HSJ

Health Sciences Journal
EISSN: 2959-2259; PISSN:2959-2240

Vol.3, Issue. 2

Received: 16 OCTOBER 2024 Accepted: 26 DECEMBER 2024 Published: 21 JANUARY 2025

MDRI

Research Article

Diagnosis of Bacterial Vaginosis Patients Treated in Lahore, Pakistan: Epidemiology and Diagnostic Aspects

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Citation
Waqar A, Mahmood H, Rukaya, Khan S, Akhtar AM, Bilal S, Diagnosis of bacterial vaginosis patients treated in Lahore, Pakistan: Epidemiology and diagnostic aspects. Health Sciences Journal, 2025;3(2): 95-102

ABSTRACT:

INTRODUCTION: BV is currently considered the most prevalent vaginal infection in women of reproductive age, affecting approximately 10 to 30% of women in this group worldwide. However, it is assumed that this prevalence is linked to the population studied, ranging from 4% in developed countries to 61% in underdeveloped countries. Following the global trend, in Pakistan, BV is also a very common condition, affecting approximately 45% of women with complaints of vaginal discharge vaginal. Although, one parameter of difficult determination and possible to underestimate due the high frequency of carriers asymptomatic, who do not seek medical care because they have no complaints, and are therefore not included in the studies. **AIM OF THE STUDY:** The present study using score of Nugent for the presence of BV among the patients in Lahore, Pakistan. To establish the validity and reliability of the presence of *clue-cells* as indicator from the syndrome, correlating results obtained in the preventive examination (Pap smear). **METHODS:** The present study is of descriptive, observational and transversal nature and was carried out with random samples, obtained from a sample population composed of patients of sex feminine, treated at various hospital in Lahore, Pakistan during April 2023 and April 2024. The patients answered a questionnaire to characterize their epidemiological profile, containing information such as: marital status, education, occupation and sexual activity. Patients who sought the aforementioned medical services were included in the study. **RESULTS:** Results of the exams of Pap smear of the patients were obtained. They were collected samples of 89 patients to the period mentioned, being 55.1% (49/89) coming from the Gynecology Department of public hospitals of Lahore, Pakistan and 44.9% (40/89) from the Gynecology Department of Private Hospital in Lahore, Pakistan. The average age of patients served is 39.9 years. Among the patients of the Gynecology Department of Public Hospital in Lahore, Pakistan the average age was 43.5 years old, and among those in the Gynecology Department of Private Hospital in Lahore, Pakistan, 35.6 years old. **DISCUSSION:** Data suggest that the highest prevalence of BV is associated with women of reproductive age, which may reflect the fact that the microorganisms that cause BV use glycogen as a substrate, whose cellular accumulation is related to hormonal stimulation**. CONCLUSION:** It is a quick and easy-to-perform method, both for determining the Nugent score, which detected a 46.1% occurrence of BV in the population studied; and for evaluating the presence of *clue cells*, requiring only a professional trained pathologist to view the slides. In addition to assisting in complementary diagnosis, associated with clinical Gynecology Department of Public Hospital, which directs towards a correct diagnosis and treatment, reducing the indiscriminate and abusive use of antimicrobials.

Keywords: Vaginosis Bacterial, *Gardner Ella vaginalis*, Pap smear.

1 | INTRODUCTION

Bacterial vaginosis (BV) can be defined as a polymicrobial syndrome, of poorly understood etiology, in which there is

an imbalance of the healthy vaginal microbiota, with an increase in anaerobic or facultative anaerobic bacteria, among which *Gardnerella vaginalis stands out,* to the detriment of *Lactobacillus* sp. [1, 2] *Gardnerella vaginalis* is isolated from almost all women with syndrome[3] and is characterized to be a boring bacterium, facultative anaerobic, non-motile, β-hemolytic in blood human, tentorial of Gram-variable coccobacillus.[4] The most common symptom of BV is the presence of vaginal discharge homogeneous, of low intensity, whitish, grayish or yellowish coloration, and odor similar to "rotten fish".[2] However, a high proportion, which can reach up to 50% of women with the syndrome are asymptomatic.[1, 5] BV is currently considered the most prevalent vaginal infection in women of reproductive age, affecting approximately 10 to 30% of women in this group worldwide. However, it is assumed that this prevalence is linked to the population studied, ranging from 4% in developed countries to 61% in underdeveloped countries. Following the global trend, in Pakistan, BV is also a very common condition, affecting approximately 45% of women with complaints of vaginal discharge vaginal.[2] Although, one parameter of difficult determination and possible to underestimate due the high frequency of carriers asymptomatic, who do not seek medical care because they have no complaints, and are therefore not included in the studies.[1]

Several behaviors and factors inherent to the host are considered to be at risk for the acquisition of BV, including ethnicity, smoking, and of sociocultural factors such as age and low income. It reflects in habits of hygiene and sexual behavior.[1.8.] As the studies pointed the infection and about three times more common in uneducated women when compared to educated women, although the reasons for this are not fully understood. The occurrence of H_2O_2 producing lactobacillus species appears to be less frequent in women, resulting in a normally higher vaginal pH in this group, which could explain this fact.[9] Smoking is another controversial factor. It acts by suppressing the growth of lactobacilli which can produce H_2O_2. It still the immune system as a whole, favoring infection and increasing the risk of BV.[10] Socioeconomic indicators such as education, income and place of residence determine both access to and quality of health care provided to women that is a fact that could explain a higher prevalence of BV in women with a low socioeconomic profile.[11] However, the literature is not unanimous in establishing such a correlation.[12] Another important factor that could lead to changes in the vaginal microbiota is sexual behavior. Studies demonstrate the BV and more frequent in populations with high rates of sexually transmitted diseases (STDs), it is associated with new or multiple sexual partners, early onset of sexual activity and lack of condom use. In addition, the high frequency of sexual intercourse, whether due to the deposition of semen (alkaline medium) in the vaginal epithelium, local stimulation of the mucosa or even the introduction of foreign bacteria into the vaginal environment, is also predisposing factor. [2,13] In this context, studies indicate that female rural workers have risk for four times bigger of develop BV in relationship to the urban woman.[8] Women in homosexual relationships also become more Gynecology Department of Public Hospital centibel, with a greater risk of acquiring the condition of BV in relation to heterosexual women.[14]

The importance of BV in public health, in addition of the syndrome, is a common discomfort that increased flow in women. It impairs sexual life[12] and can also be associated with a series of other gynecological and obstetric complications, including spontaneous abortions, premature or complicated births, postoperative and urinary tract infections, as well as abnormal results in cervicovaginal cytological analyses.[15-17] It also increases the risk of acquiring, transmitting or reactivating the human immunodeficiency virus (HIV), Gynecology Department of Private Hospital simplex virus type 2 and human papillomavirus (HPV).[16] In clinical practice, BV is difficult to diagnose. Since in most cases, no symptoms are classics and can be modified to countless aspects, such as incorrect use (often through self-medication) of vaginal creams or other local irritants, vaginal douches, recent intercourse, association of different diseases and inadequate hygiene habits. Thus, aiming to standardize the diagnosis, proposed criteria that may include clinical and laboratory data or just microbiological data, among which the best known and most publicized are those of Amsel and Nugent.[2] According to the Amsel criteria, at least three of the following of four conditions must be present to establish the diagnosis of BV: (1) Elevated vaginal fluid pH (>4.5); (2) "test of the smell" or "test" of the amines" (Whiff) positive, which consists of detecting a "rotten fish" odor due to the volatilization of aromatic amines (rescine and cadaverine) with the addition of two drops of 10% potassium hydroxide (KOH) to a slide containing vaginal fluid; (3) presence of >20% *clue cells* on fresh bacterioscopic examination of vaginal fluid; and (4) small amount of homogeneous, milky, grayish-educated vaginal discharge [18, 19]. Clue *cells*, also called "cells indicators" or "guide cells", they are epithelial vaginal cells whose surface covered of bacteria such as *G. vaginalis* , *Bacteroides* spp. and *Mobiluncus* spp. [4, 19] However, in practice, the Amsel criteria are based on subjective criteria, making them an inconclusive method, especially in the diagnosis of asymptomatic cases [16]. Therefore, in these situations, microbiological methods, such as the Nugent score, are preferable.[20] Nugent score method is based on the sum of differentiated values for the quantitative microscopic analysis of vaginal smears stained by the Gram method. Bacterial such as *Lactobacillus, Mobiluncus* and *G. vaginalis*, are identified and quantified. A final score of 0-3 is considered healthy (asymptomatic for BV) and is characterized by the predominance of Gram-positive rods. A score 7-10 checks the diagnosis of BV and it is marked by the absence of Gram-positive rods and the presence of high concentrations of *G. vaginalis* or *Mobiluncus spp*. A score

of 4-6 is compatible with an intermediate picture, and has types characteristic of both poles (Table 1).[21, 22]

Table 1 score of Nugent

Gynecology Department of Private Hospital	No. of microorganisms/Immersion field	Scoring
Lactobacillus spp. or Bacilli of Doderlein (BGP)	>30	0
	5 – 30	1
	1 – 4	2
	1	3
	0	4
Mobiluncus sp. (curved BGN)	0	0
	1 – 4	1
	5	2
Gardnerella vaginalis/*Bacteroides* sp. (CBGV; BGN)	>30	4
	5 – 30	3
	1 – 4	2
	1	1
	0	0
	Some points obtained and checked	
Sum		
0- 3	Normal	
4- 6	Intermediary	
7- 10	Vaginosis Bacterial	

Criteria from Nugent, despite to be less sensitive in the identification of BV, appear to be more reliable from a reproducibility point of view, as they eliminate the aspects subjective found criteria of Amsel.[2] In addition, it is low-cost and widely used in many laboratories, and can therefore be considered the "gold standard" for the diagnosis of BV.[23] Papanicolaou staining is also widely used in routine laboratory tests to identify BV. The technique has a sensitivity of around 50% and an average specificity of 95% for detecting BV, when compared to the standard test.[10] For this reason, it has become a diagnostic test because it is easy to perform, practical and useful for characterizing the disease, particularly when the result is positive. In addition, Furthermore, it allows the diagnosis of asymptomatic BV and has good population coverage, as it is part of the cervical-uterine prevention program.[16]

1.1 | Aim of The Study

The present study using score of Nugent for the presence of BV among the patients in Lahore, Pakistan. To establish the validity and reliability of the presence of *clue-cells* as indicator from the syndrome, correlating results obtained in the preventive examination (Pap smear).

2 | METHODOLOGY

The present study is of nature descriptive, observational and transversal and was carried out with random samples, obtained from a sample population composed of patients of sex feminine, treated at various hospital in Lahore, Pakistan during April 2023 and April 2024. The patients answered a questionnaire to characterize their epidemiological profile, containing information such as: marital status, education, occupation and sexual activity. Patients who sought the aforementioned medical services were included in the study.

2.1 | Inclusion Criteria

To realize the exam of Pap smear, (1) a gap of sexual intercourse of five days prior to collection, (2) who had not used systemic antibacterial and antifungal drugs in the thirty days prior to collection, (3) who had not used topical vaginal products and who agreed to participate in the study by signing a Free and Informed Consent Form, in accordance with resolution of the National Health Council.

2.2 | Exclusion Criteria

On the other hand, patients who declared themselves to be pregnant, had diagnosis clinical-laboratory of infections cervical-vaginal due to other causes, in addition of those who did not consent in participate in the study were excluded.

Health Sciences Journal
EISSN: 2959-2259; PISSN:2959-2240

2.3 | Sample Collections

Eventual emotional discomforts to the patients were minimized. One-time samples were collected during a gynecological consultation by the responsible physician, concomitantly with the procedures that are routinely performed in this service. This study was linked to a research project, approved by the Ethics Committee of the University. Vaginal secretion samples from patients were collected during the routine examination. Using flexible sterilized swabs for bacterial research, the clinical specimen was immediately immersed in 2 mL of specific transport medium for *Gardnerella vaginalis* – TGM, composed of 1.5% Proteose Peptone No. 3 (BD Biosciences - US), added with 10% sterile glycerin PA (JP Farma), contained in test tubes sealed with hydrophobic cotton stoppers. The material was sent on the same day to the Laboratory of Bacterial Physiology and Molecular Genetics, for processing. The swabs were wiped onto the wall of the test tube and used to perform smears in blade, that were submitted to staining by the method of Gram, for visualization, to the microscope (Olympus Optical of Germany) of cells epithelial covered by bacteria (*clue-cells*) and determination of the Nugent score. To do this, we determined the number found, per microscopic field, of each bacterial type present, between rods Gram-positive (BGPs, suggestive of *Lactobacillus* sp.), curved Gram-negative rods (GNBs suggestive of *Mobiluncus* sp.) and coccobacilli Gram-variables (CBGV) or BGNs with vacuoles (suggestive) of *G. vaginalis* or *Bacteroides* sp., respectively). This value was correlated to a score and the score end from the patient was resulting from the sum of values differentiated (Table 1). This way, patients were classified as carriers of BV, carriers of one intermediate stage of BV or asymptomatic for BV.

3 | RESULTS

Results of the exams of Pap smear of the patients were obtained consultation to the medical records of same in the system of Hospital. They were collected samples of 89 patients to the period mentioned, being 55.1% (49/89) coming from the Gynecology Department of public hospitals of Lahore, Pakistan and 44.9% (40/89) from the Gynecology Department of Private Hospital in Lahore, Pakistan. The average age of patients served is 39.9 years. Among the patients of the Gynecology Department of Public Hospital in Lahore, Pakistan the average age was 43.5 years old, and among those in the Gynecology Department of Private Hospital in Lahore, Pakistan, 35.6 years old. The description of socio-demographic characteristics (marital status, education, occupation professional and sexual life) of population studied is found in **Table 2.**

Variables Analyzed		Gynecology Department of Public Hospital (n = 49)				Gynecology Department of Private Hospital (n = 40)				Total (n=89)			
		Healthy (n=28)		With VB(n=21)		Healthy (n=20)		With VB(n=20)		Healthy (n=48)		With VB(n=41)	
		N	%	N	%	N	%	N	%	N	%	N	%
Marital status	Married	16	57.2	09	42.9	10	50.0	06	30.0	26	54.2	15	36.6
	Single	06	21.4	08	38.1	09	45.0	10	50.	15	31.2	18	43.9
	Other	06	21.4	04	19.0	01	5.0	04	20.0	07	14.6	08	19.5
Population	Urban	25	89.3	14	66.7	18	90.0	19	95.0	43	89.6	33	80.5
	Rural	03	10.7	07	33.3	02	10.0	01	5.0	05	10.4	08	19.5
Education	None	00	0.0	01	4.8	00	0.0	00	0.0	00	0.0	01	2.4
	Primary	06	21.4	04	19.0	00	0.0	00	0.0	06	12.5	04	9.8
	Fundamental	10	35.7	08	38.1	00	0.0	00	0.0	10	20.8	08	19.5
	Average	08	28.6	06	28.6	01	5.0	03	15.0	09	18.8	09	22.0
	Superior	04	14.3	02	9.5	19	95.0	17	85.0	23	47.9	19	46.3
Occupation	From Home	15	53.6	09	42.9	03	15.0	04	20.0	18	37.5	13	31.7
	Other	13	46.4	12	57.1	17	85.0	16	80.0	30	62.5	28	68.3
Active Sex Life	Yes	20	71,4	17	81.0	20	100.0	20	100.0	40	83.3	37	90.2
	No	08	28,6	04	19.9	00	0.0	00	0.0	08	16.7	04	9.8

Applying Nugent's criteria, 38 of these patients were diagnosed as symptomatic. to BV, 03 as carriers of one intermediate framework and 48 as asymptomatic for BV. In order to simplify the analysis of results, patients with of frame intermediate were grouped to the symptomatic to BV, resulting thus in one occurrence of 46.1% (41/89) of BV in the population studied, front the 53.9% (48/89) of asymptomatic patients for BV. When correlating the occurrence of BV to the sample origin, we observed that this was 50.0% (20/40) in Gynecology Department of Private Hospital and 42.8% (21/49) in Gynecology Department of Public Hospital. values of sensitivity, specificity, value predictive positive (VPP) and negative predictive value (NPV), comparing the Pap smear with the Nugent criteria and with the detection of

clue-cells between two groups of patients, served in the Gynecology Department of Private Hospital and Gynecology Department of Public Hospital, are described in Tables 3 and 4.

Table 3 Agreement between the score of Nugent and the result of Papanicolaou, in relationship the origin of the patient

	Gynecology Department of Public Hospital			Gynecology Department of Private Hospital		
Criteria of Nugent	BV (positive)	BV (negative)	Total	BV (positive)	BV (negative)	Total
Positive Cases	07	02	09	16	06	22
Papanicolaou (Negative Cases)	16	28	43	06	16	22
Total	23	30	52	22	22	44

Table 4 Agreement for the presence of *clue-cells* in patients BV (positive) as well result of Papanicolaou, with relation to the origin of the patient.

	Gynecology Department of Public Hospital			Gynecology Department of Private Hospital		
Clue cells	(positive)	(Negative)	Total	(positive)	(Negative)	Total
(positive)	03	06	09	14	8	22
Papanicolaou (Negative)	11	33	44	3	19	22
Total	14	39	53	17	27	44

In Gynecology Department of Private Hospital, 75.0% (15/20) of patients with symptomatic BV had a positive Pap smear result. In Gynecology Department of Public Hospital, 28.6% (06/21) of symptomatic patients for BV had a positive Pap smear result. A group from the Gynecology Department of Private Hospital, values of sensitivity and specificity were found of 75.0% for the Papanicolaou method when compared to the Nugent score, that is, good probability of identifying true positives and true negatives. Furthermore, Values Predictive Positive (VPP) and Negative (VPN) also of 75.0%, indicate agreement between Papanicolaou and Nugent. In the Gynecology Department of Public Hospital, the sensitivity was only 9.0%, that is, a low probability of identifying true positives, and the specificity was 96.0%, demonstrating that it is quite specific in detecting true negatives (PPV of 85.0% and NPV of 64.0%). Accordingly, we can check in the Table 4, in the Gynecology Department of Private Hospital, 75.0% (17/22) of the patients who presented *clue cells* in the smear of vaginal secretion stained by the Gram method, also presented a positive Papanicolaou result for "supracytoplasmic bacilli". In the Gynecology Department of Public Hospital, 59.5% (13/22) of patients presented *clue cells* and a positive Papanicolaou result. Among the patients diagnosed as asymptomatic for BV, no *clue cells were observed* during direct microscopic examination of smears stained by the Gram method, verifying the good agreement between the methods. Although 25.0% (06/22) of the Gynecology Department of Private Hospital patients, and 3.6% (02/30) of the Gynecology Department of Public Hospital patients considered asymptomatic for BV, had a positive result for Papanicolaou (Table 4). Thus, when comparing the presence of *clue cells* with the results of Pap smears between the two groups studied, we obtained, in Gynecology Department of Private Hospital, a sensitivity of 86.6%, specificity of 72%, PPV of 65% and NPV of 90%. In Gynecology Department of Public Hospital, sensitivity of 16.6%, specificity of 86.5%, PPV of 28.5% and NPV of 76.2%. Again, high sensitivity in Gynecology Department of Private Hospital and low sensitivity in Gynecology Department of Public Hospital were observed.

4 | DISCUSSION

BV is the non-cause of vaginal discharge in the reproductive age of women.[12] Regarding age, our results showed that among women diagnosed with BV by Nugent criteria, average age of patients in the Gynecology Department of Private Hospital in Lahore, Pakistan is 35.6 years (age range 19-56 years), and that of patients in the Gynecology Department of Public Hospital in Lahore, Pakistan is 35.7 years (range age of 16-59 years), or they are in reproductive age. Data suggest that the highest prevalence of BV is associated with women of reproductive age, which may reflect the fact that the microorganisms that cause BV use glycogen as a substrate, whose cellular accumulation is related to hormonal stimulation.[6] Regarding the level of education, among the symptomatic patients for BV treated by the Gynecology Department of Private Hospital, the vast majority have completed or are currently studying higher education. Among the symptomatic patients for BV treated by the Gynecology Department of Public Hospital, the majority have completed elementary school (38.1%), followed by 28.6% who are currently studying or have completed high school. In total of patients symptomatic to BV, the degree of education of the women participants was considered good, 46.3% (Higher education), 22.0% (High School) and 19.5% (Elementary Education) (Table 02). Regarding occupation, among the

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EISSN: 2959-2259; PISSN:2959-2240

total number of women with symptoms of BV, the majority work outside the home, although in the group of Gynecology Department of public hospitals of Lahore, Pakistan exists significant number of women with symptoms of BV who identified themselves as "housewives" (42.9%). This data may be also related to the low education observed between these women from the publicschool group, justifying the 4.8% without any year of study, 19.0% with education primary, 38.1% with teaching fundamental, 28.6% with teaching average and just 9.5% with higher education (Table 02).

One factor reported with an increased risk of acquiring BV is the woman who are single or divorced possibly due to bigger possibility of replacement of partners. In the present study, of the total number of patients, 43.9% of symptomatic women for BV were single. Two groups of patients of our study, served by the Gynecology Department of Public Hospital, 42.9% were married, and of those served by the Gynecology Department of Private Hospital, 50.0% were single (Table 02). However, we cannot make an association between marital status and BV, since in the Gynecology Department of Public Hospital in Lahore, Pakistan the majority of women served were married, and in the Gynecology Department of Private Hospital in Lahore, Pakistan the majority were single. It also makes it difficult that association from the vast majority of women with symptoms of BV (90.2%), regardless of marital status, declared having an active sex life. The choice of the best diagnostic method for BV is still controversial, mainly due to the discrepancy in results obtained in different studies carried out. Clinical criteria are yet more used in the doctor practice. BV is often misdiagnosed because criteria used are subjective, such as the appearance of the discharge, the correct pH measurement and the amine test.

It is important to remember that the use of clinical criteria is not useful for the diagnosis of asymptomatic patients, who need to be properly diagnosed and treated.[24] Criteria of Amsel of Clinical data observed by the doctor during the preventive examination, and often not documented in our study. The criteria of Nugent were chosen to classify the patients' participants regarding the presence or absence of BV, due to the ease of being carried out in the laboratory and the fact that the slides can be analyzed by a single observer, in an attempt to minimize errors of visual origin. Using the same method of diagnosis, researchers found lower occurrences to BV, of 24.7% of the patients. they were summoned randomly in their residences to be included in the study, which could justify the low rates.[16] and 34% when the inclusion criteria adopted were the presence of signs and symptoms of cervicovaginal infections among patients treated in the Gynecology and Obstetrics sector of a hospital in the same city.[23] When the patients were selected in a similar way to that of our study, that is approached when seeking services of gynecology to exams preventive of routine, the presence of BV was identified in 54.7% of women treated at a hospital in Chicago, United States [25], corroborating our results. The technique of Pap smear used commonly as test of screening to detect lesions paraneoplastic of the cervix and success in this sense, has made of technique a routine procedure. In addition, Gram's methods and Papanicolaou constitute the colors more used in the routine laboratory for the identification of BV, although, Gynecology Department of Private Hospital. The validity of method of Pap smear is controversial and stimulates the realization of comparative studies, with the aim of defining its degree of reliability.[16]

Data from the literature pointed the Pap smear presents sensitivity in around 50.0% and average specificity of 95.0% for detecting BV, when compared to the standard test (Nugent score).[16, 26] Other authors obtained sensitivity values similar to those found in our work in Gynecology Department of Hospital (75.0%), 71.0% [16] and 56.8%.[27] However, the specificity found these same authors (93.0% and 98.1%, respectively) if approaching more than that found in the Gynecology Department of Public Hospital (96.0%). The PPV and NPV values of 78.0% and 91.0%, respectively, obtained by Hasenack and collaborators (2008)[16] also do not differ substantially from those found in our study. Analyzing the comparisons made in both groups with cited works, it is clear that in all of them the specificity is high, which shows that the stained smears for the technique of Pap smear can used to exclude the syndrome, be specific in detecting true negatives. Other studies have highlighted that cytology for the technique of Pap smear cannot be one method adequate to screening, diagnosis or exclusion of BV, especially when there are other associated pathogens.[27] The high negative predictive values show that smears stained by the Papanicolaou technique can be used to exclude the presence of BV. The analysis of microscope slides requires good determined training technical. Comparing the sensitivity between the two groups of Gynecology Department of Private Hospital and Gynecology Department of Public Hospital, one of the hypotheses for the low sensitivity in the Gynecology Department of Public Hospital as compared to the Gynecology Department of Private Hospital group. The gynecologist, in most cases, forwards the Pap smear test to a single private laboratory, where the turnover of analysis is low. Thus, the slides are analyzed by few analysts. In the Gynecology Department of Public Hospital in Lahore, Pakistan, the majority of these tests are forwarded to the Clinical Pathology laboratory of the Hospital, a place with high turnover, due to the large number of residents and tutors, with the slides being analyzed by several observers.

Health Sciences Journal
EISSN: 2959-2259; PISSN:2959-2240

5 | CONCLUSTION

From the above, it is observed that although there is no true Diagnosis in Gynecology Department of Public Hospital on the diagnosis of BV. It is expected that the bacterioscopy by Gram may be one method to the diagnostic criteria as a complementary method to the Papanicolaou test, assisting and speeding up the diagnosis of BV. It is a quick and easy-to-perform method, both for determining the Nugent score, which detected a 46.1% occurrence of BV in the population studied; and for evaluating the presence of *clue cells*, requiring only a professional trained pathologist to view the slides. In addition to assisting in complementary diagnosis, associated with clinical Gynecology Department of Public Hospital, which directs towards a correct diagnosis and treatment, reducing the indiscriminate and abusive use of antimicrobials. It is expected that the epidemiological and microbiological information generated in this study may serve to characterization of the problem in region Lahore, Pakistan, or to encourage discussions and epidemiological monitoring in other regions, which serve as a basis for the development of public health policies and, thus, can contribute to better use of financial resources to be applied in preventive measures, minimizing the risks associated with cervicovaginal infections and inadequate empirical antibiotic therapy.

ACKNOWLEDGMENTS

To the Gynecology Service of Public and Private Hospitals of Lahore, Pakistan in providing the samples used in this study.

CONFLICTS OF INTEREST

There were no conflicts of interests to realization of present study.

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Health Sciences Journal
EISSN: 2959-2259; PISSN:2959-2240

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