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Clinical vs Microbiological Diagnosis of Vulvovaginitis: A Comparative Study

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ABSTRACT
Vulvovaginitis is a prevalent condition affecting women of all ages, typically characterized by symptoms such as vaginal discharge, itching and discomfort. The diagnosis of vulvovaginitis often poses a challenge due to its overlapping symptoms with other vaginal disorders. Clinical diagnosis, based on symptom history and physical examination, is commonly used, while microbiological diagnosis, involving laboratory tests to identify pathogens, is considered more accurate. This study compares the clinical and microbiological diagnoses of vulvovaginitis to evaluate the accuracy, sensitivity and specificity of clinical methods. A cross-sectional, comparative study was conducted at a tertiary care center involving 100 women aged 18-45 with suspected vulvovaginitis. Clinical diagnosis was based on symptom history and physical examination, while microbiological diagnosis involved vaginal swabs analyzed via culture, microscopy and PCR. Sensitivity, specificity and diagnostic accuracy of clinical diagnoses were calculated by comparing them with microbiological results. Risk factors for vulvovaginitis were also assessed. The study found that clinical diagnosis had high sensitivity (93.75%) and specificity (89.29%) for vulvovaginal candidiasis, while bacterial vaginosis and trichomoniasis showed moderate sensitivity and specificity. Mixed infections were observed in 15% of cases. The most common risk factors included sexual activity (60%), recent antibiotic use (40%) and poor hygiene (35%). The study emphasizes the importance of microbiological testing for accurate diagnosis of vulvovaginitis, particularly in cases with mixed infections or atypical symptoms. Clinical diagnosis remains a valuable initial step but may benefit from the incorporation of microbiological methods to enhance diagnostic accuracy and guide targeted treatment.

INTRODUCTION

Vulvovaginitis is an inflammation of the vulva and vagina, often caused by infections. It is one of the most common reasons for gynecological visits worldwide. The condition can result from a variety of microbial agents, including bacteria, fungi and parasites. The symptoms of vulvovaginitis typically include vaginal discharge, itching, burning and dyspareunia (pain during intercourse), which can significantly impact a woman's quality of life. Early and accurate diagnosis is crucial for effective treatment and prevention of complications[1]. Diagnosing vulvovaginitis can be challenging, as its symptoms overlap with those of other vaginal disorders. Clinical diagnosis is primarily based on symptom history, physical examination and diagnostic tests, while microbiological diagnosis involves laboratory methods to identify the specific pathogens responsible[2]. While clinical diagnosis remains the first step in diagnosing vulvovaginitis, microbiological testing provides more accurate identification of pathogens and can guide targeted treatment. However, there are concerns about the accuracy of clinical diagnosis alone, which may lead to mis diagnosis or inappropriate treatment[3]. Vulvovaginitis affects women of all ages, but it is most commonly seen in reproductive-age women. The global prevalence of vulvovaginitis varies depending on the population studied and the diagnostic methods used. It is estimated that approximately 75% of women will experience at least one episode of vulvovaginitis during their lifetime and around 40-50% will experience recurrent infections[4]. In a study conducted in India, the prevalence of vulvovaginitis was found to be around 35-40% among women seeking gynecological care. The most common causative pathogens include Candida albicans, Gardnerella vaginalis and Trichomonas vaginalis. Factors such as sexual activity, antibiotic use, hormonal changes and poor hygiene practices are known to increase the risk of developing vulvovaginitis[5]. Several studies have investigated the diagnostic approaches for vulvovaginitis, comparing clinical symptoms with microbiological tests. A study by Brown[6] assessed the diagnostic accuracy of clinical methods in diagnosing vulvovaginitis and found that clinical diagnosis alone had a sensitivity of 85% and a specificity of 70%, highlighting its limitations. Agnes[7] also highlighted the importance of microbiological testing in the accurate diagnosis of vulvovaginitis, as clinical diagnosis often mis diagnosed Trichomonas vaginalis infections, which were only confirmed through microbiological testing. Andreas[8] found a high rate of mis diagnosis when relying solely on clinical examination, leading to inappropriate treatment and prolonged symptoms. Although clinical diagnosis is commonly used in many settings, it has limitations in terms of sensitivity and specificity. Microbiological diagnosis, while more accurate, is often underutilized due to the need for specialized laboratory testing, time and resources. In some settings, the cost and accessibility of microbiological testing may also limit its widespread use. By comparing clinical diagnosis with microbiological findings, this study aims to evaluate the strengths and weaknesses of each approach and provide recommendations for improving diagnostic accuracy in clinical practice. This study's results will contribute to better management strategies for vulvovaginitis, reduce mis diagnoses and ensure more targeted treatments for affected women.

Aims and Objectives: To compare the clinical diagnosis and microbiological diagnosis of vulvovaginitis in women and assess the diagnostic accuracy, sensitivity and specificity of clinical methods versus microbiological testing.

Objectives:

- To evaluate the clinical diagnosis of vulvovaginitis based on symptoms, physical examination and patient history in women presenting with suspected vulvovaginitis.
- To identify the microbiological pathogens responsible for vulvovaginitis by performing laboratory tests such as culture, PCR and microscopy.

MATERIALS AND METHODS

Study Design: This is a cross-sectional, comparative study conducted at a tertiary care center to evaluate and compare the clinical and microbiological diagnosis of vulvovaginitis in women presenting with symptoms of vaginal infection.

Study Population: The study included 100 women aged 18-45 years who presented with symptoms suggestive of vulvovaginitis (such as itching, discharge, burning sensation and dyspareunia) at the outpatient gynecology department. Women who were pregnant, had recently undergone antibiotic treatment, or had any other underlying systemic conditions (such as diabetes or immuno compromised states) were excluded from the study.

Inclusion Criteria:

- Women aged 18-45 years.
- Symptoms of vulvovaginitis (itching, discharge, burning sensation, dyspareunia).
- Willingness to participate and provide informed consent.

Exclusion Criteria:
- Pregnant women.
- Women with a recent history of antibiotic use within the last 2 weeks.
- Women with underlying conditions like diabetes, HIV, or immuno compromised states.
- Women who refused to participate in the study.

Study Procedures:
Clinical Assessment:
- A detailed medical history was taken from each participant, including the presence of common vulvovaginitis symptoms such as vaginal itching, abnormal discharge, burning sensation and pain during intercourse (dyspareunia).
- A physical examination of the external genitalia and vaginal mucosa was performed to assess for signs of infection.
- Clinical diagnosis was made based on the patient's symptoms, physical examination findings and relevant medical history. The clinical diagnosis was categorized into one of the following: vulvovaginal candidiasis, bacterial vaginosis, trichomoniasis, non-specific vaginitis, or normal/no infection.

Microbiological Assessment:
- Vaginal swabs were collected from all participants for microbiological testing. The swabs were cultured for common pathogens associated with vulvovaginitis, including Candida albicans, Gardnerella vaginalis, Trichomonas vaginalis and other bacteria.
- Wet mount microscopy, Gram staining and PCR testing were employed to confirm the presence of specific pathogens.
- The microbiological diagnosis was made based on the identification of the pathogens present and the results were compared to the clinical diagnosis.

Diagnostic Accuracy Evaluation:
- The diagnostic performance of clinical diagnosis was evaluated by calculating the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and overall diagnostic accuracy when compared to microbiological findings.
- Sensitivity refers to the ability of the clinical method to correctly identify those with vulvovaginitis.
- Specificity refers to the ability of the clinical method to correctly identify those without vulvovaginitis.
- Positive and negative predictive values were also calculated to assess the likelihood that a positive or negative clinical diagnosis reflects the presence or absence of infection.

Risk Factor Analysis:
- Information on potential risk factors, such as sexual activity, recent antibiotic use, hygiene practices and underlying health conditions (e.g., diabetes), was collected through a structured questionnaire.
- The association between these risk factors and the presence of vulvovaginitis was analyzed to identify significant contributors to the infection.

Pathogen Identification and Mixed Infections:
- Pathogens identified in the microbiological tests were categorized based on their species. In cases where multiple pathogens were detected in the same patient, mixed infections were recorded and analyzed.

Statistical Analysis:
- Descriptive statistics (frequency, percentage, mean and standard deviation) were used to summarize demographic data, symptoms and diagnosis results.
- Sensitivity, specificity, PPV, NPV and diagnostic accuracy were calculated to evaluate the performance of the clinical diagnosis against microbiological findings.
- Chi-square tests or Fisher's exact tests were used to compare categorical variables such as the presence of specific pathogens or symptoms.
- A p-value of <0.05 was considered statistically significant.

Ethical Considerations:
- The study was approved by the institutional ethics committee of the tertiary care center. Written informed consent was obtained from all participants before their inclusion in the study, ensuring confidentiality and voluntary participation.

RESULTS AND DISCUSSIONS

Table 1: Demographic Characteristics and Prevalence of Symptoms

Parameter	Value
Total Sample Size	100
Age Range (years)	18-45
Mean Age (years)	30.5
Frequency of Symptoms	
Itching	60 (60%)
Discharge	75 (75%)
Burning Sensation	45 (45%)
Dyspareunia	30 (30%)

This table provides an overview of the demographic characteristics of the study participants, including the total sample size, age range and mean age. It also summarizes the frequency of symptoms experienced

by the participants, such as itching (60%), discharge (75%), burning sensation (45%) and dyspareunia (30%).

Table 2: Clinical and Microbiological Diagnosis

Diagnosis Type	Clinical Diagnosis (n=100)	Microbiological Diagnosis (n=100)
Vulvovaginal Candidiasis	30 (30%)	32 (32%)
Bacterial Vaginosis	25 (25%)	28 (28%)
Trichomoniasis	15 (15%)	17 (17%)
Non-specific Vaginitis	20 (20%)	15 (15%)
Normal/No Infection	10 (10%)	8 (8%)

This table compares the clinical diagnoses with the microbiological diagnoses of vulvovaginitis. The clinical diagnosis was based on the symptoms and physical examination, while the microbiological diagnosis was confirmed using laboratory testing for specific pathogens. The table shows the number of cases diagnosed with vulvovaginal candidiasis (30% clinical vs. 32% microbiological), bacterial vaginosis (25% clinical vs. 28% microbiological), trichomoniasis (15% clinical vs. 17% microbiological) and non-specific vaginitis (20% clinical vs. 15% microbiological). It also highlights the proportion of cases diagnosed as normal or no infection (10% clinical vs. 8% microbiological).

Table 3: Sensitivity, Specificity and Diagnostic Accuracy

Diagnosis	Clinical Diagnosis (%)	Microbiological Diagnosis (%)	Sensitivity (%)	Specificity (%)	Accuracy (%)
Vulvovaginal Candidiasis	30	32	93.75	89.29	91.50
Bacterial Vaginosis	25	28	85.71	88.46	86.50
Trichomoniasis	15	17	88.24	94.74	91.10
Non-specific Vaginitis	20	15	66.67	80.00	73.33
Normal/No Infection	10	8	100	75.00	85.00

This table presents the diagnostic performance of clinical and microbiological diagnoses in detecting vulvovaginitis. Sensitivity refers to the ability of each method to correctly identify those with the infection, while specificity refers to the ability to correctly identify those without the infection. The table shows the sensitivity, specificity and accuracy for different diagnoses. For example, clinical diagnosis of vulvovaginal candidiasis has a sensitivity of 93.75% and specificity of 89.29%, while the clinical diagnosis of non-specific vaginitis shows lower sensitivity (66.67%) and specificity (80%).

Table 4: Pathogen Distribution in Mixed Infections

Pathogen(s)	Frequency (%)
Candida albicans+ Gardnerella vaginalis	7 (7%)
Candida albicans+Trichomonas vaginalis	4 (4%)
Gardnerella vaginalis+Trichomonas vaginalis	3 (3%)
Candida albicans+Gardnerella vaginalis+Trichomonas vaginalis	1 (1%)

This table summarizes the distribution of pathogens found in mixed infections, where >one pathogen was identified. The most common mixed infection involved Candida albicans and Gardnerella vaginalis (7%), followed by combinations of Candida albicans and Trichomonas vaginalis (4%) and Gardnerella vaginalis with Trichomonas vaginalis (3%). A smaller proportion of cases involved all three pathogens (1%).

Table 5: Prevalence of Risk Factors for Vulvovaginitis

Risk Factor	Frequency (%)
Sexual Activity	60 (60%)
Antibiotic Use (recent)	40 (40%)
Diabetes Mellitus	25 (25%)
Pregnancy	15 (15%)
Poor Hygiene	35 (35%)

This table outlines the prevalence of various risk factors associated with vulvovaginitis among the study participants. Sexual activity was the most common risk factor, reported by 60% of the participants, followed by recent antibiotic use (40%) and poor hygiene (35%). A smaller proportion of participants had diabetes mellitus (25%) and were pregnant (15%).

This study aimed to compare the clinical diagnosis with the microbiological diagnosis of vulvovaginitis, assess diagnostic accuracy and explore the prevalence of common pathogens and associated risk factors. The findings of our study are discussed below, with comparisons. In our study, the clinical diagnosis based on symptoms and physical examination was compared to microbiological testing using cultures and molecular methods (PCR, wet mount and Gram staining). We found that clinical diagnosis had high sensitivity (93.75%) and specificity (89.29%) for vulvovaginal candidiasis. This is in line with studies like those by Sustr[9], which reported that clinical diagnosis based on symptoms such as vaginal discharge and itching is accurate in diagnosing Candida albicans infection, but can lead to mis diagnoses due to the overlap in symptoms with other conditions, such as bacterial vaginosis (BV) or trichomoniasis. However, clinical diagnosis for bacterial vaginosis and trichomoniasis showed relatively lower specificity (80% and 75%, respectively). Studies such as Karolina[10] have noted that clinical criteria for BV, like the presence of a homogenous discharge or a positive "whiff test," are often unreliable for distinguishing it from other infections. Moreover, trichomoniasis, which often presents with non-specific symptoms such as a frothy discharge, was also mis diagnosed clinically in some cases. This is consistent with the findings of Modak[11], who reported that clinical diagnosis of trichomoniasis using symptom-based criteria had a sensitivity of only 65% and specificity of 85%. Our study also revealed that the clinical diagnosis was less accurate for non-specific vaginitis (66.67% sensitivity and 80% specificity), similar to the findings of Dermendzhiev[12], who found that non-specific vaginitis often lacks distinct clinical features, making it more challenging to diagnose accurately based on clinical signs alone. Micro

biologically, we found that the most common pathogens causing vulvovaginitis were Candida albicans (32%), Gardnerella vaginalis (28%) and Trichomonas vaginalis (17%), with a few cases of mixed infections. These findings are consistent with previous studies, such as Khedkar[13], who reported that Candida and Gardnerella are the most common pathogens associated with vulvovaginitis. In a study by Money[14], Gardnerella vaginalis was identified as the most frequent pathogen in women with bacterial vaginosis, accounting for up to 60% of cases. The prevalence of Trichomonas vaginalis in our study (17%) is also similar to other studies such as Coleman[15], which found that T. vaginalis was responsible for 10-20% of cases of vaginitis. Interestingly, our study also identified a significant proportion of mixed infections (15%), which is a crucial finding. Mixed infections are common in vulvovaginitis, as reported by Wenhui[16], who found that 20% of patients with vulvovaginitis had mixed infections, particularly combinations of Candida and Gardnerella or Trichomonas. This highlights the complexity of diagnosing vulvovaginitis, as mixed infections can present with overlapping symptoms, complicating both clinical diagnosis and treatment. The sensitivity and specificity of clinical diagnosis in our study varied by infection type. For instance, clinical diagnosis of Candida albicans had a sensitivity of 93.75% and specificity of 89.29%, while Trichomonas vaginalis showed a lower sensitivity of 75% and specificity of 82%. These results reflect the diagnostic challenges associated with vulvovaginitis. As noted by Andrea[17], clinical diagnosis of Candida infections tends to be more reliable due to its characteristic symptoms, such as thick white discharge and itching, whereas Trichomonas often lacks clear signs and may be easily mis diagnosed. The overall diagnostic accuracy in our study (85%) is comparable to studies such as Pepe[18], who found that combining clinical examination with laboratory testing improved diagnostic accuracy for vulvovaginitis. Our study also supports the importance of microbiological confirmation in cases of suspected bacterial vaginosis and trichomoniasis, as clinical diagnosis alone is often insufficient. In our study, sexual activity (60%), recent antibiotic use (40%) and poor hygiene practices (35%) were identified as the most common risk factors for vulvovaginitis. These findings are consistent with those of Subitha[19], who reported that sexual activity increases the risk of acquiring infections like Trichomonas and Gardnerella, while Antibiotic use disrupts the normal vaginal flora, making women more susceptible to Candida overgrowth. Similarly, Fethers[20] emphasized the role of sexual activity and poor hygiene as significant risk factors for bacterial vaginosis. The association between underlying health conditions, such as diabetes mellitus, and vulvovaginitis was also explored in our study, with diabetes reported in 25% of the participants. Celia[21] highlighted that women with diabetes are more prone to recurrent Candida infections, which may be linked to higher glucose levels promoting fungal growth.

Study Limitations:

- The study was conducted at a single center, which may limit the generalizability of the findings.
- The microbiological diagnosis may have limitations based on the sensitivity of the tests used, particularly in detecting less common pathogens or mixed infections.

CONCLUSION

The study reveals significant differences in the diagnostic accuracy, sensitivity and specificity of clinical and microbiological diagnoses of vulvovaginitis. Clinical diagnosis, based on symptoms and physical examination, offers a quick and accessible approach but has lower sensitivity and specificity compared to microbiological testing. The study emphasizes the importance of microbiological testing for confirming diagnosis and guiding treatment, especially in cases of mixed infections or atypical presentations. Common risk factors, such as sexual activity, antibiotic use and poor hygiene, contribute to the incidence of vulvovaginitis. The study recommends a combination of clinical assessment and microbiological testing for accurate vulvovaginitis diagnosis, reducing mis diagnosis and minimizing infection recurrence. Future research with larger and more diverse populations is needed to refine diagnostic protocols and explore additional risk factors.

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