aims to identify the risk factors associated with bacterial vaginosis in women of reproductive age treated at a Peruvian hospital during 2021, with the goal of generating local evidence to support the development of more effective prevention and treatment strategies.

Methods

Study design

An observational, cross-sectional analytical study was conducted to identify sociodemographic, epidemiological, and behavioral factors associated with bacterial vaginosis (BV) in women of reproductive age. The study was carried out at the "Ricardo Cruzado Rivarola" Hospital in Nazca, Peru, between July and December 2021. The target population included sexually active women aged 18 to 45 who attended the hospital for gynecological care. Exclusion criteria included pregnancy, being on their menstrual period, having immunosuppressive conditions, or having received antibiotic treatment within two weeks prior to clinical evaluation.

Population and sample

The sample size was calculated using a formula for cross-sectional analytical studies, assuming an expected exposure rate of 50% for the risk factor "early sexual initiation," with a 95% confidence level and 80% statistical power, resulting in a total of 296 participants. Patients were selected through simple random sampling. Data were obtained from institutional medical records, which had been previously authorized for research purposes. Information was collected using a structured data collection form, previously validated by experts in public health, research methodology, and statistics.

Procedure

The structured form was based on the instrument used in the study by Rosales (2019) and was validated by an expert panel composed of a methodologist, a statistician, and a public health specialist. The tool allowed for the collection of clinical and personal background information relevant to BV and its potential risk factors.

The diagnosis of BV was established using Amsel's criteria. A case was considered positive if the patient met at least three of the following findings: homogeneous white-gray vaginal discharge, vaginal pH greater than 4.5, positive amine (whiff) test, and presence of clue cells on wet mount microscopy. To improve diagnostic accuracy, Gram staining and Nugent scoring were also used. A score between 7 and 10 was considered confirmatory. All diagnostic procedures were performed by trained medical personnel following standardized protocols.

Variables collected included sociodemographic data (age, marital status, education level), gynecological-obstetric history, sexual practices, contraceptive use, substance use (tobacco, alcohol, drugs), nutritional status according to body mass index (BMI), and intimate hygiene habits. Additionally, factors traditionally associated with vaginal dysbiosis were considered, such as the use of synthetic underwear, vaginal douching practices, and self-medication with antifungals.

Data analysis

Data analysis was performed using IBM SPSS Statistics version 23. Descriptive statistics were used to summarize population characteristics. Bivariate analysis was then conducted using the chi-square test to identify associations between categorical variables and the presence of BV. A significance level of 5% was used.

Ethical Considerations

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and current national regulations. The protocol was approved by the Institutional Research Ethics Committee of Universidad San Juan Bautista under resolution No. 551-2022-CIEI-UPSJB and was authorized by the hospital. Data confidentiality was ensured through anonymous coding, and no direct interventions were performed on the participants.

Results

The study population consisted of 296 women of reproductive age who received care at the "Ricardo Cruzado Rivarola" Hospital in Nazca during the second half of 2021. Sociodemographic findings revealed a characteristic distribution, with a predominance of young women, most of whom had completed secondary education and were in a stable relationship. From an epidemiological perspective, there was a high prevalence of overweight and generally adequate hygiene practices among participants. However, nearly one-third of the women reported a history of previous BV episodes. (Table 1)

Table 1

Characteristics of women of childbearing age treated at the "Ricardo Cruzado Rivarola" Hospital in Nazca 2021

Variable	Frecuency (n)	Percentaje (%)
Age		
15 to 34 years old	160	54.10%
35 to 45 years old	136	45.90%
Age of onset of SR		
Before 20 years of age	140	47.30%
20 years and older	156	52.70%
Grade of education		
Elementary School	51	17.20%
Secondary	184	62.20%
High school	61	20.60%
Marital status		
Single	99	33.40%
Married/Cohabitant	197	66.60%
Nutritional status		
Normal weight	95	32.10%
Overweight	159	53.70%
Obese	42	14.20%
Personal hygiene		
Inadequate	84	28.40%
Adequate	212	71.60%
History of vaginosis		
Yes	87	29.40%
No	209	70.60%
Promiscuity		
More than 2 pairs	154	52.00%
1-2 partners	142	48.00%
Alcohol consumption		
Yes	79	26.70%
No	217	73.30%
Tobacco use		
Yes	93	31.40%
No	203	68.60%
Drug use		
Yes	24	8.10%
No	272	91.90%

Analysis of associated factors revealed statistically significant relationships between several variables and the presence of bacterial vaginosis. At the sociodemographic level, young age, lower educational level and unmarried marital status showed particularly robust associations. Epidemiological factors such as nutritional status and history of previous infection also showed significant associations, as did various risk behaviors, including early initiation of sexual activity and substance use (Table 2).

Table 2

Factors associated with bacterial vaginosis in women of age treated at the "Ricardo Cruzado Rivarola" hospital in Nazca 2021

Variable	Vaginosis present (n=148)	Vaginosis ausent (n=148)	p-value
Age			**<0.001**
15 to 34 years old	106 (71.6%)	54 (36.5%)	
35 to 45 years old	42 (28.4%)	94 (63.5%)	
Grade of education			**<0.001**
Elementary school	37 (25.0%)	14 (9.5%)	
Secondary	94 (63.5%)	90 (60.8%)	
High school	17 (11.5%)	44 (29.7%)	
Marital status			**<0.001**
Single	67 (45.3%)	32 (21.6%)	
Married/Cohabitant	81 (54.7%)	116 (78.4%)	
Nutritional status			**<0.001**
Normal weight	28 (18.9%)	67 (45.3%)	
Overweight	89 (60.1%)	70 (47.3%)	
Obese	31 (20.9%)	11 (7.4%)	
Personal hygiene			**0.02**
Inadequate	51 (34.5%)	33 (22.3%)	
Adequate	97 (65.5%)	115 (77.7%)	
History of vaginosis			**0.03**
Yes	52 (35.1%)	35 (23.6%)	
No	96 (64.9%)	113 (76.4%)	
Age of onset of SR			**<0.001**
Before age 20	84 (56.8%)	56 (37.8%)	
20 or older	64 (43.2%)	92 (62.2%)	
Promiscuity			**<0.001**
More than 2 pairs	89 (60.1%)	65 (43.9%)	
1-2 partners	59 (39.9%)	83 (56.1%)	
Alcohol consumption			**<0.001**
Yes	55 (37.2%)	24 (16.2%)	
No	93 (62.8%)	124 (83.8%)	
Tobacco use			**<0.001**
Yes	61 (41.2%)	32 (21.6%)	
No	87 (58.8%)	116 (78.4%)	
Drug use			**<0.001**
Yes	20 (13.5%)	4 (2.7%)	
No	128 (86.5%)	144 (97.3%)	

Discussion

The results of this study show that bacterial vaginosis (BV) remains a gynecological health concern with multiple determinants, particularly among young women of reproductive age. The higher frequency of cases observed among women aged 15 to 34 may be explained by increased cumulative exposure to risky sexual behaviors during this life stage(13). This finding is consistent with studies conducted in Latin America, such as those by Gatti and Pinto in Brazil(14,15),

which also reported an association between early reproductive age and increased BV prevalence. Similarly, research conducted in sub-Saharan Africa, Southeast Asia, and even Europe describes comparable patterns, especially in contexts where early sexual debut coincides with limited access to sexual and reproductive health services(16-18).

Educational level was also identified as a relevant factor, particularly among women with only primary education. Several studies have documented that low educational attainment is associated with limited knowledge of warning signs and inadequate hygienic practices, which perpetuate recurrent episodes of vaginal dysbiosis(19-21). This association may be mediated by restricted access to information on intimate health, as well as by a lower adoption of preventive behaviors.

Regarding marital status, a higher proportion of cases was observed among single women. This finding may be related to greater variability in sexual partners or less frequent use of barrier methods. Unlike other studies where this variable was not significant, in the present study, being single appears as a social and behavioral marker that may reflect a pattern of cumulative risk(5,9,12).

Nutritional status showed a significant relationship with the presence of BV. Both overweight and obesity were associated with a higher frequency of cases, which may be explained by plausible biological mechanisms. Obesity induces a systemic pro-inflammatory state that may compromise mucosal immunity and alter the composition of the vaginal microbiota(22). Additionally, skin folds and localized moisture may promote the proliferation of anaerobic microorganisms ''–'– . These findings are consistent with studies in young adult women in Brazil, which reported high BV rates in women with elevated body mass index(21).

Intimate hygiene also emerged as a relevant factor. Women who reported inadequate hygienic practices had a higher frequency of BV, which aligns with studies warning about the risks of vaginal douching, wearing non-breathable underwear, and excessive cleaning with irritating products. Although many of these practices are intended as preventive measures, there is ample evidence that they can disrupt vaginal pH and reduce the concentration of lactobacilli, thus creating a favorable environment for pathogenic microorganisms(6,24-26).

Another important finding was the association between a history of BV and recurrence. This suggests that, in many patients, predisposing factors persist or that previous treatment was insufficient. Recurrence of BV is a well-documented phenomenon, with estimates indicating that 30% to 50% of women may experience recurrence within the first year after treatment, particularly in contexts where underlying factors such as sexual behavior or hygiene practices are not addressed(9,18,20).

From a behavioral perspective, early sexual debut was significantly associated with the presence of BV, reinforcing the literature that links early sexual maturation with greater vulnerability to reproductive tract infections. Similarly, a higher number of sexual partners remained a risk factor, possibly related to exposure to diverse sexual microbiotas, which can destabilize the resident vaginal microbiota(27-29).

Finally, the consumption of alcohol, tobacco, and drugs was significantly associated with the presence of BV. These findings suggest that the overall behavioral profile of patients may influence their susceptibility to vaginal infections. Substance use has been linked not only to risky sexual behavior but also to immunological alterations that may impair local responses to dysbiosis(30).

This study presents several limitations that should be considered. First, its cross-sectional design prevents establishing causal relationships, limiting the analysis to associations between variables. Second, information on sexual behavior, hygiene habits, and substance use was self-reported, which may introduce social desirability or underreporting biases. Although a combination of clinical and microbiological criteria was used to diagnose BV, cultures and PCR tests to identify specific strains or confirm co-infections were not performed. In addition, no adjustments for multiple comparisons were made, which increases the risk of type I error in the bivariate analysis. Lastly, since the sample was obtained from a single semi-urban healthcare center, the generalizability of the findings to other regions should be interpreted with caution.

Conclusions

Bacterial vaginosis among women of reproductive age in Nazca was significantly associated with modifiable sociodemographic and behavioral factors. Higher infection rates were observed among younger women, those with low educational levels, single marital status, a history of overweight or obesity, inadequate intimate hygiene practices, early sexual debut, multiple sexual partners, and the use of alcohol, tobacco, or drugs. These findings highlight a pattern of vulnerability linked to social conditions, lifestyle, and sexual behaviors, providing local evidence on the distribution and determinants of bacterial vaginosis in semi-urban settings in Peru.

Authors' contributions

Anixa Gutierrez-Lujan: study design, analysis and interpretation of data, collection of data, manuscrip writing. **Walter Gomez-Gonzales**: study design, manuscript writing, critical revision.

Ethical considerations

The protocol was approved by the Institutional Research Ethics Committee of Universidad San Juan Bautista under resolution No. 551-2022-CIEI-UPSJB.

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Conflicts of interest

The authors declare no conflict of interest.

Availability of data

The datasets generated and /or analyzed during current study available from the corresponding author on reasonable request.

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