

# Assessment of excessive vaginal discharge among women who presented to Phuentsholing General Hospital: A hospital-based study

Yeshey Dorjey<sup>1</sup>  | Dechen Wangmo<sup>2</sup> | Dechen Tshomo<sup>2</sup>

<sup>1</sup>Gynaecology Unit, Phuentsholing General Hospital, Chukha, Bhutan

<sup>2</sup>Maternal and Child Health, Phuentsholing General Hospital, Chukha, Bhutan

## Correspondence

Yeshey Dorjey, Gynaecology Unit, Phuentsholing General Hospital, Chukha, Bhutan.

Email: [yesheydorjey@gmail.com](mailto:yesheydorjey@gmail.com)

## Abstract

**Introduction:** Excessive vaginal discharge is troublesome for females. The majority of the women seek gynecological consultation due to excessive vaginal discharge. The causes vary from physiological to pathological discharge. Unless the cause is identified and treated, women will remain in distress. The present study was thus carried out to determine the most common cause of the excessive vaginal discharge.

**Methods:** A cross-sectional study was conducted at the Phuentsholing General Hospital, Chukha, Bhutan, from May 1 to October 31, 2021. All females aged 18 years and older, irrespective of marital status, who presented with excessive vaginal discharge were recruited for the study. With due informed consent, a sterile speculum examination was performed and a high vaginal swab was collected and subjected to various tests. The data collected were analyzed using SPSS 23 software. Descriptive statistical tests were used for frequencies, percentages, mean, and standard deviations; the  $\chi^2$  test was used to determine associations, and a logistic regression test was performed to determine the effect of independent variables on dependent variables.

**Results:** A total of 400 women were recruited for the study, of whom 362 (90.5%) women had infective causes for vaginal discharge. Trichomoniasis was the most common infection identified in 162 (40.5%) women, followed by bacterial vaginosis (91, 22.8%) and vulvovaginal candidiasis (52, 13.0%). In 38 (9.5%) women, infective cause was not found and categorized as physiological vaginal discharge. Malodorous, profuse discharge, vulval itching, dyspareunia, dysuria, and lower abdominal pain were significantly associated with infectious vaginal discharge.

**Conclusions:** Excessive vaginal discharge was mainly caused by infections. The most commonly detected infection was trichomoniasis, followed by bacterial vaginosis and vulvovaginal candidiasis. Every female with vaginal discharge requires proper evaluations to identify the infection and treat it adequately.

## KEYWORDS

bacterial vaginosis, human immunodeficiency virus, sexually transmitted infection, trichomoniasis infection, vaginal discharge, vulvovaginal candidiasis

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## 1 | INTRODUCTION

A vaginal discharge is one of the most common gynecological symptoms affecting women and is a very reason for seeking medical attention. The prevalence rate of vaginal discharge is 6.8%.<sup>1</sup> Excessive per vaginal discharge occurs due to infective or non-infective causes. Physiological discharge is considered noninfective and is odorless, colorless, nonirritant, and nonoffensive.<sup>2</sup> On the contrary, pathological discharge is malodorous, offensive, and irritant. The infective cause is most of the time polymicrobial and it accounts for 51%–64% of cases.<sup>1,3</sup>

Vaginal discharge varies with age, menstrual cycle, contraceptive use, and estrogen level.<sup>4</sup> In reproductive-age women, the majority of cases are caused by mixed microbial infection, with bacterial vaginosis (BV) being the most commonly detected infection.<sup>3</sup> Perimenopausal and menopausal women present with vaginal discharge with varied causes, ranging from benign to malignant. These women need proper evaluation to exclude malignancy before treating for infection.<sup>5</sup>

With the varied causes at different ages of vaginal discharge, finding the exact causative organism and treatment is a challenge for physicians.

In Bhutan, vaginal discharge cases have been increasing over the last 3 years.<sup>6</sup> The current practice of management of vaginal discharge in Bhutan is largely syndromic and empirical as recommended by the World Health Organization.<sup>7</sup> Syndromic management is found to be effective and beneficial; however, it resulted in a high proportion of missed treatment or inadequate treatment, causing recurrent infection.

In Bhutan, no study has been conducted on excessive vaginal discharge. It is important to determine the most frequently occurring infection-causing excessive vaginal discharge in the local community to choose the correct treatment. Therefore, this hospital-based study was conducted to evaluate excessive vaginal discharge in women to find out the most common infections in the women who presented to Phuentsholing hospital.

## 2 | METHODS

A hospital-based cross-sectional study was conducted in Phuentsholing General Hospital, Chukha, Bhutan, from May 1 to October 31, 2021. Ethical clearance was obtained from the Research Ethical Board of Health, Ministry of Health, Bhutan, with the Ref. No. REBH/Approval/2021/032 dated April 23, 2021, and informed written consent was taken from the patients. All females aged 18 years and older, irrespective of marital status, who presented with excessive vaginal discharge to the gynecology unit at Phuentsholing General Hospital were recruited for the study. Females aged <18 years, pregnant women, women already diagnosed with genital organ malignancies, and women with a known case of vesicovaginal fistula and rectovaginal fistula were excluded from the study. A detailed history was elicited, and a thorough genital examination was

performed to note any abnormalities in the vulva, vagina, and cervix. A sterile Cusco's speculum examination was performed to examine the cervix, except for virgin patients. The characteristics of the discharge, that is, amount, odor, color, and consistency, were noted. Specimens of vaginal discharge were collected from the posterior vaginal fornix under direct vision using a sterile cotton swab stick. In virgin patients, the specimens were collected from the introitus. The specimens collected were subjected to a series of laboratory tests. An abdominal examination was performed to note the lower abdominal pain, and a bimanual examination was performed to elicit adnexal tenderness except for the virgin. Women were counseled, and 2 ml of blood was drawn from the median cubital vein using a standard aseptic technique and tested for coexisting sexually transmitted infections (STIs) including human immunodeficiency virus (HIV). Women with vesicular lesions present on the genitalia were excised with a fine sterile scalpel, the bottom of the ulcer was scraped, and the specimen was collected for a smear.

The diagnosis of the following infections was identified:

**Gonococcal infection:** Smear was prepared from a swab on a clean grease-free glass slide and air-dried. Gram staining was performed and the slide was examined under a light microscope. The presence of intracellular, Gram-negative, bean-shaped cells, arranged in pairs, with a size of  $0.8 \mu\text{m} \times 0.6 \mu\text{m}$ , that stained pink along with the nuclei and the protoplasm of pus cells confirmed gonococcal infections.<sup>8</sup> In the absence of gonococcal infection, the same slide was used for the diagnosis of chlamydial infection and vulvovaginal candidiasis (VVC).

**Chlamydial infections:** The presence of polymorph leukocyte cells without the presence of Gram-negative diplococci indicates chlamydial infections, and the presence of Gram-positive (violet) budding yeast cells (appears like figure of 8) and yeast hyphae confirms vulvovaginal candida infection.<sup>8</sup>

**VVC:** Vaginal fluid was placed on a clean, grease-free slide, to which two drops of 10% potassium hydroxide (KOH) were added. A coverslip was placed and the slide was gently heated over a flame for 10–20 s. Then, the slide was observed under a microscope. The presence of rounded or oval budding yeast cells about 5–7  $\mu\text{m}$  in diameter and mycelia or pseudohyphae confirms the vulvovaginal candida infection.<sup>9</sup>

**Syphilis:** For women with ulcerative lesions on the genitalia, the specimen (tissue fluid) was collected by compressing the base of the ulcer after removing any scab or crust covering the lesion. A glass slide was gently applied on the lesion to collect the fluid on the slide and a coverslip was placed on the slide after ensuring that air bubbles had been removed. Then, the slide was immediately examined under a dark-field microscope in a dark room. The presence of a motile, silvery-white, bright, spiral organism, 6–14  $\mu\text{m}$  long and with 8–14 spirals, confirms the diagnosis of syphilis.<sup>8</sup>

**BV:** The vaginal pH was measured by directly touching the pH paper strips to the lateral vaginal wall. The vaginal swab was applied on a clean grease-free slide and a drop of normal saline was added and gently rubbed to mix the vaginal fluid with saline. A coverslip was placed and the slide was examined under a microscope; the presence of clue cells indicates BV. A drop of 10% potassium hydroxide (KOH)

was added to the same slide and whiffed for the amine odor; the presence of an intense fishy odor indicates a positive amine test. The diagnosis of BV was made using Amsel's criteria.<sup>10</sup>

**Trichomoniasis:** A swab was placed in a test tube containing normal saline and vigorously rotated to mix the vaginal fluid. A drop of fluid from the tube was placed on a slide and placed on a coverslip and examined under a microscope; the presence of a pyriform shape, flagellated organism, of size  $10\ \mu\text{m} \times 7\ \mu\text{m}$ , with characteristic jerky motility, with a lateral undulating membrane, indicates trichomoniasis.<sup>8</sup>

**Genital herpes:** In women with vesicular lesions on the genitalia, the top of the vesicles was excised with a fine sterile scalpel, the bottom of the ulcer was scraped, and the tissue fluid was collected. A smear was prepared on a grease-free slide and air-dried. The smear was fixed with methanol, stained with Giemsa, and observed under a microscope. The presence of many cells fused, appearing as a multinucleated giant cell, ballooning of the cytoplasm, the presence of inclusion bodies inside the nucleus (intranuclear), eosinophilic (red), and granular appearance of different sizes indicates herpes infection.<sup>8</sup>

**Hepatitis B infection:** The one-step hepatitis B surface antigen testing kit (HBsAg kit) was used to diagnose hepatitis B infection. The test kit uses a rapid chromatographic immunoassay for the qualitative detection of hepatitis B surface antigen in the serum or plasma. Two milliliters of blood was collected from the median cubital vein, to which two drops of plasma were added, the specimen was added to the specimen well on the kit, and the result was read after 20 min. The appearance of two lines indicates hepatitis B infection.

**HIV infection:** The Uni-Gold rapid HIV test kit was used for the diagnosis of HIV infection. Two milliliters of blood was collected from the median cubital vein, to which two drops of plasma were added, and then the specimen was added to the specimen well on the kit; the appearance of two lines suggests HIV infection. The HIV infection was confirmed by the enzyme-linked immunosorbent assay (ELISA) test for HIV serology.<sup>11</sup>

**Mucopurulent cervicitis** is defined as the presence of 30 or more polymorphonuclear leukocytes per oil immersion field in cervical mucus. The patients not fulfilling the above diagnostic criteria with inflammatory changes in Gram stain were reviewed and endocervical swabs were taken for Gram's stain to look for the features of mucopurulent cervicitis.

## 2.1 | Statistical analysis

The collected data were captured and entered using Epi data 3.1.2 (Odense) and validated to avoid data entry errors. The data were then exported and analyzed using SPSS version 23. Descriptive statistics were used to calculate the frequencies, percentages, mean, median, and standard deviation. The associations were analyzed using the  $\chi^2$  test and a logistic regression analysis was performed to study the effect of independent variables on the dependent variables. A  $p$  value of  $<0.05$  was considered as statistically significant at a 95% confidence interval (CI).

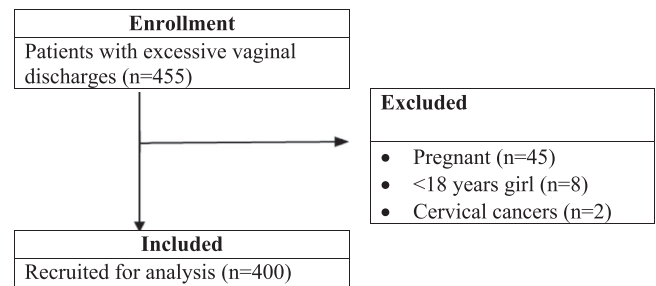


FIGURE 1 Study flowchart

## 3 | RESULTS

A total of 455 patients who presented with excessive vaginal discharge were screened using the eligibility criteria; among these, 55 patients were excluded: 45 were pregnant, 8 were aged  $<18$  years, and 2 had ulcerative growth on the cervix (cervical cancer). A total of 400 patients with vaginal discharge were enrolled in this study for analysis (Figure 1).

### 3.1 | Spectrum of causes of vaginal discharge and the coexisting STIs

Among 400 patients with vaginal discharge, 362 patients (90.5%) had an infective cause and only 38 (9.5%) had a noninfective cause. The most common infection was trichomoniasis (162, 40.5%), followed by BV (91, 22.8%) and VVC (52, 13.0%). Mixed infection was present in 32 (8.0%) patients; among these patients, *Trichomonas vaginalis* (TV) + BV (12, 37.5%) and TV + VVC (10, 31.2%) were the most commonly occurring polymicrobial infections identified. The most common coexisting STIs present were syphilis (5, 41.6%) and hepatitis B (4, 33.3%), and there was one HIV (1, 8.3%) infection as well (Table 1).

### 3.2 | Clinical presentation and the characteristics of the diseases

Among the symptoms, foul smelly vaginal discharge was commonly reported by patients with trichomoniasis (135, 47.4%) and bacterial vaginosis (69, 24.2%). Profuse vaginal discharge was seen in bacterial vaginosis (83, 43.7%) and VVC (50, 26.3%). Vulval itching was present in trichomoniasis (103, 54.2%) and VVC (52, 27.4%). Dyspareunia was reported the most by patients with trichomoniasis (49, 41.5%), followed by bacterial vaginosis (22, 18.6%). Dysuria was present in trichomoniasis (52, 39.7%), VVC (31, 23.7%), and bacterial vaginosis (16, 12.2%). Lower abdominal pain was present in trichomoniasis (62, 35.0%) and bacterial vaginosis (48, 27.1%). Premenstrual flare was reported in trichomoniasis (73, 59.3%); postcoital bleeding was seen in trichomoniasis (5, 25.0%), mixed infections (4, 20.0%), and mucopurulent

**TABLE 1** Spectrum of causes of vaginal discharge and the coexisting STIs in the study population

	Frequency (n)	Percentage (%)
<b>Infective cause (n = 362)</b>		
Bacterial vaginosis	91	22.8
Trichomoniasis	162	40.5
VVC	52	13.0
Mucopurulent cervicitis	7	1.8
Gonorrhoeal infection	14	3.5
Chlamydial infection	4	1.0
Mixed infection	32	8
<b>Noninfective cause (n = 38)</b>		
Physiological discharge	38	9.5
<b>Total</b>	<b>400</b>	<b>100.0</b>
<b>Coexisting STI (n = 12)</b>		
Syphilis	5	41.6
Genital herpes	2	16.6
Hepatitis B	4	33.3
HIV	1	8.3
<b>Mixed infection (n = 32)</b>		
TV + BV	12	37.5
TV + VVC	10	31.2
TV + MPC	2	6.2
BV + VVC	5	15.6
TV + BV + VVC + MPC	3	9.3

Abbreviations: BV, bacterial vaginosis; HIV, human immunodeficiency virus; MPC, Mucopurulent cervicitis; STI, sexually transmitted infection; TV, *Trichomonas vaginalis*; VVC, vulvovaginal candidiasis.

cervicitis (4, 20.0%). The patients with mixed infections reported almost all the symptoms (Table 2).

The majority of the patients (265, 66.2%) presented to the hospital after experiencing vaginal discharge for more than 7 days, and significant numbers of patients (65, 16.2%) experienced recurrent infections.

On pelvic examination, malodorous discharge was present in patients with trichomoniasis (93, 41.3%) and bacterial vaginosis (91, 40.4%). Vulval excoriation was seen in trichomoniasis (58, 38.7%), and the rest of the findings are summarized in Table 2.

### 3.3 | Sociodemographic characteristics

Of the total of 400 patients, the majority (339, 84.7%) were in the age range of 18–35 years, and more than half (225, 56.3%) of them were married. Almost all the patients (365, 91.2%) had completed primary education and above, and 333 (83.3%) were employed either

in private sectors or government services. Contraceptives were being used by 333 patients (83.3%); hormonal contraception was the most preferred method (used by 247 patients, 61.8%). The sociodemographic characteristics, that is, age, marital status, and education level, varied significantly between the patients with infective causes and noninfective causes of vaginal discharge (Table 3).

### 3.4 | Associations of sociodemographic and clinical features of the patient with the infective cause of vaginal discharge

Literate and married patients were found to have more infective causes as compared to noninfective causes of vaginal discharge, with an OR of 3.0 (95% CI: 1.42–6.41,  $p = 0.003$ ) and an OR of 1.8 (95% CI: 0.95–3.69,  $p = 0.047$ ), respectively.

Among the patients who presented with malodorous, profuse discharge, vulval itching, dyspareunia, dysuria, and lower abdominal pain, a statistically significant association was found with infective causes of vaginal discharge (OR: 29.5, 95% CI: 7.00–124.72,  $p < 0.001$ ; OR: 15.9, 95% CI: 2.10–11.39,  $p < 0.001$ ; OR: 7.6, 95% CI: 1.30–5.61,  $p = 0.006$ ; OR: 1.2, 95% CI: 1.10–1.32,  $p < 0.001$ ; OR: 1.1, 95% CI: 1.10–1.22,  $p < 0.001$ ; OR: 35.4, 95% CI: 4.80–260.77,  $p < 0.001$ , respectively) as shown in Table 4.

### 3.5 | Effect of demographic characteristics on the infective causes of vaginal discharge

Infective vaginal discharge is considered as the dependent variable and the demographic characteristics of the patients are considered as independent variables. The possible combined effect of the demographic characteristics was studied using the logistic regression test.

Married patients are 1.6 times more likely to have infective vaginal discharge as compared to single or widowed patients; however, this is not statistically significant (OR: 1.6, 95% CI: 0.73–3.91,  $p = 0.213$ ). Literate and employed patients are more likely to have infective vaginal discharge as compared to illiterate and unemployed patients, but the difference is not significant. The effect of independent variables on the dependent variable is summarized in Table 5.

## 4 | DISCUSSION

Out of 400 women with vaginal discharge, over 90% were found to have infective causes and around 10% were found to have noninfective causes. The most common infections identified were trichomoniasis (162, 40.5%), followed by bacterial vaginosis (91, 22.8%) and VVC (52, 13.0%). Polymicrobial infection (mixed infection) was detected in 32 women (8.0%), among whom, over 37% had trichomoniasis and bacterial vaginosis infections, followed by trichomoniasis and vulvovaginal candida infection, seen in more than

**TABLE 2** Multiple response table showing the distribution of clinical signs and symptoms with the infective agents causing vaginal discharge

	Infective causes of vaginal discharge, n (%)						
	Bacterial vaginosis	<i>Trichomonas vaginalis</i>	Vulvovaginal candidiasis	Mixed infection	Mucopurulent cervicitis	Gonorrhea infection	Chlamydial infection
<b>Symptoms</b>							
Foul smelly	69 (24.2)	135 (47.4)	42 (14.7)	24 (8.4)	6 (2.1)	7 (2.5)	2 (0.7)
Profuse discharge	83 (43.7)	21 (11.1)	50 (26.3)	29 (15.3)	6 (3.2)	1 (0.5)	0 (0.0)
Vulval itching	3 (1.6)	103 (54.2)	52 (27.4)	32 (16.8)	0 (0.0)	0 (0.0)	0 (0.0)
Dyspareunia	22 (18.6)	49 (41.5)	18 (15.3)	20 (16.9)	1 (0.8)	5 (4.2)	3 (2.5)
Dysuria	16 (12.2)	52 (39.7)	31 (23.7)	20 (15.3)	1 (0.8)	9 (6.9)	2 (1.5)
Abdominal pain	48 (27.1)	62 (35.0)	29 (16.4)	25 (14.1)	2 (1.1)	7 (4.0)	4 (2.3)
Premenstrual flare	19 (15.4)	73 (59.3)	14 (11.4)	12 (9.8)	1 (0.8)	2 (1.6)	2 (1.6)
Postcoital bleeding	2 (10.0)	5 (25.0)	3 (15.0)	4 (20.0)	4 (20.0)	2 (10.0)	0 (0.0)
<b>Duration of symptoms</b>							
<7 days	8 (25.0)	17 (53.1)	4 (12.5)	0 (0.0)	0 (0.0)	3 (9.4)	0 (0.0)
7–14 days	45 (25.4)	91 (51.4)	29 (16.4)	2 (1.1)	3 (1.7)	6 (3.4)	1 (0.6)
>14 days	25 (28.4)	35 (39.8)	14 (15.9)	5 (5.7)	2 (2.3)	4 (4.5)	3 (3.4)
Recurrent	13 (20.0)	19 (29.2)	5 (7.7)	25 (38.5)	2 (3.1)	1 (1.5)	0 (0.0)
<b>Examination findings</b>							
Malodorous	91 (40.4)	93 (41.3)	5 (2.2)	31 (13.8)	5 (2.2)	0 (0.0)	0 (0.0)
Vulval excoriation	30 (20.0)	58 (38.7)	42 (8.0)	12 (8.0)	2 (1.3)	3 (2.0)	3 (2.0)
Mucopurulent	20 (24.1)	37 (44.6)	11 (13.3)	8 (9.6)	2 (2.4)	3 (3.6)	2 (2.4)
Cervical erythema	3 (8.8)	15 (44.1)	5 (14.7)	1 (2.9)	7 (20.6)	2 (5.9)	1 (2.9)
Adnexal tenderness	24 (21.8)	53 (48.2)	18 (16.4)	8 (7.3)	3 (2.7)	3 (2.7)	1 (0.9)

31%. The findings from this study were in contrast to what was reported from the neighboring countries, where bacterial vaginosis and vulvovaginal candida infection were reported the most.<sup>1,3,12,13</sup> The geographical variation, use of different treatment regimes, and individual susceptibility to a particular infection could explain the different infections identified in the current study.

Fifty-one women had reported extramarital contact (high-risk sexual behavior); 12 of these women had a coexisting sexually transmitted infection: syphilis in 5 women (41.6%), HBsAg positivity in 4 women (33.3%), genital herpes in 2 women (16.6%), and HIV infection in 1 woman (8.3). The finding of coexisting sexually transmitted infections in women with vaginal discharge implies the need to routinely screen for other associated infections.

In the current study, over 84% of the women were in the age range of 18–35 years, and younger-age women were significantly associated with infective vaginal discharge. They fall in the highly sexually active category and are more prone to sexually transmitted infection.<sup>14</sup>

Half of the women in this study did not have proper education and more than half of them were unemployed or employed in the private sector; extramarital affairs were reported by these women.

Illiteracy, unemployment, and extramarital affairs are known risk factors for contracting sexually transmitted infections.<sup>15</sup> However, in the current study, literacy and employment were not associated with infectious vaginal discharge, unlike extramarital affairs, which were significantly associated with infectious vaginal discharge.

Of 400 women, only around over 5% of them used barrier methods of contraception (condom), more than 60% of women were on hormonal contraception (oral contraceptive pills and depot medroxyprogesterone acetate), 9% had undergone tubectomy operations, and as few as 7% were using intrauterine devices. The remaining around 17% of women did not use any contraception. Except for barrier methods of contraception (condom), the rest of the methods do not protect from or prevent contraction of sexually transmitted infections.<sup>16</sup> Women in Bhutan generally prefer to use hormonal contraception because either the partner or the women themselves reported less sexual pleasure with barrier methods of contraception.<sup>6</sup> Therefore, there is a need for proper counseling and couple education on the benefits of barrier methods of contraception.

In the current study, more than 90% of the women started seeking gynecological intervention only after experiencing excessive

**TABLE 3** Comparison of sociodemographic characteristics of patients with infective and noninfective causes of vaginal discharge

	Total, n (%)	Infective cause, n = 362 (%)	Noninfective cause, n = 38 (%)	p Value
<b>Age (years)</b>				
18–25	193 (48.2)	166 (45.8)	27 (71.1)	0.014
26–35	146 (36.5)	139 (38.7)	7 (18.5)	
36–45	57 (14.3)	54 (14.7)	3 (7.8)	
>45	4 (1.0)	3 (0.8)	1 (2.6)	
<b>Marital status</b>				
Living together	128 (32.0)	108 (29.8)	20 (52.6)	0.035
Married	225 (56.2)	209 (57.7)	16 (42.1)	
Divorced	45 (11.3)	43 (11.9)	2 (5.3)	
Widow	2 (0.5)	2 (0.6)	0 (0.0)	
<b>Education</b>				
Illiterate	35 (8.8)	33 (9.1)	2 (5.3)	0.004
Primary	167 (41.7)	141 (39.0)	26 (68.4)	
Secondary	106 (26.5)	97 (26.8)	9 (23.7)	
Higher secondary	76 (19.0)	75 (20.7)	1 (2.6)	
Master's degree and above	16 (4.0)	16 (4.4)	0 (0.0)	
<b>Employment</b>				
Housewife	67 (16.8)	60 (16.6)	7 (18.4)	0.662
Private sector	214 (53.5)	195 (53.8)	19 (50.0)	
Civil servant	51 (12.7)	44 (12.2)	7 (18.4)	
Business	68 (17.0)	63 (17.4)	5 (13.2)	
<b>Contraception</b>				
None	67 (16.8)	60 (16.6)	7 (18.4)	0.911
Hormonal	247 (61.7)	222 (61.3)	25 (65.8)	
IUCD	28 (7.0)	26 (7.2)	2 (5.3)	
Condom	21 (5.3)	20 (5.5)	1 (2.6)	
Tubectomy	37 (9.2)	34 (9.4)	3 (7.9)	

Abbreviation: IUCD, intrauterine contraceptive device.

vaginal discharge for more than a week. It is assumed that women try various home remedies to treat vaginal discharge during the first weeks of symptoms, and some females do not seek medical attention due to social barriers, especially unmarried and virgin women.<sup>17</sup> However, they come to seek medical attention only when nothing works for them at home or when the symptoms become more severe. On the contrary, some women regard almost any secretion from the vagina as abnormal discharge and seek early medical attention, and most of the time, it is a physiological discharge. In the current study,

for around 10% of the women, no infective cause was found and they were diagnosed as having physiological discharge.

A total of 455 patients presented with excessive vaginal discharge during the study period, and 55 of them were excluded from the analysis: 45 were pregnant, 8 were aged <18 years, and 2 had ulcerative growth on the cervix, which was discovered during the speculum examination. Whenever a patient presents with excessive vaginal discharge, it is the first task of every physician or gynecologist to thoroughly evaluate the patient to ascertain whether it is physiological or pathological discharge; this is to rule out any offending lesion at the vulva, vagina, and cervix.<sup>18</sup>

Among the symptoms, malodorous, profuse discharge, vulval itching, dyspareunia, dysuria, and lower abdominal pain were strongly associated with infective causes of vaginal discharge. Patients with malodorous discharge and lower abdominal pain were 29 and 35 times more likely to have infectious discharge, respectively, as compared to those with other symptoms.

Recurrent vaginal infection is a distressing condition for the patients, and causing confusion for the physician in providing treatment. Most of the time, recurrent vaginal infection can occur due to poor compliance with medication, because organisms are resistant to the medications, or due to inadequate treatment because of polymicrobial infections. In the present study, over 16% of the women had experienced recurrent vaginal discharge and the majority of the recurrent infections were mixed or polymicrobial infections. Phuentsholing is a commercial city of Bhutan and a border town with India; it has lots of entertainment centers. Many people from other districts visit the place for shopping, business, and entertainment, and others visit for an official tour. Extramarital affairs and illicit relationships are rampant at Phuentsholing; all these factors contribute to increased incidences of recurrent vaginal infections.

Pregnant mothers and females younger than 18 years of age with vaginal discharge were not included in this study. The causative organisms identified might have been different if all the females with vaginal discharges were included in the study. Since this is a hospital-based study, the finding cannot be generalized to the whole community. In the current study, the diagnosis of the microorganisms causing vaginal discharge was made based on Gram staining and microscopic findings since Phuentsholing hospital does not have the facility to perform gold-standard methods, such as culture and sensitivity, PCR, ELISA, and GeneXpert testing. In some of the women, the diagnosis might have been missed and they may have received inappropriate treatment, which could have ultimately caused recurrent infection. These are the limitations of the study; however, the study had an adequate number of patients with vaginal discharge, the laboratory tests were performed with the standard equipment, and the analysis detected infection in 90% of the women with vaginal discharge.

There were significant numbers of women who presented with recurrent vaginal discharge with polymicrobial infections; many women do not use contraception and almost all women prefer hormonal contraception despite the free supply of condoms available in every health center. Since none of the contraceptive methods



**TABLE 4** Associations between sociodemographic characteristics and the signs and symptoms of patients with infective causes of per vaginal discharge

	Causes of vaginal discharge		OR (95% CI)	p Value
	Infective cause	Noninfective cause		
<b>Education</b>				
Literate	188 (51.9)	10 (26.3)	3.0 (1.42–6.41)	0.003
Illiterate	174 (48.1)	28 (73.7)		
<b>Employment</b>				
Employed	302 (83.4)	31 (8.6)	1.1 (0.47–2.7)	0.819
Unemployed	60 (16.6)	7 (18.4)		
<b>Marital status</b>				
Married	209 (57.7)	16 (42.1)	1.8 (0.95–3.69)	0.047
Single	153 (42.3)	22 (57.9)		
<b>Contraception</b>				
Using contraception	302 (83.4)	31 (81.6)	1.1 (0.47–2.7)	0.459
Not using contraception	60 (16.6)	7 (18.4)		
<b>Extramarital contact (n = 51)</b>				
Yes	49 (13.5)	2 (5.3)	2.8 (0.65–12.07)	0.109
No	313 (86.5)	36 (94.7)		
<b>Malodorous discharge</b>				
Yes	225 (62.2)	2 (5.3)	29.5 (7.00–124.72)	<0.001
No	137 (37.8)	36 (94.7)		
<b>Profuse discharge</b>				
Yes	190 (52.5)	7 (18.4)	15.9 (2.10–11.39)	<0.001
No	172 (47.5)	31 (81.6)		
<b>Vulval itching</b>				
Yes	190 (52.5)	11 (28.9)	7.6 (1.30–5.61)	0.006
No	172 (47.5)	27 (71.1)		
<b>Dyspareunia</b>				
Yes	118 (32.6)	0 (0.0)	1.2 (1.10–1.32)	<0.001
No	244 (67.4)	38 (100.0)		
<b>Dysuria</b>				
Yes	131 (36.2)	0 (0.0)	1.1 (1.10–1.22)	<0.001
No	231 (63.8)	38 (100.0)		
<b>Postcoital bleeding</b>				
Yes	20 (5.5)	0 (0.0)	1.1 (1.07–1.15)	0.129
No	342 (94.5)	38 (100.0)		
<b>Lower abdominal pain</b>				
Yes	177 (48.9)	1 (2.6)	35.4 (4.80–260.77)	<0.001
No	185 (51.1)	37 (97.4)		
<b>Adnexal tenderness</b>				
Yes	110 (30.4)	13 (34.2)	0.8 (0.414–1.70)	0.375
No	252 (69.6)	25 (65.8)		

(Continues)

TABLE 4 (Continued)

	Causes of vaginal discharge		OR (95% CI)	p Value
	Infective cause	Noninfective cause		
Premenstrual flare				
Yes	123 (34.0)	12 (31.8)	1.1 (0.54–2.28)	0.460
No	239 (66.0)	26 (68.4)		

Abbreviations: CI, confidence interval; OR, odds ratio.

Characteristics	B	SE	Wald	p Value	OR (95% CI)
Age	-0.023	0.033	0.472	0.492	0.97 (0.91–1.04)
Marital status	0.530	0.426	1.550	0.213	1.6 (0.73–3.91)
Education	0.770	0.522	2.182	0.140	2.1 (0.77–6.00)
Employment	0.281	0.524	0.288	0.592	1.3 (0.47–3.70)
Use of contraception	-0.345	0.479	0.518	0.472	0.7 (0.27–1.81)
Extramarital contact	1.011	0.750	1.819	0.177	2.7 (0.63–11.94)
Constant	-5.502	2.219	6.147	0.013	0.004

Abbreviations: CI, confidence interval; OR, odds ratio.

TABLE 5 Logistic regression table showing the effect of demographic characteristics on the infective cause of vaginal discharge

protects and/or prevents sexually transmitted infections, except for condoms, there is a need for health education and couple counseling on the use of condoms to prevent recurrent STIs. Recurrent infections occur partly due to the fact that microorganisms are resistant to the antimicrobial medications. There is a need for future research to study the responses of microorganisms to the currently available antimicrobial medications and to develop a treatment protocol.

## 5 | CONCLUSIONS

For almost all the women who presented at Phuentsholing hospital, excessive vaginal discharge was caused by infections. Trichomoniasis was the most common infection identified, followed by bacterial vaginosis and VVC. Every female patient who presents with vaginal discharge should be subjected to proper evaluation and routine screening for coexisting sexually transmitted infection and needs to be treated adequately. This study re-emphasizes the need for proper examination of the pelvis to rule out offending lesions at the vulva, vagina, and cervix.

### AUTHOR CONTRIBUTIONS

Yeshey Dorjey was involved in the conceptualization, data curation, formal analysis, investigation, methodology, and validation of the study; writing of the manuscript – original draft; and writing of the manuscript – review and editing. Dechen Wangmo was involved in the formal analysis, investigation, and methodology of the study; writing of the manuscript – original draft; and writing of the manuscript – review

and editing. Dechen Tshomo was involved in the formal analysis and investigation of the study; writing of the manuscript – original draft; and writing of the manuscript – review and editing.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### ETHICS STATEMENT

Ethical approval was obtained from the Research Ethical Board of Health (REBH), Ministry of Health, Bhutan. Informed consent to participate in the study was obtained from the patient. Written informed consent was obtained for publication of their clinical details. A copy of the consent form is available for review by the Editor of this journal. Data sharing does not apply to this article as no data sets were generated or analyzed during the current study.

### TRANSPARENCY STATEMENT

The lead author (Yeshey Dorjey) affirms that this manuscript is an honest, accurate, and transparent account of the study being reported, that no important aspects of the study have been omitted,



and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

## ORCID

Yeshey Dorjey  <http://orcid.org/0000-0001-7324-3028>

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