# A Study of Bacterial Vaginosis and Associated Risk Factors among Married Women in Zakho City, Kurdistan Region, Iraq

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## *Abstract*

**Bacterial Vaginosis (BV) is a leading cause of reproductive tract problem affecting mostly of reproductive age group, worldwide. The aim of this study is to detect the infection rate of BV and then evaluate the risk factors associated with this bacterium among married women in Zakho city, Iraq. This cross-sectional study was performed among 150 reproductive age women group from October 2021 till April 2022. The administered and structured questionnaire was designed to measure demographic, risk factors and clinical characteristics. The vaginal swabs were collected from each subject and used for microscopical examination including wet mount, vaginal pH, germ tube and Gram stain methods to analyze the infection rate. The analysis of univariate regression analysis was applied to determine the relationships between BV and associated risk factors and clinical characteristics. The average age of participants was 32.64 years (±8.01 SD). The prevalence of BV was 41 (27.33%) among married women. About 12 (8%) and 1 (0.67%) of participants had mixed infections with *Candida albicans* and *Trichomonas vaginalis*, respectively. BV was found mostly among the age group less than 20 years (41.67) followed by age group of 40-50 years (37.93%). We found a higher infection rate among subjects from rural area (34.78%), but statistically not significant (p=0.17). Higher number of births was statistically associated to BV (OR 1.17, 1.006-1.37; p=0.003). BV was also highly associated among symptomatic patients with abnormal vaginal discharges (OR 4.18, 1.89-1.9.23; p=0.002), genital ulcer (OR 0.34, 0.13-0.84; p=0.01), and vaginal pH level more than 4.5 (OR 0.009, 0.002-0.043; p=0.001). BV is still prevalent among the married women in our region. The higher infection rate was significantly associated with higher births number, vaginal discharges, genital ulcer and higher vaginal pH. There is an urgent regular required screening for bacterial vaginosis among symptomatic women. Therefore, the early detection of risk factors associated with bacterial vaginal growth is critical to enhance the health condition of married women, in order to prevent the risk of BV.**

## I. INTRODUCTION

Bacterial vaginosis (BV) is leading to cause a problem in female reproductive system specifically among female of child bearing age, worldwide (Bertini, 2017). It is generally characterized by an surge the level of vaginal pH, and discharges (mainly gray discharge color) with a fishy smell after adding 10% KOH, occurrence of clue cells and overgrowth of facultative and anaerobic bacteria (Allsworth and Peipert, 2007). Previous study found that BV is a major risk factor for gynaecological and obstetric out comes such as pregnant and non-pregnant women and it is considered a major role to transmit sexually transmitted infections (STIs) (Fethers *et al*., 2008).

BV is a clinical condition characterized by vaginal dysbiosis caused by a decrease in Lactobacillus H2O2-producing and by a polymicrobial flora such as *Gardnerella vaginalis*

(Allsworth and Peipert, 2007). Moreover, *Bacterial vaginalis* is detected about 10 - 31% of adolescent girls, but it is more common among sexually active women, with prevalence rates as high as 55–60% in the population of high-risk infections (Yen *et al*., 2003). In general, the infection rate is higher in Africa (Kenyon *et al*., 2013), but it has been found to vary according to ethnic and race group in different parts of the world (Alcendor, 2016). It is well known that BV during pregnancy could increase pregnancy complications such as spontaneous abortion, postpartum infections such as endometritis, premature rupture of membranes, chorioamnionitis, preterm delivery, and low birth weight (Shimaoka *et al*., 2019). The associated risk factors and causes of abortion and miscarriage among married women have been extensively reported in Zakho city, but no studies conducted among BV (Naqid *et al*., 2020a, Naqid *et al*., 2019,

Naqid *et al.*, 2020f). A few indications concerning the cause of BV have been discovered by evaluating epidemiologic factors, women with BV were more probable to use intrauterine devices and other contraceptives (Yen *et al.*, 2003). Furthermore, females with BV are more susceptible to getting other sexually transmitted infections (STIs) such trichomoniasis, gonorrhea, and chlamydia, and it raises the higher risk of pre-term delivery among pregnant women (Fethers *et al.*, 2008).

There are several studies reported there are association between BV and socio-demographic, clinical and behavioural characteristics among women (Achondou *et al.*, 2016; Bitew *et al.*, 2017), however, other researchers found no significant association with some of these risk factors (Shayo *et al.*, 2012). Several other reports have reported the involvement of sexual with BV while others noticed BV in women sexually inexperienced (Verstraelen *et al.*, 2010). This study suggested that BV is thought a sexually active infection rather than sexually transmitted infection (STIs) (Verstraelen *et al.*, 2010). Another report has found a significant difference between BV and multiple sex partners (Fethers *et al.*, 2008). In several countries, several researches have performed the prevalence rate of infection among pregnancy women (Shayo *et al.*, 2012; Verstraelen *et al.*, 2010) and in Zakho city the higher resistance profile of bacteria was reported (Naqid et al., 2020b, Naqid et al., 2020c, Naqid et al., 2020d, Naqid et al., 2020e), but there a very limited data from Kurdistan Region, Iraq, regarding the infection rate of BV and its risk factors among married women. To avoid complications among married women due to BV, assessment of prevalence rate of BV and their associated risk factors is essential for therapy and prevention control program. Thus, the aim of present study is to evaluate the infection rate of bacterial vaginosis and its risk factors among married women at Zakho city, Kurdistan Region, Iraq.

## II. MATERIALS AND METHODS

### A. Study design and sampling

The present study was conducted as a cross-sectional among married women attending at the Private Specialist Laboratory and Obstetrics and Gynecological Hospital in Zakho, Duhok, Kurdistan Region-Iraq. A total of 150 married women with symptoms of vaginitis and cervicitis were visited private special laboratory and obstetrics and gynecological hospital in Zakho city, Kurdistan Region-Iraq. All participants with ages ranging from 18-48 years.

### B. Sampling technique and data collection

Data was collected from October 2021, to April 2022 using a designed structured questionnaire to collect data on participant's sociodemographic, and clinical characteristics. Demographic data including age, educational levels, place of residence, smoking, types of contraceptives use, past medical history and recurrent infection while clinical data collected comprised symptoms, presence of vaginal discharges, colour of discharges and pH of vagina. All married women who

complained of vaginal discharge, vaginal itching, painful intercourse, or painful urination were considered symptomatic.

After physical and gynaecological examination, high vaginal swabs (HVS) were immediately collected from each subject using insertion of a sterile unlubricated speculum into the vagina. Two sterile vaginal swabs were used and the samples were labelled properly. One of them was put on a glass slide covering with normal saline and adding KOH 10% for wet mount method and the other swab was put on a clean glass slide, then air-dried and fixed with heat fixed, and then using gram stain. The prepared slides were then examined using oil immersion (X100 and X40 objective) to quantitate for the detection of "clue" cells. Under objective X100 and X40, the wet mount was examined to investigate *Trichomonas vaginalis* (TV). Sabouraud Dextrose agar (SDA), and germ tube test were also carried out on the samples to isolate and identify *Candida albicans*. This yeast was able to produce germ-tubes after incubation at 37 °C in serum for 2 hours.

### C. Identification of Bacterial vaginosis

According to the presence of international consensus ascertains the detection of Bacterial vaginosis when 3 of the following Amsel clinical criteria are present (Bhujel *et al.*, 2021a). (1) pH level of vagina > 4.5., (2) A thin, grayish-to-white discharge coats the vagina and vestibule. (3) Whiff test positive after adding of 10% KOH it produces a fishy odour. (4) Detection of clue cells under microscopic examination.

### D. Inclusion and Exclusion Criteria

The inclusion criteria were married women and age more 18 years old were selected and agreed to participate in the present study. The following criteria were used to exclude participants from the study: The patient is not married, the patient does not agree to participate, a patient who previously administrated antibiotics for vaginitis and cervicitis, and the patient is more than 48 years old.

### E. Ethical Approval and Informed Consent

All participants were voluntary and informed consent was gained from each subject. The protocol and procedure of this study was approved by the ethical committee of the Shekhan Technical College of Health at Duhok Polytechnic University's Scientific Committee, Iraq. It was also approved by the Duhok Governorate's Research Ethical Committee (Reference number: 15092021-9-4)

### F. Statistical analysis

The significant differences between variables were reported using the GraphPad Prism version 8. Descriptive information was expressed as frequency and percentages Univariate logistic regression analysis was used to analysis the relationship between BV and associated risk factors according to demographic and clinical characteristics and 95% confidence intervals (CIs) and Odds ratios (ORs) were also assessed. The significant levels were considered as p value < 0.05.

## III. RESULTS

### A. Characteristics of study participants

Overall, 150 married women were participated in the present study. The demographic and clinical features of each subject are presented in Table 1. The participant age range was between 18 to 48 years with average age 32.64 years (±8.01 SD). The majority of the age of participants were in 31-40 years (40%), followed by 21-30 years old (32.7%) (Table 1). In terms of residence, about 69.3% of the study subjects lived in the urban region. In addition, the majority studied subjects were illiterate 64 (42.7%) and secondary education 41 (27.3%). Additionally, a higher proportion of the vaginal samples were whitish in color 60 (40.0%). Furthermore, the prevalence of painful intercourse, lower abdominal pain, abdominal discharge, and vaginal itching, were 71.3%, 53.3%, 48.7%, and 42.7%, respectively (Table 2).

### B. Morphology characteristics of Bacterial vaginosis C. albicans

Vaginal smear was stained with Gram statin and showed clue cells after examining under microscope indicating bacterial vaginosis (Figure 1-A). Using wet mount preparation, *T. vaginalis* was appeared as bear shape (Figure 1-B) under microscope (X40 objectives). The results of germ tube test showed that *C. albicans* appeared as a long tube-like projection extending from the yeast cells with no constriction (Figure 2).
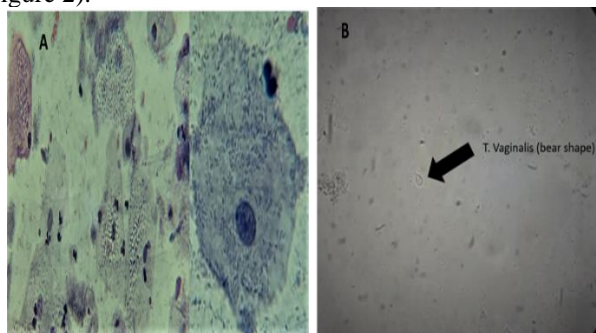


Figure 1. A: Vaginal smear gram-stained preparation shows clue cells indicating B. vaginosis. B: Wet mount preparation shows bear shape indicating *T. vaginalis*.



Figure 2. Germ tube test a positive result *(Candida albicans)* shows germ tube long tube-like projections with no constriction.

Table 1. Demographic characteristics of the studied participants.

| Demographic characteristics | Frequency (n=150) | Percentage (%) |
|---|---|---|
| **Age (Year)** | | |
| <20 | 12 | 8 |
| 21–30 | 49 | 32.7 |
| 31-40 | 60 | 40 |
| 41-50 | 29 | 19.3 |
| **Education level** | | |
| Illiterate | 64 | 42.7 |
| Primary and secondary school | 41 | 27.3 |
| High school | 27 | 18 |
| Higher education | 18 | 12 |
| **Residence** | | |
| Urban | 104 | 69.3 |
| Rural | 46 | 30.7 |
| **Smoking** | | |
| Yes | 8 | 5.3 |
| No | 142 | 94.7 |
| **Number of Birth** | | |
| 0 | 24 | 16 |
| 1-4 | 87 | 58 |
| > 4 | 39 | 26 |
| **Contraceptive Use** | | |
| Yes | 80 | 53.3 |
| No | 70 | 46.7 |
| **Contraceptive Types** | | |
| Intrauterine Device | 9 | 6 |
| Pills | 22 | 14.7 |
| Condom | 16 | 10.7 |
| Natural | 33 | 22 |
| None | 70 | 46.6 |
| **Past medical history** | | |
| Yes | 95 | 63.3 |
| No | 55 | 36.7 |
| **Drug history recurrent infection** | | |
| Yes | 37 | 24.7 |
| No | 113 | 75.3 |

Table 2. Clinical characteristics of recruited participants.

| Clinical characteristics | Frequency (n=150) | Percentage (%) |
|---|---|---|
| Abnormal discharge | 73 | 48.7 |
| Painful urination | 49 | 32.7 |
| Vaginal Itching | 64 | 42.7 |
| Lower abdomen pain | 80 | 53.3 |
| Genital ulcer | 48 | 32 |
| Painful intercourse | 107 | 71.3 |
| Bleeding in urine | 28 | 16.7 |
| Color of vaginal discharges | | |
| Yellow-Green | 29 | 19.3 |
| Red/brown | 10 | 6.7 |
| Gray | 24 | 16 |
| Whitish | 60 | 40 |
| Colorless | 25 | 16.7 |
| Physical Findings | | |
| Vulva and vaginal redness | 26 | 17.3 |
| Vulva and vaginal sores | 47 | 31.3 |
| Vulva and vaginal Swelling | 22 | 14.7 |
| Vaginal pH level | | |
| <4.5 | 95 | 63.3 |
| >4.5 | 55 | 36.7 |

## C. Distribution of vaginal infections and co-infections

The distribution of Bacterial vaginosis, *Trichomonas vaginalis* and *Candida albicans* among married women were 27.33% (41/150), 38.67% (58/150) and 4.77% (7/150), respectively (Table 3). Regarding mixed infections, the majorities 12 (8%) had *Candida albicans* plus bacterial vaginosis followed by mixed Bacterial vaginosis with *Trichomonas vaginalis* 1(0.67%) (Table 3).

Table 3. Distribution of vaginal infections and co-infection among married women

| Vaginal infections | Number of positive | Percent |
|---|---|---|
| Bacterial vaginosis | 41 | 27.33 |
| *Candida albicans* | 58 | 38.67 |
| *Trichomonas vaginalis* | 7 | 4.77 |
| **Mixed Infections** | | |
| Bacterial vaginosis/ *Candida albicans* | 12 | 8 |
| Bacterial vaginosis / *Trichomonas vaginalis* | 1 | 0.67 |

## D. Risk factors associated with bacterial vaginosis

Univariate logistic analysis was applied to analysis the relationship between risk factors and demographic characteristics (Table 4). It was found that there was not significantly associated with all possible associated risk factors in the analysis, except number of birth (OR 1.17, 1.006-1.37; p=0.003). The highest rate of infection was reported among age less than 20 years (41.67%) followed by the age group of 40-50 (37.93%). The prevalence of BV among education levels were not statistically associated (p=0.89). With respect to the residence, the highest prevalence was among participants from rural area (34.78%), but the significant difference was not reported (p=0.17). The rate of infection was slightly higher among married women who used intrauterine device as a contraceptive (44.44%) than other contraceptives, but the significant difference was also not reported (p = 0.61). Although the other investigated risk factors were no significant influence as presented in (Table 4).

## E. Association between BV and clinical characteristics of participants

BV was significantly higher among participants who had abnormal discharges (OR; 4.18, 1.89-1.9.23; p=0.002), including yellow-green discharge (p=0.001), whitish discharge (p=0.03) and colorless (p=0.001) (Table 5). The prevalence was also significantly higher in participants who had genital ulcer (OR 0.34, 0.13-0.84; p=0.01), and vaginal pH level more than 4.5 (OR 0.009, 0.002-0.043; p=0.001). Other clinical characteristics of participant had no significant influence as presented in (Table 5).

## IV. DISCUSSION

BV is leading to cause a major problem of reproductive system among women of child bearing age globally (Bertini, 2017). It has previously reported that BV is a potential risk factor for gynaecological and obstetric consequences and it is supposed to play an important role in the transmission of sexually transmitted infections (Fethers *et al.*, 2008).

Table 4. Evaluation of risk factors associated with Bacterial vaginosis among married women using Univariate analysis

| Variable | Bacterial vaginosis n (%) Negative | Positive | Univariate logistic analysis OR (95% CI) | p value |
|---|---|---|---|---|
| **Age group (Year)** | | | | |
| <20 | 7 (58.33) | 5 (41.67) | 1.01 (0.96-1.05 | 0.63 |
| 21–30 | 37 (75.51) | 12 (24.49) | | |
| 31-40 | 47 (78.33) | 13 (21.67) | | |
| 41-50 | 18 (62.07) | 11 (37.93) | | |
| **Level of education** | | | | |
| Illiterate | 45 (70.31) | 19 (29.68) | 0.97 (0.69-1.38) | 0.89 |
| Primary and secondary | 32 (78.05) | 9 (21.95) | | |
| High school | 19 (70.37) | 8 (29.63) | | |
| Higher education | 13 (72.22) | 5 (27.78) | | |
| **Residence** | | | | |
| Urban | 79 (75.96) | 25 (24.04) | 1.68 (0.79 - 3.58) | 0.17 |
| Rural | 30 (65.22) | 16 (34.78) | | |
| **Smoking** | | | | |
| Yes | 6 (75) | 2 (25) | 0.88 (0.17-4.55) | 0.87 |
| No | 103 (72.54) | 39 (27.46) | | |
| **Number of Birth** | | | | |
| 0 | 19 (79.17) | 5 (20.83) | 1.17 (1.006-1.37) | 0.03 |
| 1-4 | 67 (77.01) | 20 (22.99) | | |
| > 4 | 23 (58.97) | 16 (41.03) | | |
| **Contraceptive Use** | | | | |
| Yes | 55 (68.75) | 25 (31.25) | 1.53 (0.74-3.18) | 0.24 |
| No | 54 (77.14) | 16 (22.86) | | |
| **Contraceptive Types** | | | | |
| Intrauterine Device | 5 (55.56) | 4 (44.44) | 1.06 (0.83-1.36) | 0.61 |
| Pills | 16 (72.72) | 6 (27.27) | | |
| Condom | 12 (75) | 4 (25) | | |
| Natural | 22 (66.67) | 11 (33.33) | | |
| Nonusers | 54 (77.14) | 16 (22.85) | | |
| **Past medical history** | | | | |
| Yes | 66 (69.47) | 29 (30.53) | 1.57 (0.72-3.41) | 0.24 |
| No | 43 (78.18) | 12 (21.82) | | |
| **History of recurrent infection** | | | | |
| Yes | 27 (72.97) | 10 (27.03) | 1.17 (0.51-2.65) | 0.71 |
| No | 82 (72.57) | 31 (27.43) | | |

This study was performed to analyse the relationship between bacterial vaginosis, risk factors and clinical characteristics among participated women at Zakho City, Iraq.

The infection rate in different studies was differs among various populations (11% -71%) (Georgijević *et al*., 2000). In this report, the overall rate of BV infection among participants was 27.33% and higher prevalence was reported among age less than 20 years (41.67%), the reason behind this may be due to the women are sexually more active during this age.

Our results were in agreements with that obtained by several studies, regarding that the occurrence of the BV was not associated significantly with age group (Bhakta *et al*., 2021; Bitew *et al*., 2017). The Infection rate in this study was less than other studies reported in Iran (61.7%) (Moussavi and Behrouzi, 2004), but agree to results of studies conducted in Jordan in 2001 (Abu Shaqra, 2001) and Indonesia in 2001 (Joesoef *et al*., 2001). Our results are also in accordance with study is slightly higher than those studies conducted in the report performed in Cameron (26.2%) (Kamga *et al*., 2019), Nepal (24.4%) (Ranjit *et al*., 2018), India (24%) (Modak *et al*., 2011). However, the infection rate in such the report performed in Cameron (26.2%) (Kamga *et al*., 2019), Nepal (24.4%) (Ranjit *et al*., 2018), India (24%) (Modak *et al*., 2011). However, the infection rate in such different countries; India (19.6%) (Gupta *et al*., 2016), Brazil (20.7%) (Gondo *et al*., 2010), Nigeria (17.3%) (Ibrahim *et al*., 2014) and Ethiopia (20.1%) (Yalew *et al*., 2022). This discrepancy could be due to random sample variation, population size, analysis methods, distribution of geographical area, differences in the socioeconomic and behavioural among studied population. These differences may also occur due to the variation in the diagnostic criteria used for BV and studied population size (Afolabi *et al*., 2016; Lamichhane *et al*., 2014). There are two common methods used for the detection of BV: the Nugent criteria and the Amsel clinical criteria. The Nugent criteria score is expensive, require specialists and lab equipment, time-consuming, which can cause many issues especially in developing countries including Iraq, but it is high sensitivity and reproducibility, However, Amsel clinical criteria are simple technique, inexpensive and fast (Bhujel *et al*., 2021b).

It is important to note that BV is clearly associated to adverse reproductive problems and gynecological outcomes among women. However, the major causes of BV remain not understood clearly and have been commonly linked with sociodemographic, reproductive system, sexual, and behavioural characteristics (Kamga *et al*., 2019). In the field of public health, the complication of the demographic characteristics challenges is continued to investigate the role of bacteria and its association to a host of biomedical and social conditions these could lead to a major health problem of the community. These factors include educational level, socioeconomic status, reproductive history past medical history and contraceptive use.

Table 5. Association between Bacterial vaginosis and clinical characteristics among married women

| Variable | Bacterial vaginosis n (%) | | Univariate logistic analysis | |
|---|---|---|---|---|
| | **Negative** | **Positive** | **OR (95% CI)** | *p value* |
| **Symptoms** | | | | |
| Abnormal discharge | | | | |
| Yes | 43 (58.91) | 30 (41.09) | 4.18 (1.89-9.23) | 0.002 |
| No | 66 (85.71) | 11 (14.29) | | |
| Painful urination | | | | |
| Yes | 35 (71.43) | 14 (28.57) | 1.09 (0.51-2.35) | 0.81 |
| No | 74 (73.27) | 27 (26.73) | | |
| Vaginal Itching | | | | |
| Yes | 48 (75) | 16 (25) | 0.81 (0.39-1.69) | 0.57 |
| No | 61 (70.93) | 25 (29.07) | | |
| Lower abdomen pain | | | | |
| Yes | 56 (70) | 24 (30) | 1.34 (0.65-2.76) | 0.43 |
| No | 53 (75.71) | 17 (24.29) | | |
| Genital ulcer | | | | |
| Yes | 41 (85.42) | 7 (14.58) | 0.34 (0.13-0.84) | 0.01 |
| No | 68 (66.67) | 34 (33.33) | | |
| Painful intercourse | | | | |
| Yes | 75 (70.09) | 32 (29.91) | 1.61 (0.69-3.74) | 0.25 |
| No | 34 (79.07) | 9 (20.93) | | |
| Bleeding in urine | | | | |
| Yes | 18 (64.29) | 10 (35.71) | 1.63 (0.68-3.91) | 0.27 |
| No | 91 (74.59) | 31 (25.41) | | |
| **Color of vaginal discharge** | | | | |
| Yellow-Green | | | | |
| Yes | 11 (37.93) | 18 (62.07) | 0.46(0.096-2.15) | 0.001 |
| No | 98 (80.99) | 23 (19.01) | | |
| Red/brown | | | | |
| Yes | 8 (80) | 2 (20) | 1.07 (0.19-5.73) | 0.68 |
| No | 101 (72.14) | 39 (27.86) | | |
| Gray | | | | |
| Yes | 0 (0) | 24 (100) | 0.57 (0.26 -1.23) | 0.14 |
| No | 109 (86.51) | 17 (13.49) | | |
| Whitish | | | | |
| Yes | 49 (81.67) | 11 (18.33) | 0.45 (0.21-0.98) | 0.03 |
| No | 60 (66.67) | 30 (33.33) | | |
| Colorless | | | | |
| Yes | 25 (100) | 0 (0) | 0.049 (0.007-0.38) | 0.001 |
| No | 84 (67.2) | 41 (32.8) | | |
| **Vaginal pH level** | | | | |
| <4.5 | 92 (96.84) | 3 (3.16) | 0.009 (0.002-0.043) | 0.001 |
| >4.5 | 15 (27.27) | 40 (72.73) | | |

The levels of p values < 0.05 were considered significant.
OR: odds ratio; CI; confidence Interval

In the present study age, education levels, residence, using contraceptive, smoking, past medical history and history of recurrent infections were not significantly differences.

In contrast to the present study, other reports found that history of recurrent infection, people how lived on the rural area, educational levels and women aged more than 45 years had significant associated with the infection rate (Geng *et al*., 2016; Kamga *et al*., 2019; Yalew *et al*., 2022).

In the current study, women using intrauterine device as contraceptive were at an increased risk of infection; but this was statistically not associated (p=0.61) and using condom were at decreased risk of BV. We also found a higher infection rate among women with low education level; this was also not significant differences (p=0.84). This could be due to higher education level is associated with higher sophistication levels, application of conventional medicine by them and enlightenment. Regarding the type of contraceptive, the relationship between using of intrauterine device and BV has not been understood yet. Several studies detected an increased risk of infection in intrauterine device users, could be due to that intrauterine device may affect the normal flora of the vaginal in favor for the bacterial growth and before insertion of intrauterine device should be screened, but others found no association (Bartalena *et al*., 2007). Similar to our study, other reports have proposed that BV is highly prevalent among women who used intrauterine device than nonusers (Hodoglugil *et al*., 2000). In contrast to our study, one study performed in 2001 among African-American women, they found that the contraceptive user and low educational levels were highly associated such infection (Holzman *et al*., 2001). Another study conducted in Iran found that the user of contraceptives appeared as a protective, while the low level of education was significantly associated to an increase in prevalence rate of infection (Ashraf Ganjoei, 2005); these results are similar to our study. This difference may be due to stressor differences, environmental, socioeconomic and behavioural, status and in the geographical variation.

The screening of bacterial vaginosis among women is essential as it was led to premature rupture of membranes, still births, abortion, postpartum infections, preterm birth and low birth weight infants (Yudin and Money, 2008). In our study, the infection rate was higher among women who had higher births number (p=0.03). The commonest presenting symptoms of women who have bacterial vaginosis is a vaginal discharge with malodorous. Bacterial vaginosis was also significantly higher among women who had abnormal discharges (p=0.002). Additionally, the infection rate was also highly associated in women who had genital ulcer (p=0.01), and the levels of vaginal pH level more than 4.5 (p=0.001), while other characteristic were not significantly associated between the negative and positive of bacterial vaginosis among women. We suggested that the regular screening program among symptomatic women with vaginal discharges is vital to investigate BV in order to prevent the complications and preterm delivery. Our results for genital ulcer, abnormal vaginal discharge, and vaginal pH were

similar with the study conducted in India (Bhakta *et al*., 2021; Nayak *et al*., 2020). It has also previously reported that the itching of genitalia, abnormal vaginal discharge, and burning remain the major problems which associated with bacterial vaginosis (Valsangkar *et al*., 2014).

Our study has some limitations. Firstly, the low number of samples lower than expected participated in the present study, which may reduce the evaluation of number size and may indirectly influence the statistical analysis of significance. Secondly, the absence of anaerobic culture media and the lack of facility of molecular techniques for the detection of bacterial species.

## V. CONCLUSION

This study could provide important epidemiologic data on BV for future risk behaviours and population-based studies. BV is one of the major causes of vaginal discharge and itching among child bearing age women and this could be problem for health among this age in our community. BV is still highly detected among the married women in this study. Higher number of births, low level of education, vaginal discharges, higher vaginal pH, genital ulcer, intrauterine device use as a contraceptive were a main risk factors for such bacteria. There is an urgent regular need for screening for BV among symptomatic women with abnormal vaginal discharges. Therefore, the early detection of risk factors associated with bacterial vaginal growth is critical to enhance the health condition of married women, in order to prevent the risk of BV among them.

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