

Occurrence and Clinical Characteristics of Vaginitis among Women of Reproductive Age in Lagos, Nigeria

Chinedum Taahie Oparaugo^{1,2*}, Bamidele Abiodun Iwalokun^{2,3,4}, Francisca Obiageri Nwaokorie⁵, Nathaniel Adeleke Okunloye⁶, Adesegun Abiola Adesesan⁷, Idowu Olaide Edu-Muyideen⁷, Abimbola Modupe Adedeji⁸, Oliver Chukwujekwu Ezechi⁹, Mopelola Anotu Deji-Agboola²

¹Biochemistry & Nutrition Department, Nigerian Institute of Medical Research, Lagos, Nigeria

²Department of Medical Microbiology & Parasitology, Olabisi Onabanjo University, Ago-Iwoye, Nigeria

³Molecular Biology & Biotechnology Department, Nigerian Institute of Medical Research, Lagos, Nigeria

⁴Central Research Laboratory, Nigerian Institute of Medical Research, Lagos, Nigeria

⁵Department of Medical Laboratory Science, College of Medicine, University of Lagos, Idi-Araba, Lagos, Nigeria

⁶Department of Biochemistry, Faculty of Basic Medical Sciences, College of Health Sciences, Ladoké Akintola University of Technology, Ogbomoso, Nigeria

⁷Microbiology Department, Nigerian Institute of Medical Research, Lagos, Nigeria

⁸Monitoring & Evaluation Unit, Nigerian Institute of Medical Research, Lagos, Nigeria

⁹Clinical Science Department, Nigerian Institute of Medical Research, Lagos, Nigeria

Email: *ctoparaugo@yahoo.com

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Abstract

Background: Vaginitis is an important public health problem globally. It is associated with gynaecological and obstetric complications. Vulvovaginal candidiasis, bacterial vaginosis and trichomoniasis are mainly responsible for vaginitis. The aim of this study is to determine the occurrence, clinical characteristics and associated risk factors of vulvovaginal candidiasis and bacterial vaginosis among women of reproductive age attending Primary Health Care centres in Lagos Nigeria. **Methods:** This cross-sectional study recruited 258 women with genital complaints after obtaining their informed written consent between May 2017 and March 2018. Structured questionnaires were administered and high vaginal swabs were collected for laboratory examination. The results were analysed with descriptive statistics, chi-square and simple logistic regression. **Results:** Out of the 210 (81.4%) of the women with one or more vaginal infections, 105 (50.0%), 26 (12.4%) had bacterial vaginosis, and vulvovaginal candidiasis respectively while 78 (37.1%) had both vulvovaginal candidiasis and bacterial vaginosis. Only 1 (0.5%) participant had trichomoniasis and bacterial vaginosis. History of abortion and age below 25 years

were associated with vulvovaginal candidiasis while pregnancy, history of miscarriage, age at first sexual activity and discharge were associated with bacterial vaginosis. Itching was associated with both vulvovaginal candidiasis and bacterial vaginosis. **Conclusion:** This study revealed vulvovaginal candidiasis and bacterial vaginosis as important cause of genital complaints among reproductive age women in Lagos. Health education, robust diagnosis and early treatment are needed in order to reduce the associated risk factors, disease burden and complications.

Keywords

Vaginitis, Women, Reproductive Age

1. Introduction

Vaginitis is a global public health challenge among women of reproductive age. It is estimated that more than one million sexually transmitted infections (STIs) are acquired every day and there are 374 million new infections with one of four STIs: Chlamydia, gonorrhoea, syphilis and trichomoniasis [1]. Vaginitis contributes to gynaecological morbidity and maternal mortality [2]. Some vaginal infections present with few or no symptoms but many have abnormal vaginal discharge, itching, burning sensation, irritation, and discomfort as common complaints [3]. Though there are many pathogenic agents observed in the vaginal microflora, candidiasis, bacterial vaginosis and trichomoniasis are responsible for majority of vaginal infections in women of reproductive age [4] [5].

Vulvovaginal candidiasis (VVC) is the major cause of fungal vaginitis [4] [6]. It is estimated to be the second most common cause of vaginitis after bacterial vaginosis [7]. Approximately 75% of all women experience at least one episode of VVC during their lives [8]. *Candida albicans* is the most frequent specie that causes VVC though other species like *C. glabrata*, *C. dubliniensis*, *C. kefyr*, *C. pintolopesii*, *C. guilliermondii* have been reported [9] [10]. Risk factors associated with VVC are sexual activity, recent antibiotic use, pregnancy and immunosuppression from such conditions as poorly controlled HIV infection or diabetes [11]. VVC is common in pregnancy and is associated with a significantly increased likelihood of low birth babies [12].

Bacterial vaginosis is a dysbiosis that results in reduction of vaginal lactobacilli leading to growth of anaerobic organisms like *Gardnerella vaginalis*, *Prevotella* spp, *Mycoplasma hominis*, *Mobiluncus* spp. [6] [13]. Although bacterial vaginosis is often sexually enhanced, it is not a sexually transmitted infection [13]. It is the most common cause of abnormal vaginal discharge in women of reproductive age [3] [4]. Up to half of the women with BV are asymptomatic [14] but for those that are symptomatic, the symptoms cause a lot of distress and impact their quality of life and relationships [15].

Trichomoniasis is caused by a parasitic protozoan, *Trichomonas vaginalis*,

which infects the urogenital tract of females and males [16]. It is the most common non-viral sexually transmitted infection in the world [16]. It is estimated that 156 million people are infected worldwide yearly [1]. Although the main clinical manifestation of trichomoniasis is vaginitis, urethritis and prostatitis, the symptoms of the disease in women are yellowish-green frothy discharge, dysuria and the strawberry cervix which is recognized by punctuated haemorrhagic lesions [17].

Vaginal infections are associated with gynaecological morbidity and maternal mortality. They can cause pelvic inflammatory disease, tubal infertility, ectopic pregnancy, reproductive dysfunction and adverse birth outcomes such as premature rupture of membranes, premature labour, low birth weight, neonatal morbidity and mortality, post abortion or poor hysterectomy infection and enhanced predisposition to neoplastic transformation in cervical tissues. They also increase the risk of HIV and herpes simplex virus acquisition and transmission [16].

Vulvovaginal candidiasis, bacterial vaginosis and trichomoniasis are the main cause of vaginitis among women. In Nigeria, many studies on women with vaginitis focused only on one of the main causes of vaginitis [18] [19] [20] [21] [22]. In cases where there are co-infections, there is poor management of patients and this can lead to recurrence. Bacterial vaginosis recurrence leads to repeated presentations to hospitals or use of home-remedies that have not been proved scientifically [15]. Effective treatment requires accurate diagnosis of vaginitis. Therefore, this study was carried out to investigate the occurrence and clinical characteristics of vaginitis among women of reproductive age with genital complaints in Lagos Nigeria. This will help in the effective management of the infection at grass root level and prevent recurrence.

2. Methods

2.1. Study Settings

The study was conducted at Clinical Diagnostic Laboratory Unit, Nigerian Institute of Medical Research (NIMR) Lagos Nigeria. Ethical approval was obtained from NIMR Institutional Review Board and permission from Primary Health Care centre board.

2.2. Study Design and Population

This is a cross sectional study on reproductive age women (18 - 49 years) with genital complaints who attended twenty Primary Health Care centres in Lagos Nigeria between May 2017 and March 2018. Women who were on antibiotics one month before the date of sample collection were excluded from the study. The women were educated on the causes and prevention of vaginal infections, the study benefits and procedure. They were well informed about some gynaecological disorders that may occur among women of reproductive age such as abortion and post abortion sepsis, miscarriage and pelvic inflammatory syn-

drome. Participants were recruited from the women who signed consent form and waited for the sample to be collected. A pretested structured questionnaire was used to get information on age, marital status, occupation, educational status, residence, income per month, history of abortion (previous pregnancy terminated by inducement), pregnant now, history of miscarriage (previous pregnancy terminated spontaneously), life time number of sexual partners, age at first sexual activity. The case record files of participants were used to obtain the symptoms (discharge, lower abdominal pain, itching, foul odour from vagina).

2.3. Sample Collection and Processing

High vaginal swab (HVS) was collected using sterile disposable speculum and two swab sticks. One HVS sample was used for Gram stain, saline wet mount for *Trichomonas vaginalis* by direct light microscopy examination ($\times 40$) and assessment of bacterial vaginosis using the Amsel criteria. Presence of three out of the four Amsel criteria (vaginal discharge, vaginal pH greater than 4.5, positive whiff test, clue cell) was used in the diagnosis of bacterial vaginosis. The second HVS sample was inoculated in Sabouraud Dextrose Agar and incubated aerobically at $35^{\circ}\text{C} - 37^{\circ}\text{C}$ for 24 - 48 hours. Identification of *Candida* species was done based on morphology on wet mount microscopy ($\times 40$) and Gram staining while Germ tube test was used to identify *Candida albicans* [23].

2.4. Data Analysis

Data entry and analysis were done using Statistical Package for Social Sciences version 26. The variables of the study participants were described using frequencies, percentages and charts. Chi square and simple logistic regression were used to compare the vaginal infections with sociodemographic and clinical profile variables. A value of $P \leq 0.05$ was considered statistically significant.

3. Result

A total of 258 women with genital complaints were recruited for the study. Only 210 (81.4%) of the women had one or more vaginal infections with 105 (50.0%) and 26 (12.4%) having bacterial vaginosis (BV) and vulvovaginal candidiasis (VVC) respectively. Also, 78 (37.1%) had BV and VVC while 1 (0.5%) had bacterial vaginosis and *T. vaginalis* (TV). None of the participants had the three infections. Further analysis comparing bacterial vaginosis and vulvovaginal candidiasis (BV versus VVC + BV) showed significant disparity in favour of bacterial vaginosis ($P = 0.01$) and also when the two groups (VVC + BV, VVC) were compared with the single case of BV and TV pooled with the BV only cases ($P < 0.0001$) (Figure 1).

The sociodemographic characteristics of the reproductive age women with vulvovaginal candidiasis and bacterial vaginosis are shown in Table 1. Infection with VVC was highest (57.1%) in age groups less than 20 years and 21 - 25 years ($P = 0.042$), followed by 47.6% and 40.8% in 41 - 45 and 31 - 35 years age group

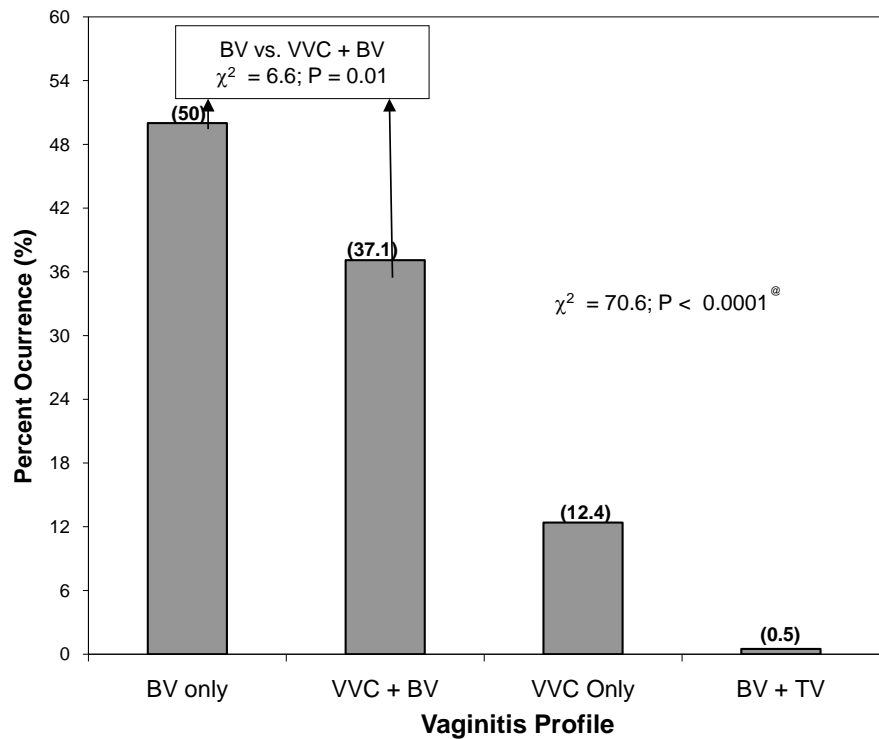


Figure 1. Prevalence and vaginitis profile among the studied women. BV, Bacterial Vaginosis; VVC = Vulvovaginal Candidiasis; TV = Trichomoniasis; ®Disparity in % occurrence of vaginitis types with the only BV + TV pooled with BV only cases.

Table 1. Sociodemographic characteristics of reproductive aged women with vulvovaginal candidiasis and bacterial vaginosis.

Variables	Number of Participants N (%)	VVC N (%)	P value	Bacterial vaginosis N (%)	P value	VVC and bacterial vaginosis N (%)	P value
Age							
<20	21 (8.1)	12 (57.1)	0.042	11 (52.4)	0.235	10 (47.6)	0.178
21 - 25	21 (8.1)	12 (57.1)		16 (76.2)		9 (42.9)	
26 - 30	21 (8.1)	7 (33.3)		15 (71.4)		6 (28.6)	
31 - 35	130 (50.4)	53 (40.8)		90 (69.2)		36 (27.7)	
36 - 40	44 (17.1)	10 (22.7)		36 (81.8)		9 (20.5)	
41 - 45	21 (8.1)	10 (47.6)		16 (76.2)		8 (38.1)	
Marital status							
Single	23 (8.9)	10 (43.5)	0.385	16 (69.6)	0.574	8 (34.8)	0.115
Divorced	2 (0.8)	2 (100)		2 (100)		2 (100.0)	
Separated	3 (1.2)	2 (66.7)		3 (100)		2 (66.7)	
Widowed	2 (0.8)	1 (50.0)		2 (100)		1 (50.0)	
Married	228 (88.4)	89 (39.0)		161 (70.6)		65 (28.5)	
Occupation							
Trader	64 (24.8)	26 (40.6)	0.840	51 (79.7)	0.117	23 (35.9)	0.537

Continued

Unemployed	41 (15.9)	19 (46.3)		24 (58.5)		14 (34.1)	
Civil servant	110 (42.6)	42 (38.2)		80 (72.7)		29 (26.4)	
Self employed	43 (16.7)	17 (39.5)		29 (67.4)		12 (27.9)	
Educational status							
None	4 (1.6)	0 (0.0)	0.420	4 (100.0)	0.355	0 (0.0)	0.543
Primary	2 (0.8)	1 (50.0)		2 (100.0)		1 (50.0)	
Secondary	106 (41.1)	43 (40.6)		78 (73.6)		33 (31.1)	
Tertiary	146 (56.6)	60 (41.1)		100 (68.5)		44 (30.1)	
Residence							
Urban	213 (82.6)	87 (40.8)	0.703	150 (70.4)	0.489	65 (30.5)	0.829
Rural	45 (17.4)	17 (37.8)		34 (75.6)		13 (28.9)	
Income per month (₦)							
51,000 - 100,000	87 (33.7)	34 (39.1)	0.942	64 (73.6)	0.792	28 (32.2)	0.751
10,000 - 50,000	150 (58.1)	61 (40.7)		106 (70.7)		45 (30.0)	
None	21 (8.1)	9 (42.9)		14 (66.7)		5 (23.8)	

respectively. Also, bacterial vaginosis infection was high (81.8%) in 36 - 40 years age group followed by 76.2% in 21 - 25 and 41 - 45 years age group. Co-infection of VVC with bacterial vaginosis was more (47.6%) in participants less than 20 years but there was no significant difference ($P = 0.178$). All the participants that were divorced, separated and widowed had bacterial vaginosis compared with 70.6% of the married women with bacterial vaginosis but there was no significant association ($P = 0.574$). All the women that were divorced had both VVC and bacterial vaginosis, however no significant difference was observed ($P = 0.115$). Majority of the participants were civil servants (42.6%). Their educational status revealed that 146 (56.6%) of the women attended tertiary institution while 213 (82.6%) were urban dwellers. More than half (58.1%) of the women earned ₦ 10,000 to ₦ 50,000 monthly.

Table 2 shows the association of clinical profiles of reproductive age women with vulvovaginal candidiasis and bacterial vaginosis. Eleven (25.6%) of the participants with history of abortion had VVC compared with 93 (43.3%) that had no abortion ($P = 0.031$). Almost half (49.2%) of the women that were pregnant had VVC. Pregnancy was associated with bacterial vaginosis ($P = 0.013$). The women that were not sure of pregnancy were removed from the association between state of pregnancy and infection. Women who were pregnant had 94% increased risk of having VVC (OR = 1.94, 95% CI: 1.03, 3.66), 37% increased risk of co-infection with VVC and bacterial vaginosis (OR = 1.37, 95% CI: 0.71, 2.64; $P = 0.354$) but the risk estimate is not statistically significant. Majority (90.9%) of the women with history of miscarriage had bacterial vaginosis compared with 164 (69.5%) without bacterial vaginosis ($P = 0.034$). The only participant that

Table 2. Association of clinical profiles of reproductive age women with vulvovaginal candidiasis and bacterial vaginosis.

Variables	Number of Participants N (%)	VVC N (%)	P value	Bacterial vaginosis N (%)	P value
History of abortion					
Yes	43 (16.7)	11 (25.6)	0.031	30 (69.8)	0.805
No	215 (83.3)	93 (43.3)		154 (71.6)	
Pregnant now					
Yes	63 (24.4)	31 (49.2)	0.109	38 (60.3)	0.013
No	108 (41.9)	36 (33.3)		87 (80.6)	
Not sure	87 (33.7)	37 (42.5)		59 (67.8)	
History of miscarriage					
Yes	22 (8.5)	9 (40.9)	0.952	20 (90.9)	0.034
No	236 (91.5)	95 (40.3)		164 (69.5)	
Life time number of sexual partners					
1	86 (33.3)	29 (33.7)	0.127	58 (67.4)	0.330
2 - 5	172 (66.7)	75 (43.6)		126 (73.3)	
Age at first sexual activity (years)					
<10	1 (0.4)	1 (100.0)	0.561	1 (100.0)	0.020
11 - 15	21 (8.1)	8 (38.1)		19 (90.5)	
16 - 20	85 (32.9)	31 (36.5)		55 (64.7)	
21 - 25	108 (41.9)	48 (44.4)		72 (66.7)	
26 - 30	43 (16.7)	16 (37.2)		37 (86.0)	
Discharge					
Yes	127 (49.2)	55 (43.3)	0.334	121 (95.3)	<0.001
No	131 (50.8)	49 (37.4)		63 (48.1)	
Lower abdominal pain					
Yes	24 (9.3)	10 (41.7)	0.887	15 (62.5)	0.316
No	234 (90.7)	94 (40.2)		169 (72.2)	
Itching					
Yes	21 (8.1)	13 (61.9)	0.035	7 (33.3)	<0.001
No	237 (91.9)	91 (38.4)		177 (74.7)	
Foul odour from vagina					
Yes	15 (5.8)	8 (53.3)	0.289	12 (80.0)	0.444
No	243 (94.2)	96 (39.5)		172 (70.8)	
Discharge and itching					
Yes	17 (6.6)	7 (41.2)	0.940	15 (88.2)	0.111
No	241 (93.4)	97 (40.2)		169 (70.1)	
Lower abdominal pain and itching					
Yes	10 (3.9)	6 (60.0)	0.195	7 (70.0)	0.925
No	248 (96.1)	98 (39.5)		177 (71.4)	

had first sexual activity before 10 years had both VVC and bacterial vaginosis and there was significant association with BV ($P = 0.020$). Out of 127 (49.2%) of the women with discharge, 55 (43.3%) had VVC, 121 (95.3%) had bacterial vaginosis ($P < 0.001$). Only 24 (9.3%) women had lower abdominal pain with 10 (41.7%) having VVC, 15 (62.5%) having bacterial vaginosis but there was no significant association. Majority 13 (61.9%) of the women with itching had VVC ($P = 0.035$) while 33.3% had bacterial vaginosis ($P < 0.001$). Eight (53.3%) and 12(80.0%) of the women with foul odour from vagina had VVC and bacterial vaginosis respectively. However, there was no significant difference. Only 17(6.6%) participants had discharge and itching with majority, 15(88.2%) having bacterial vaginosis.

Further analysis showed that 44 (17.1%) of the reproductive age women had no symptoms, 37 (14.3%) had no symptom and no infection, 7 (2.7%) had infection without symptoms, 11 (4.3%) had symptoms without infection while 203 (78.7%) had both symptoms and infection. There is significant association between symptoms and infections ($P = 0.001$). Infection with *T. vaginalis* was found only in the 31 - 35 years age group.

4. Discussion

Our study showed that 81.4% of the women had one or more vaginal infections with VVC, bacterial vaginosis or *T. vaginalis*. This is higher than reports from Osogbo south western Nigeria (76%) [24], Ghana (56.4%) [25], Cameroon (52.44%) [26], Nepal (33.5%) [27], Yemen (37.6%) [7], Ethiopia (15.4%) [4], Kerkuk-Iraq (13.2%) [28]. However, it is lower compared to reports from India (89.0%) [29].

The result revealed that 12.4% of the participants had VVC only. This is lower than reports from Ghana (36.5%) [25], Nepal (40.3%) [27]. It is higher than reports from Yemen (6.6%) [7], Ethiopia (8.3%) [4], Iran (26.2%) [9], India (37.3%) [30]. In Nigeria, higher prevalence of VVC has been observed in different populations. In Ibadan Oyo state, prevalence of 30.9% was reported [31] while prevalence of 30%, 14%, 35.25%, 25.7% were reported in Port Harcourt, Abuja, Zaria, Yenagoa [22] [32] [33] [34] respectively. The differences observed can be as a result of type of study population, changes in vaginal flora and sexual activity.

In this study, women less than 20 and 21 - 25 years age group had the highest frequency (57.1%) of VVC. Uzoh *et al.* [35] reported 20 - 29 years age group as having highest frequency (38.5%) in Asaba Nigeria. However, Wariso *et al.* [22] reported 40% as highest frequency in age group 26 - 30 years in Southern Nigeria while Sahoo *et al.* [36] reported 39.2% among 26 - 35 years age group. These variations may be attributed to hormonal and physiological variations. In this study, there was statistical significance between age and VVC occurrence ($P = 0.042$). Hedayati *et al.* [10], Konadu *et al.* [25], Aalei and Touhidi [37] reported no significance.

The study showed that 49.2% of the pregnant women had VVC. Some studies

from Nigeria have reported lower prevalence of 41% [38], 40% [35], 38% [12]. Mucci *et al.* [39] and Sangre *et al.* [40] reported 24.8% and 22.7% from Argentina and Burkina Faso respectively. However, Akinbami *et al.* [41] reported a higher prevalence of 60% in Ogbomosho South West Nigeria. These observed differences may be as a result of diet, hygiene and sexual practices.

History of abortion and miscarriage was associated with VVC ($P = 0.031$) and bacterial vaginosis ($P = 0.034$) respectively. In a study by Konadu *et al.* [25], VVC and bacterial vaginosis were not associated with history of spontaneous abortion.

The study showed that bacterial vaginosis was the commonest cause of vaginal infection followed by VVC. This is consistent with findings from Tanzania, Yemen, South western Nigeria, Birgunj Nepal, Sudan [3] [7] [24] [27] [42]. Studies from Ethiopia, India, Brazil, observed that VVC was the commonest cause of vaginal infection [4] [5] [6]. The differences may be as a result of variations in method, study population, hygiene practices and educational status. In this study, 50.0% of the women had bacterial vaginosis only. This is higher than 27.2% reported among reproductive aged women seeking Primary Health Care in Yemen [7]. Bonneton *et al.* [43] also reported a lower prevalence of 18.6% in Senegal. Different studies in Nigeria have reported lower prevalence of bacterial vaginosis, 16.6% [20], 27% [21], 38% [23]. However, Udenze *et al.* [44] reported 74% while Enitan *et al.* [19] reported 65% and 85% prevalence by Nugent's criteria and culture respectively in Ilara, Ogun state Nigeria. The observed variations in prevalence may be due to differences in study populations and techniques used for the test.

The prevalence of *T. vaginalis* (0.5%) is in agreement with reports from Sudan [42] but in contrast with the studies in Nepal where there was no positive case [27]. Higher prevalence of trichomoniasis have been reported in Kanchipuram India (4.0%) [45], Kogi state Nigeria (5.1%) [18] and Ibadan south western Nigeria (1.5%) [46]. *T. vaginalis* was found only in 31 - 35 years age group. Idakwo *et al.* [18] reported higher prevalence in age groups of 21 - 30 and 31 - 40 years while Tine *et al.* [47] reported 31 - 45 years age group. Studies from Egypt [48], Iran [49] reported that women in age group 25 - 45 years are at higher risk of *T. vaginalis* infection. There was no co-infection between VVC and *T. vaginalis*. This is in agreement with report by Idakwo *et al.* [18]. However, Mascarenhas *et al.* [6], Pondei *et al.* [34] reported co-infections by *Candida* species and *T. vaginalis*. Differences may be due to variations in methodology, level of awareness and poor personal hygiene. The low *T. vaginalis* prevalence could be as a result of the wet mount method used in detection. Studies by Adjei *et al.* [50], Squire *et al.* [51], showed that direct wet-mount microscopy has low sensitivity in detecting *T. vaginalis*.

The commonest symptom for patients with bacterial vaginosis was vaginal discharge (95.3%). Majigo *et al.* [3] and Enitan *et al.* [19] reported vaginal discharge as the commonest symptom. There was a significant association between discharge and bacterial vaginosis ($P < 0.001$). This finding agrees with previous

study by Ranjit *et al.* [52] in Nepal and Garba *et al.* [53] in North Central Nigeria. Itching was also statistically significant in patients with bacterial vaginosis (<0.001) but study by Ranjit *et al.* [52] registered no significant relationship between itching and bacterial vaginosis. However, itching was the commonest symptom in VVC patients (61.9%) [P = 0.035]. Hedayati *et al.* [10], Karmastaji *et al.* [54] reported erythema with itching in VVC patients as the commonest symptoms. Abdul-Aziz *et al.* [7] reported significant relationship between vaginal itching and VVC among reproductive aged women in Yemen though Habibi-pour [55] did not find any significant correlation. In this investigation, pregnancy was associated with bacterial vaginosis but study by Apalata *et al.* [56] reported no significant association.

The study has some limitations. Detection of *T. vaginalis* by wet mount may have reduced the actual prevalence. Other causes of abnormal discharge were not detected in the study. Some diseases that make VVC to thrive were not taken into consideration.

5. Conclusion

Findings from this study reveal high burden of bacterial vaginosis and vulvovaginal candidiasis among reproductive age women with history of abortion and miscarriage as potential risk factors. There is need for strategy that will improve reproductive health education especially among women of age 25 years and below.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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