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Microbiological Evaluation of Vaginal Discharge and Its Clinical Correlation in Women: A Cross-Sectional Study

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ABSTRACT

Background: Vaginal discharge is a common complaint among women and may result from various infectious causes. Accurate diagnosis is essential for appropriate management, as clinical features alone may be misleading.
Objective: To evaluate the microbiological etiology of vaginal discharge and correlate it with clinical findings.
Materials and Methods: This cross-sectional study was conducted among 150 women aged 18–50 years presenting with vaginal discharge. Detailed history and clinical examination were performed using a structured proforma. High vaginal swabs were collected under aseptic precautions and subjected to wet mount microscopy, potassium hydroxide (KOH) preparation, Gram staining, and culture for identification of causative organisms. Data were analyzed using appropriate statistical tests, and a p-value < 0.05 was considered statistically significant.
Results: Bacterial vaginosis was the most common etiology (40%), followed by candidiasis (30%) and trichomoniasis (14.7%), while mixed infections were noted in 10% of cases. The majority of patients belonged to the 26–35 years age group. White discharge (50%) and itching (45%) were the most common clinical features. A statistically significant association was observed between clinical and microbiological diagnosis ($p < 0.05$).
Conclusion: Microbiological evaluation plays a crucial role in the accurate diagnosis of vaginal discharge. Reliance on clinical features alone may lead to misdiagnosis. Early and appropriate diagnosis helps in effective management and prevention of complications.

Keywords: *Vaginal discharge, bacterial vaginosis, candidiasis, microbiological evaluation.*

INTRODUCTION

Vaginal discharge is one of the most common complaints among women attending outpatient clinics in gynecology and general medicine. While a certain degree of discharge is physiological and varies with hormonal status and reproductive age, abnormal discharge often indicates an underlying pathological process. Women with pathological discharge frequently present with associated symptoms such as itching, foul odor, dysuria, and pelvic discomfort, which can adversely affect their physical and psychological well-being.[1]

The major infectious causes of vaginal discharge include bacterial vaginosis, vulvovaginal candidiasis, and trichomoniasis. Bacterial vaginosis is characterized by a disturbance in the normal vaginal microbiota, where protective lactobacilli are replaced by anaerobic organisms such as *Gardnerella vaginalis* and *Mobiluncus* species.[2] Vulvovaginal candidiasis, most commonly caused by *Candida albicans*, presents with curdy white discharge and intense pruritus.[3] Trichomoniasis, a protozoal infection caused by *Trichomonas vaginalis*, is typically associated with frothy, malodorous discharge and vaginal irritation.[4]

The normal vaginal environment is maintained by lactobacilli, which produce lactic acid and hydrogen peroxide, thereby maintaining an acidic pH that inhibits the growth of pathogenic organisms. Disruption of this ecosystem can occur due to multiple factors such as antibiotic use, uncontrolled diabetes mellitus, hormonal changes, poor genital hygiene, and immunosuppression.[5] These factors predispose women to infections and recurrent episodes of abnormal discharge.

Clinical diagnosis based solely on symptoms and physical examination may be misleading because different etiologies often present with overlapping clinical features. For example, itching may be present in both candidiasis and trichomoniasis, while malodorous discharge is commonly associated with bacterial vaginosis but is not pathognomonic.[6] Hence, reliance on clinical findings alone can lead to misdiagnosis and inappropriate treatment.

Microbiological evaluation plays a vital role in identifying the exact etiology of vaginal discharge. Techniques such as wet mount microscopy, potassium hydroxide (KOH) preparation, Gram staining, and culture methods help in detecting causative organisms. Diagnostic criteria such as Amsel's criteria and Nugent scoring system further improve the accuracy and standardization of diagnosis.[7]

Accurate diagnosis is essential not only for effective treatment but also for preventing complications such as pelvic inflammatory disease, infertility, adverse pregnancy outcomes, and increased susceptibility to sexually transmitted infections, including HIV.[8] Early identification and appropriate management can significantly reduce morbidity and improve quality of life. the present study was conducted to evaluate the microbiological profile of vaginal discharge in women attending a tertiary care center and to correlate these findings with clinical presentation.

MATERIALS AND METHODS:

Study Design

This was a hospital-based cross-sectional study conducted to evaluate the microbiological etiology of vaginal discharge and its clinical correlation among women attending a tertiary care center.

Study Setting

The study was carried out in the Department of Microbiology in collaboration with the Department of Obstetrics and Gynecology at a tertiary care teaching hospital.

Study Duration

The study was conducted over a period of 6 months.

Study Population

Women presenting with complaints of vaginal discharge to the outpatient and inpatient departments were included in the study.

Sample Size

A total of 150 women were included based on feasibility and patient availability during the study period.

Inclusion Criteria

- Women aged 18–50 years
- Presenting with complaints of vaginal discharge
- Willing to provide informed consent

Exclusion Criteria

- Pregnant women
- Women who had taken antibiotics or antifungal drugs within the last 2 weeks
- Women during menstruation
- Known cases of malignancy of genital tract

Data Collection

A pre-structured proforma was used to record:

- Demographic details (age, socioeconomic status)
- Presenting complaints (duration, color, odor of discharge)
- Associated symptoms (itching, dysuria, lower abdominal pain)
- Menstrual and obstetric history
- Relevant medical history (diabetes, immunosuppression)

Clinical Examination

All patients underwent detailed general and gynecological examination:

- Inspection of external genitalia
- Per speculum examination to assess:
    - Nature of discharge (thin/thick/frothy/curdy)
    - Color and odor
    - Vaginal and cervical findings

Vaginal pH was assessed using pH indicator strips.

Sample Collection

- Two high vaginal swabs (HVS) were collected under aseptic precautions using a sterile speculum.
- Care was taken to avoid contamination.
- Samples were transported immediately to the microbiology laboratory for analysis.

Laboratory Procedures

1. Wet Mount Examination

- A drop of normal saline was added to the sample
- Examined under microscope for:
    - Motile *Trichomonas vaginalis*
    - Pus cells

2. Potassium Hydroxide (KOH) Mount

- 10% KOH preparation used
- Examined for:
    - Budding yeast cells
    - Pseudohyphae (Candida)

3. Gram Staining

- Smears prepared and stained
- Evaluated for:
    - Presence of clue cells (suggestive of bacterial vaginosis)
    - Gram-positive budding yeast cells
- Nugent scoring system used where applicable

4. Culture

- Samples inoculated on appropriate media:
    - Blood agar
    - MacConkey agar
    - Sabouraud dextrose agar (for fungi)
- Plates incubated at 37°C for 24–48 hours
- Organisms identified by standard microbiological methods

Diagnostic Criteria

Bacterial Vaginosis

Diagnosed based on Amsel's criteria (≥3 of the following):

- Homogeneous discharge
- Vaginal pH > 4.5
- Positive whiff test
- Presence of clue cells

Candidiasis

- Presence of budding yeast cells or pseudohyphae on KOH/Gram stain

Trichomoniasis

- Motile organisms seen on wet mount

Statistical Analysis

Data entered in Microsoft Excel and analyzed using SPSS version 20.0.Descriptive statistics expressed as frequency and percentage. Association between clinical and microbiological findings assessed using Chi-square test. A p-value < 0.05 was considered statistically significant

Ethical Considerations

Study approved by the Institutional Ethics Committee and Written informed consent obtained from all participants

RESULTS:

The majority of women presenting with vaginal discharge belonged to the **26–35 years age group**, indicating higher prevalence in the reproductive age group. Younger (18–25 years) and older women (>45 years) constituted a smaller proportion of cases (Table 1).

Table 1: Age Distribution

Age Group (years)	Number (n=150)	Percentage (%)
18–25	30	20%
26–35	60	40%
36–45	40	26.7%
46–50	20	13.3%

Bacterial vaginosis was the most common cause, accounting for 40% of cases. Candidiasis was the second most frequent etiology (30%), followed by trichomoniasis (14.7%). Mixed infections were observed in 10% of cases, highlighting the presence of multiple pathogens in a subset of patients (Table 2).

Table 2: Etiological Distribution

Etiology	Number	Percentage (%)
Bacterial vaginosis	60	40%
Candidiasis	45	30%
Trichomoniasis	22	14.7%
Mixed infection	15	10%
No organism detected	8	5.3%

The most common presenting complaint was white vaginal discharge (50%), followed by itching (45%) and foul-smelling discharge (35%). Dysuria was reported in a smaller proportion (20%). These findings indicate that symptoms are variable and often overlapping (Table 3).

Table 3: Clinical Features

Clinical Feature	Number	Percentage (%)
White discharge	75	50%
Foul smell	52	34.7%
Itching	68	45.3%
Dysuria	30	20%

A statistically significant association was observed between clinical diagnosis and microbiological confirmation (Table 4).

Table 4: Clinical vs Microbiological Correlation

Diagnosis	Clinically Diagnosed (n)	Microbiologically Confirmed (n)	Not Confirmed (n)	p-value
Bacterial vaginosis	**70**	**49**	**21**	
Candidiasis	**60**	**45**	**15**	**0.038**
Trichomoniasis	**35**	**23**	**12**	
Total	**165**	**117**	**48**	

DISCUSSION:

The present study evaluated the microbiological profile of vaginal discharge and its correlation with clinical findings among women attending a tertiary care center. Vaginal discharge remains one of the most common gynecological complaints, particularly in women of reproductive age, and its etiology is often multifactorial.

In this study, the majority of patients belonged to the 26–35 years age group, which corresponds to the sexually active and reproductive period. Similar observations have been reported in previous studies, where a higher prevalence of vaginal infections was noted among women in this age group, possibly due to increased sexual activity, hormonal influences, and higher exposure to risk factors.[9]

The present study identified bacterial vaginosis as the most common cause (40%), followed by candidiasis (30%) and trichomoniasis (14.7%). These findings are consistent with earlier reports indicating that bacterial vaginosis is the leading cause of abnormal vaginal discharge in women of reproductive age.[10] The predominance of bacterial vaginosis may be

attributed to alterations in the vaginal flora, particularly the depletion of lactobacilli and overgrowth of anaerobic organisms.

Candidiasis was the second most common etiology in our study. The relatively high prevalence of candidiasis may be explained by predisposing factors such as diabetes mellitus, antibiotic usage, and poor genital hygiene. Previous studies have also documented similar findings, highlighting candidiasis as a frequent cause of symptomatic vaginal discharge, especially in immunocompromised individuals.[11]

Trichomoniasis accounted for a smaller proportion of cases compared to bacterial vaginosis and candidiasis. This may be due to variations in sexual behavior, awareness, and access to healthcare. However, its clinical significance remains high due to its association with sexually transmitted infections and potential complications.[12]

In the present study, mixed infections were observed in 10% of cases, emphasizing the importance of comprehensive microbiological evaluation. Mixed infections are often underdiagnosed when relying solely on clinical features, as symptoms may overlap and mask the presence of multiple pathogens.[13]

With regard to clinical presentation, white discharge was the most common symptom, followed by itching and foul-smelling discharge. However, the correlation between clinical diagnosis and microbiological findings was only moderate. The highest agreement was observed in candidiasis, followed by bacterial vaginosis and trichomoniasis. These findings indicate that clinical features alone are insufficient for definitive diagnosis. Similar observations have been reported in previous studies, where clinical diagnosis showed limited sensitivity and specificity when compared to laboratory methods.[14]

The statistical analysis using the Chi-square test demonstrated a significant association between clinical and microbiological diagnosis ($p < 0.05$). While this suggests that clinical assessment provides useful initial clues, it also underscores the need for microbiological confirmation to avoid misdiagnosis and inappropriate treatment.[15]

Microbiological techniques such as wet mount examination, KOH preparation, and Gram staining proved to be simple, cost-effective, and reliable methods for identifying causative organisms. These techniques are particularly valuable in resource-limited settings, where advanced diagnostic facilities may not be readily available.[16]

Early and accurate diagnosis of vaginal infections is essential to prevent complications such as pelvic inflammatory disease, infertility, and adverse pregnancy outcomes. Furthermore, untreated infections may increase susceptibility to sexually transmitted infections, including HIV.[17] Therefore, routine microbiological evaluation should be incorporated into clinical practice for effective management of vaginal discharge.

Overall, the findings of the present study reinforce the importance of combining clinical assessment with laboratory diagnosis. While clinical features provide an initial direction, microbiological confirmation ensures accurate identification of the etiological agent and guides appropriate therapy.

CONCLUSION:

Vaginal discharge is a common clinical problem with diverse microbiological etiologies, of which bacterial vaginosis is the most prevalent, followed by candidiasis and trichomoniasis. Although clinical features provide useful initial clues, they are often insufficient for accurate diagnosis due to overlapping presentations. Microbiological evaluation using simple laboratory techniques significantly improves diagnostic accuracy and helps in appropriate management. The study highlights the importance of routine laboratory confirmation in all cases of vaginal discharge. Early and accurate diagnosis can prevent complications and improve patient outcomes.

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