RESEARCH ARTICLE

BACTERIAL VAGINOSIS; PREDOMINANT CAUSE OF VAGINAL DISCHARGE IN VINDHYA REGION AND ANALYSIS OF ASSOCIATED RISK FACTORS AMONG WOMEN OF REPRODUCTIVE AGE GROUP

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ARTICLE INFO	ABSTRACT
	Background: Vaginitis is one of the most common ambulatory problems to occur in women of reproductive age group. It is responsible for 5-10 million office visits per year throughout world. In India prevalence of vaginitis is approximately 30%. Vaginitis has substantial impact on female reproductive health, mental health, work ability and routine physical activity and is also associated with various obstetrical and gynecological complications. Bacterial vaginosis is most common form of vaginitis. So, we aim to find out prevalence and analyze risk factors associated with bacterial vaginosis at tertiary care hospital in Rewa, Madhya Pradesh India. ***Method:*** An observational cross-sectional study was conducted at Department of Obstetrics and Gynecology, Shyam Shah Medical College Rewa for 18 months from January 2021 to June 2022 on 1000 women of reproductive age group, visiting routine Gynae OPD of department of Obstetrics & Gynecology. ***Results:*** Prevalence of bacterial vaginosis in present study was found to be 22%. Various associated risk factors were use of cloth during menses, douching/cleanliness habit, rural area of residence and various occupations like factory workers and farmers. ***Conclusion:*** As it is evident that vaginitis will never be completely prevented, but incidence can be reduced. Much of the morbidity and complications can be reduced by identification and prevention of modifiable risk factors and interventional strategies directed mainly on high-risk behaviors in day-to-day life.

INTRODUCTION

Reproductive health is defined by WHO as a "state of complete physical, mental and social well-being and not merely absence of a disease or infirmity, in all matters relating to reproductive system and to its functions and processes" (UN, 1994). Reproductive morbidity is a broad concept that encompasses health problems related to reproductive organs and their functions. It is estimated that reproductive and sexual ill-health accounts for 20% of global[1-2]. Vaginitis is one of the most common ambulatory problems to occur in women. Symptomatic vaginal discharge in the women of reproductive age group is responsible for 5- 10 million OPD visits per year throughout the world[3]. The prevalence of vaginal discharge in India is estimated to be 30%. Females are more prone to urinary and vaginal infections because of short urethra and due to anatomical and functional proximity to the anal canal. Causative organisms for vaginitis can be endogenous, iatrogenic or sexually transmitted. Many women believe that such infections are normal and do not seek care due to shame or lack of information. Subsequently, these gynaecological disorders have substantial impact on female reproductive health, mental health, work ability and routine physical activities.

The most common causes of vaginitis are of infectious origin and include bacterial vaginosis, vulvovaginal candidiasis, and trichomoniasis. Bacterial vaginosis is implicated in 40% to 50% of cases, with vulvovaginal candidiasis accounting for 20% to 25% and trichomoniasis for 15% to 20% of cases. Non-infectious causes, including atrophic, irritant, allergic, and inflammatory vaginitis, are less common and account for 5% to 10% of vaginitis cases. BV, which is primarily characterized by a malodorous discharge, is common in women with multiple sex partners and is caused by the overgrowth of several facultative and anaerobic bacterial species[4]. The National Health and Nutrition Examination Survey (NHANES) of U.S. reported a 29.2% (21.2 million) overall prevalence of bacterial vaginosis on self-collected vaginal swabs among women 14–49 years of age, based on a nationally representative sample of women who participated in NHANES 2001–2004. Bacterial vaginosis is associated with many complications like post-hysterectomy vaginal cuff infection, post-abortion endometritis, increased risk of spontaneous miscarriage ranging from 13 to 24 gestational weeks, increased risk of acquiring sexually transmitted infections (STI), especially genital herpes and HIV, chorioamnionitis and chances of preterm birth, tubal factor infertility due to ascending dissemination of involved microorganism and also it prevents implantation leading to many IVF(In vitro fertilization) failures.

The treatment option varies according to the aetiology but unfortunately, many women seek to over the counter drugs[5] instead of visiting a gynaecologist due to social taboo and stigma. This leads to inadvertent use of antimicrobials leading to their resistance. Therefore, proper diagnosis of vaginal infections and causative agent should be done to prevent the unjudicial use of chemotherapeutic agents to avoid further complications. Moreover, special emphasis should be given to identify and prevent/modify risk factors associated with vaginitis. Various risk factors include multiple sex partners, various sexual practices, unhygienic menstrual habit, douching habits, use of hormonal contraceptives, medical conditions like uncontrolled diabetes mellitus, use of steroids, immunosuppressives, low socio-economic status, illiteracy, lack of awareness regarding vaginitis and its complications, cigarette smoking etc. Due to its disease burden, repetitive medical attention, inadvertent use of antimicrobials and money in part, impact on daily routine and physical activities of women, various obstetric and gynaecological complications and burden on economy, it is essential to identify various risk factors associated with vaginitis. This study is aimed to determine prevalence of bacterial vaginosis, most common causative agents in general for vaginitis and potential risk factors associated with it. Successful identification and evaluation of common causes and contribution of various risk factors will help in curbing the disease burden, preventing complications and will contribute to better quality of life.

METHODS

The present study is an observational, hospital based study conducted in Gynae OPD at Department of Obstetrics & Gynaecology, S. S. Medical College, Rewa (M.P.) over a period of 18 months from January 2021 to June 2022.

Study Population: Women of reproductive age group (18-45yr of age) attending Gynae OPD of Department of Obstetrics & Gynaecology, with complaints of vaginitis were randomly enrolled in the study.

Sample size: 1000 women of reproductive age group with features of vaginitis.

Study area: This is a tertiary care centre which provides health facilities to a large population of urban & rural areas of Rewa division.

Selection of cases: The women were selected on the basis of following criteria

INCLUSION CRITERIA

- Married
- Age 18 to 45 years
- Non-pregnant
- Presenting with features of vaginitis.

EXCLUSION CRITERIA

- Unmarried women.
- <18 years
- >45 years
- Didn't give written consent for the study or not willing to participate in the study.

Methods of study: After taking well informed written consent, women who fulfilled above mentioned criteria were interviewed on the basis of pre-structured questionnaire for interview (proforma). Questionnaire was predesigned into three sections, first section inquired into demographic & socioeconomic background of women: age, residence, educational status, socio-economic status by modified Kuppuswamy classification, no. of living children etc.; second section inquired into personal hygiene, sexual practices, diet, cigarette smoking, alcohol or tobacco abuse, douching habits, family planning

method used, use of cloth or pad during menses etc. Third section consisted of symptoms they complained of; nature, amount, colour, odour of discharge, itching in private part, associated abdominal pain, dysuria, dyspareunia etc. Then patients were examined per abdomen for any associated pain or tenderness, per speculum for characteristics of discharge and per vaginum for any mass or tenderness etc. Diagnosis was made by history taking, clinical & physical examination and laboratory tests (pH, High vaginal swab, microscopy, culture).

- pH strip used to test vaginal fluid pH
- Three high vaginal swabs taken and sent to institute's microbiology lab
- One swab used for wet mount preparation
- Second swab for KOH mount and Whiff test
- Third swab for Gram staining & culture.

Pap smear taken

Other tests done

Urine for routine and microscopy: Data collected on the basis of detailed history and clinical evaluation of women presenting with symptoms of vaginitis. All information was recorded in a pre-structured proforma, entered in MS Excel spread sheet & analysed by appropriate statistical method.

Ethical consideration: The proposal was cleared by Institutional Ethical Committee (S. S. Medical College, Rewa) before starting the study. After ethical approval study was started and patients were enrolled after their informed written consent. Confidentiality and privacy of the participants were maintained. All the data was kept in strict confidentiality with access to only the researcher & mentor.

Statistical analysis: Qualitative and quantitative data analysed and explained as percentage method using bar chart and pie chart and regression analysis wherever applied.

RESULTS

A Total 1000 cases were enrolled in the study according to inclusion & exclusion criteria. Prevalence of bacterial vaginosis was 22%.

Table 1. Clinical and Laboratory investigations in Bacterial vaginosis cases using Amsel's criteria

Diagnostic criteria	Number (N=220)	Percentage
Homogenous thin discharge	176	80%
Positive Whiff test	217	98.6%
Presence of Clue cells	210	95.4%
Vaginal pH>4.5	220	100%

Out of 1000 participants enrolled for the study, 220 cases were diagnosed with bacterial vaginosis based on Amsel's criteria (Table 1). Bacterial vaginosis was diagnosed when ¾ criteria were full-filled. Out of 4 criteria, most common was alkaline vaginal Ph (pH>4.5) seen in all cases followed by Positive Whiff test (98.6%), Presence of clue cells (95.4%) and homogenous thin vaginal discharge (80%).
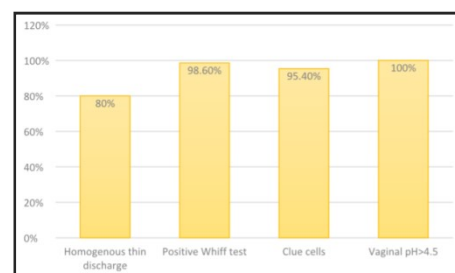

Figure 1. Clinical and Laboratory investigations in Bacterial vaginosis cases using Amsel's criteria

Table 2 shows maximum participants (58.2%) were of age group of 26-35 years, followed by 35-45 years (28.6%) and 18-25 years (13.18%). Among all cases maximum belonged to rural areas (90%) and only 10% belonged to urban areas. Most of cases were having elementary primary schooling (74.1%), while 18.6% were illiterates. In this study maximum participants (52.3%) were factory workers, followed by farmers (34.09%). Housewives were 3.6%, while 10% had other occupations like vendor, teacher, shopkeeper, labourer etc. Majority of patients had lower middle socio-economic status (46.3%), followed by lower class (44.5%) and only 3 participants were from upper class. Socio-economic classification was based on Modified Kuppuswamy Classification.
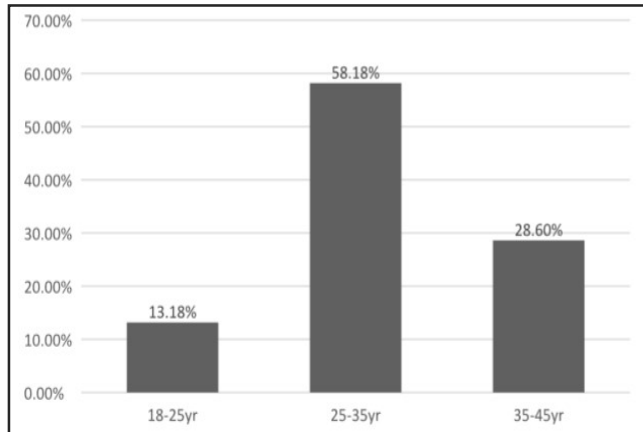

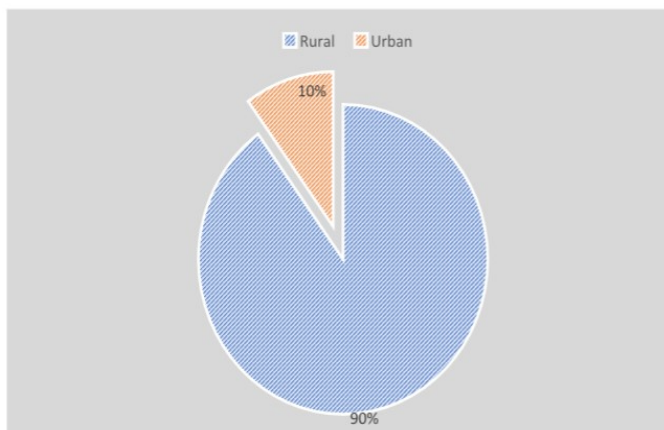**Figure 2. Correlation of bacterial vaginosis with age**

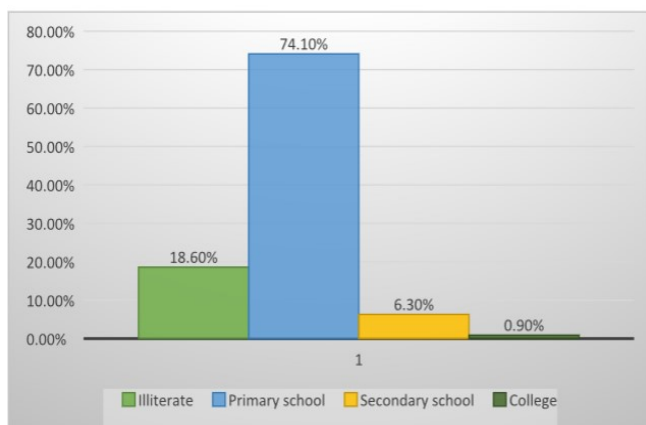**Figure 3. Distribution of Bacterial vaginosis according to area of residence**

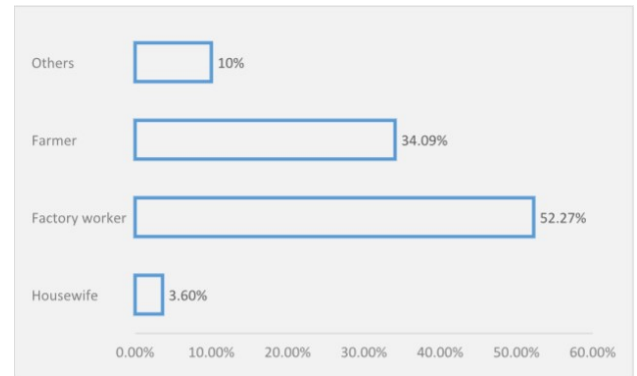**Figure 4. Distribution of bacterial vaginosis according to status of literacy**

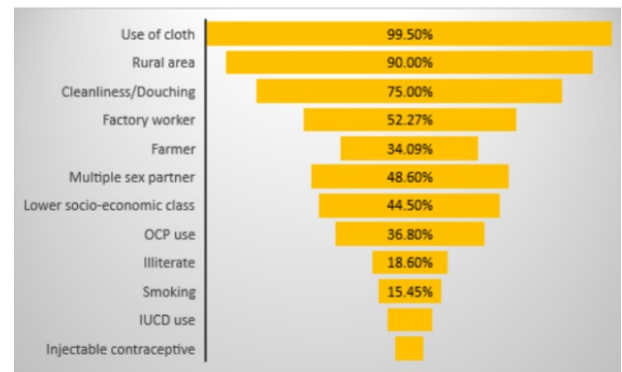**Figure 5. Bacterial vaginosis and occupational risk**

Figure 6. Risk factor analysis in cases of Bacterial vaginosis

Table 2. Demographic and socio-economic profile of patients diagnosed with bacterial vaginosis

Socio-demographic profile	Details	Number (N=220)	Percentage
Age (in years)	18-25	29	13.18%
	25-35	128	58.18%
	35-45	63	28.6%
Area of Residence	Rural	198	90%
	Urban	22	10%
Status of literacy	Illiterate	41	18.6%
	Primary school	163	74.1%
	Secondary school	14	6.3%
	College	2	0.9%
Employment status	Housewife/unemployed	8	3.6%
	Factory worker	115	52.27%
	Farmer	75	34.09%
	Other	22	10%
Socio-economic status	Upper	3	1.36%
	Upper Middle	17	7.7%
	Lower Middle	102	46.3%
	Upper Lower	50	22.7%
	Lower	48	21.8%

Table 3. Distribution of symptoms in cases of Bacterial vaginosis

Symptoms	Number	Percentage
Discharge from genitals	172	78.18%
Itching/Soreness	99	45%
Associated abdominal pain	98	44.5%
Foul smelling discharge	209	95%
Dysuria	35	15.9%
Dyspareunia/ Discomfort during intercourse	5	2.27%

Most common symptom among cases with bacterial vaginosis was discharge from genitals (78.18%) as shown in Table 3. Discharge was foul smelling in 95% cases. Itching or soreness in genitals was second most common symptom seen in cases of bacterial vaginosis (45%).

Associated abdominal pain seen in 44.5% of cases. Dysuria or burning micturition seen 15.9% cases and least common was dyspareunia seen in 2.27% cases.

Table 4. Risk factor analysis in cases of Bacterial vaginosis

Risk factor	Number	Percentage
Use of cloth during menses	219	99.5%
Rural area of residence	198	90%
Cleanliness/Douching habit	165	75%
Factory worker	115	52.27%
Farmer	75	34.09%
Multiple sex partners	107	48.6%
Lower class	98	44.5%
OCP use	81	36.8%
Illiterate	41	18.6%
Smoking	34	15.45%
IUCD use	25	11.3%
Injectable contraceptives	16	7.27%

Bacterial vaginosis seen most commonly in participants using cloth during menses (99.5%). People residing in rural area were also at risk (90%). 75% participants had habit of douching/cleanliness of genital organs with varied instance and frequency. Factory workers (52.27%) and farmers (34.09%) were particularly at risk for developing bacterial vaginosis. Multiple sex partners (48.6%) were also common in bacterial vaginosis cases. Lower socio-economic class was also found to be risk factor (44.5%). Maximum were oral contraceptive users (36.8%), followed by IUCD users (11.3%) and Injectable contraceptive users (7.27%). Illiterates were 18.6%.

DISCUSSION

Genital infection is a wide spread problem among females of reproductive age group. It is the second most common problem after menstrual disorders[6]. One in ten women will present with vaginal discharge in 1 year course[7]. Prevalence of bacterial vaginosis in our study found to be 22% which is similar to Amit Singh et al[8] (28.64%), Pawanarkar and Chopra et al[9] (19%), Koumans et al[10] and Madhivanan et al[11] (19.1%). Most common age group for bacterial vaginosis was 25-35 years (58.18%) in present study. Similar study for assessing prevalence and risk factors on bacterial vaginosis was done by Bhalla et al[12], Madhivanan et al, Amit Singh et al in India and Dahal et al in Nepal[13] also signify that the women of child bearing age were more affected. This may be due to effects of factors such as altered menstrual status, hormonal changes, sexual activity, contraceptive use, vaginal deliveries and various procedures like dilatation curettage etc are common in females of these age groups which may have contributed for higher risk of vaginal infection. Also, in our country trends of women getting married and enter in married life earlier and end reproduction earlier too. Majority of the patients were from rural area (90%). Women are generally not aware of risk factors of vaginitis in rural areas. They seek health facility only until alarming symptoms develop or when it affects their daily household or work ability. Maximum cases seen in lower middle (46.3%) and lower class (44.5%). These outcomes clearly indicate that the disease prevalence is higher in population with lower middle and lower socioeconomic status. Maximum cases were having primary school level of education (74.09%), secondary education in 6.3% and only 2 were having college level education. Illiterates were 18.6%. Reproductive health is generally a curriculum of secondary schooling or above which is lacking in patients with primary school education so more cases in later group. Factory workers (52.2%) and farmers (34.09%) were particularly affected occupations. In present study 96% participants were employed which is comparable with Basanta Kumar Pati et al[14] where 95% cases were employed. This can be attributed to unhygienic toilets, hot environment, sexual practise with more than 1 partner and smoking or tobacco chewing during or in between work hours in factory workers. Farmers also work in hot environment, may not be taking regular bath, tight clothing or can also be affected by pesticide sprays etc.

Multiple sex partners seen in 48.6% which is similar to Nessa et al[15] where more infections seen in sex workers. High prevalence of vaginitis with sexual activity may be result of disturbance of vaginal microflora due to frequent sexual intercourse and the subsequent frequent washing with water or water with soap. Most commonly used contraceptive was OCP (36.8%). Findings are consistent with . Injectable hormonal contraceptive seen in 7.27% and IUCD used in 11.3%. This can be due to changes in vaginal flora, pH and estrogen levels which may contribute to infections by creating hyper estrogenic environment. Also, ascent of infections can take place in IUCD users. Condom users were 4% who were affected with bacterial vaginosis. Incidence of vaginitis and condom users can be explained by acquiring vaginal dermatitis, allergic and irritant vulvovaginitis and inflammation associated either with latex or the spermicide product. It must be considered that that vulvar mucosa is non keratinized epithelia and moisture within which it is immersed, promotes the penetration of irritants and allergens, therefore creating vaginitis states as Moraes et al[16]. Use of cloth during menses was common risk factors seen in 99.5% cases in our study. In India, particularly in rural practise, women mostly use cloth napkin which are washed, sundried and reused multiple times for subsequent cycles. Cloth used is mostly dried in damp and indoor places due to social taboos and restrictions which compel females in drying cloth pad indoors, away from sunlight and open air generally in lack of proper sunlight. Many a times they are either not washed properly leading to collection of various harmful bacteria and fungi which causes various infections when used again and again. Also, Das P et al[17] reported menstrual hygiene practices and risk of urogenital infections in women in their study.

Smoking seen in 15.4% of cases and found to be risk factor in present study. Smoking cigarette causes depletion of hydrogen peroxide producing lactobacilli, therefore increasing the risk of bacterial vaginosis. Vaginal metabolites that differ between smokers and non-smokers also do exist. Biogenic amines which are elevated in smokers, have roles in anaerobic bacterial proliferation, immune and stress resistance with a significant link to the development of bacterial vaginosis. Also, smoking acts by depletion of Langerhans cell in cervical epithelium, macrophages which act in natural defence mechanism thus leading to local immune-suppression and causing bacterial vaginosis. Additionally, smoking decreases estrogen levels, causing less glycogen production leading to raised pH which is already a risk factor for bacterial vaginosis. Cleanliness of genitals/ douching seen in majority (75%) of cases similar to study conducted by Holzman et al[18] and Rajamanoharan et al[19]. Douching/Cleanliness removes normal protective vaginal flora, decreasing their number and thus permitting the overgrowth of pathogens. It may also act as a pressurized fluid vehicle for transport of pathogens and infections in lower genital tract to ascend above the cervix into the uterus, fallopian tubes, or abdominal cavity. Douching reduces the density of normal vaginal flora therefore predisposing to colonization by sexually transmitted pathogens. Furthermore, douching may cause vaginal irritation and vaginitis. Hence douching is not recommended as vagina cleans itself by secreting mucus. In present study, most common symptom in patients of bacterial vaginosis was vaginal discharge (78.18%) which is comparable with Zehrah Adnan et al[20] where it was seen in 77.8% of cases. Second most common symptom was itching or pruritis in genital organs (45%). Fishy odor may related to volatilization of amine such as putrescine and cadaverine which produce by bacterial[21]. Itching or soreness in genitals was second most common symptom seen in cases of bacterial vaginosis (45%). Associated abdominal pain seen in 44.5% of cases which is higher than Ranjit et al[22]. This was followed by dysuria or burning micturition (15.9%) and dyspareunia (2.27%) of cases. These facts can be contributed to salient characteristic features of bacterial vaginosis. pH.4.5 seen in all cases which is consistent with Caillouette et al[23].

CONCLUSION

Bacterial vaginosis found to be most common cause of infectious vaginitis.

The study shows that use of old cloth napkins during menstruation has potential contribution towards vaginitis for which further case control study with large sample is recommended. Besides, risk factors such as use of oral contraceptive remarkably linked with females having bacterial vaginosis. Also, occupational risk for bacterial vaginosis may be found in factory workers and farmers. Douching/Cleanliness habit, by removing beneficial microbiota enhances chances of bacterial vaginosis. The study recommends the need of creating awareness and organizing educational programs concerning reproductive health and hygiene for females particularly in rural areas and lower socio-economic status. Furthermore, various programmes should be run to reduce the cost of sanitary pad or make them free so that it can be assessed by all.

Ethical approval: Approval taken from Institutional Ethics Committee before the start of study.

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