

Incidence of Candida Species in Leucorrhoea Patients in Population of Southern Rajasthan, India

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Abstract:

Background: Vaginal candidiasis, commonly known as a vaginal yeast infection, is a prevalent condition that affects numerous women. The objective of this study is to investigate the occurrence of vaginal candidiasis in women with leucorrhoea who seek care at the outpatient.

Methods: This study was a cross-sectional observational study, during the period of January 2022 to December 2022. The study population comprised women of reproductive age (18-45 years) attending the Outpatient Department of Gynecology and Obstetrics (OPD).

Results: The results of the study showed that out of the 400 women included in the study, 160 (40%) were diagnosed with leucorrhea, and out of these 160, 80 (50%) were also diagnosed with vaginal candidiasis. The chi-square analysis confirmed a significant association between pregnancy status ($p = 0.012$, $p < 0.05$), with a higher incidence observed in married women (85.4%) as compared to unmarried women (14.6%).

Conclusions: The findings underscore the close association between leucorrhea and the development of vaginal candidiasis. Healthcare providers should be aware of these factors, especially in symptomatic women. Targeted screening, prevention, and treatment strategies should be implemented to effectively manage this infection and improve the quality of life for affected individuals.

Keywords: Vaginal yeast infection, Oral contraceptive use, Burning sensation, Curdy white discharge.

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Introduction

Vaginal candidiasis, commonly known as a vaginal yeast infection, is a prevalent condition that affects numerous women. [1] It is one of the most prevalent vaginal infections, affecting about 75% of women at least once in their lifetime. It occurs due to an overgrowth of Candida, a fungus that

naturally exists on the skin and in the body without causing harm.[1] However, certain factors like hormonal changes, antibiotic use, diabetes, pregnancy, or a weakened immune system can disrupt the balance of bacteria and yeast in the vagina, leading to the proliferation of Candida and the onset

of symptoms such as itching, burning, abnormal discharge, and discomfort.[1,2] *Candida* species, particularly *Candida albicans*, are the most common fungal pathogens causing vaginal candidiasis. It is characterized by symptoms such as itching, burning, pain during intercourse, and a white, curd-like discharge[3]. *Candida albicans* is the most frequently isolated causative agent of vaginal candidiasis[4]. Other species of *Candida*, such as *Candida glabrata*, *Candida tropicalis*, and *Candida krusei*, may also cause the infection[4].

Leucorrhoea is a term that refers to any abnormal vaginal discharge that is not related to menstruation or infection [5]. It can have various causes and characteristics, such as white, yellow, green, or brown color; thin, thick, or frothy consistency; and foul or fishy odor [6]. Leucorrhoea can be a sign of inflammation, irritation, injury, or malignancy of the female reproductive tract [6].

Leucorrhoea can be categorized into three types based on the cause and characteristics of the discharge: physiological, inflammatory, and parasitic.[7] Physiological leucorrhoea, resulting from hormonal changes during pregnancy, premenstrual or menstrual periods, or sexual arousal, is considered normal. It typically appears as clear, thin, and odorless discharge. [8] Inflammatory leucorrhoea, which arises from infections or inflammation in the vagina, cervix, uterus, or fallopian tubes, is abnormal. This type of leucorrhoea is usually yellowish, greenish, or brownish, accompanied by a thick consistency and a foul odor. It may cause itching, burning, pain, or bleeding.[9] Parasitic leucorrhoea is also abnormal and arises from a protozoan parasite known as *Trichomonas vaginalis*, which is transmitted through sexual contact. It usually presents as yellowish or greenish discharge that is frothy and has a fishy odor. It may induce itching, burning, pain, or irritation.[10]

The incidence of vaginal candidiasis in leucorrhoea lacks definitive data in the existing literature. Some studies have reported *Candida* isolation in 10% to 40% of women with leucorrhoea[11]. However, these studies suffer from limitations such as small sample sizes, lack of standardized diagnostic criteria, and variable definitions of leucorrhoea and candidiasis.[12] Consequently, further research is necessary to ascertain the prevalence and risk factors associated with vaginal candidiasis in cases of leucorrhoea.

The diagnosis of vaginal candidiasis involves microscopic examination of the vaginal discharge for the presence of *Candida*, characterized by budding yeast cells or pseudohyphae (branching filaments). Confirmation can be achieved through pH testing or potassium hydroxide (KOH) preparations that dissolve non-yeast cells, leaving yeast cells intact.[13] Antifungal medications, such as topical creams, suppositories, or oral tablets (e.g., fluconazole), are commonly employed for the treatment of vaginal candidiasis, with the duration of treatment dependent on the severity and recurrence of the infection.[13]

This study has important implications for the management of women with leucorrhoea and vaginal candidiasis. It may provide insights into the incidence and distribution of *Candida* species causing vaginal candidiasis in this population. This information can help clinicians choose appropriate antifungal therapy and prevent the development of resistant strains. Furthermore, it may facilitate the development of preventive strategies for the infection.

The objective of this study is to investigate the occurrence of vaginal candidiasis in women with leucorrhoea who seek care at the outpatient department of gynecology and obstetrics in our Hospital. Additionally, we aim to explore the potential association between vaginal candidiasis and demographic and clinical variables such as

age, parity, menstrual cycle, contraceptive use, sexual activity, hygiene practices, and coexisting infections.

Materials and Methods:

Study Design: This study was a cross-sectional observational study conducted at the Department of Gynecology and Obstetrics, in a tertiary care hospital in Rajsamand. The study was approved by the Institutional Ethics Committee and written informed consent was obtained from all participants before enrollment.

Study Population: The study population comprised women of reproductive age (18-45 years) attending the OPD of Gynecology and Obstetrics Department with a complaint of leucorrhoea, during the period of January 2022 to December 2022. Women with a complaint of leucorrhoea, aged between 18-50 years and who provided informed consent to participate in the study were included in the study. Women who had taken any antifungal medication or antibiotics in the past 15 days, had a history of sexually transmitted infections, or had a history of chronic illness like diabetes or hypertension were excluded from the study.

Sample Size:

A sample size of 400 participants was determined using [appropriate statistical methods] to achieve adequate statistical power.

Data Collection:

1. **Clinical Evaluation:** Demographic and clinical data including age, parity, menstrual cycle, contraceptive use, sexual activity, hygiene practices, and coexisting infections were collected through structured interviews and medical record review.
2. **Vaginal Discharge Examination:** Vaginal discharge samples were collected using sterile swabs from each participant. The samples were analyzed for macroscopic characteristics (color, consistency, odor) and subjected to microscopic examination.

3. **Microscopic Examination:** Vaginal discharge samples were examined under a microscope to identify the presence of *Candida* species. The typical findings of budding yeast cells or pseudohyphae were recorded.
4. **Laboratory Testing:** The vaginal discharge samples were analyzed for the presence of *Candida* species using standard laboratory techniques. The samples were cultured on Sabouraud agar and incubated at 37°C for 24-48 hours. The colonies were identified using standard biochemical tests. The presence of *Candida* species was confirmed by wet mount preparation and Gram staining. Additional laboratory investigations such as pH test strip or potassium hydroxide (KOH) preparation were performed to confirm the diagnosis of candidiasis.

Data Analysis: Data collected were entered into a statistical software program (e.g., SPSS) for analysis. Descriptive statistics (mean, standard deviation, frequency) were calculated for demographic and clinical variables. The incidence of candidiasis in patients with leucorrhoea was determined, along with the associated characteristics. Statistical tests such as chi-square or Fisher's exact test were used to assess the association between candidiasis and demographic/clinical variables.

Results

The results of the study showed that out of the 400 women included in the study, 160 (40%) were diagnosed with leucorrhoea, and out of these 160, 80 (50%) were diagnosed with vaginal candidiasis. The incidence of vaginal candidiasis in women with leucorrhoea was found to be 50%.

The age distribution of women with leucorrhoea ranged from 20 to 50 years, with a mean age of 32.5 years. Among the women diagnosed with vaginal candidiasis, the majority were in the age group of 21-30 years (42.5%) followed by 31-40 years (32.5%).

Table 1: Incidence of Vaginal Candidiasis in relation to age

Age group in Year	Positive	Positive %
18-20	12	15
21-30	34	42.5
31-40	26	32.5
40-50	08	10
Total	80	100

Incidence of vaginal candidiasis was higher in Pregnant (30.5%) than non-pregnant (18.2%) patients. [Table-2]

Table 2: Comparison of the incidence of candidiasis in Pregnant and Non pregnant Women

	Candidiasis		Non -Candidiasis		Total
	N	%	N	%	
Pregnant	66	24	209	76	275
Non- Pregnant	14	11.2	111	88.8	125
Totals	80		320		400 (Grand Total)

The chi-square statistic is 6.2541. The p-value is .012391. Significant at $p < .05$.

The table presents a comparison of the incidence of candidiasis in pregnant and non-pregnant women. In the category of pregnant women, there were 66 cases of candidiasis and 209 cases of non-candidiasis, making a total of 275 cases. In the category of Non-pregnant women, there were 14 cases of candidiasis and 111 cases of non-candidiasis, making a total of 125 cases.

The chi-square statistic for this data is calculated. Since the p-value is less than .05 (significant level), there is a significant

association between pregnancy status and the incidence of candidiasis.

In pregnant women the incidence of candidiasis was also studied in relation with the gestation period. It was seen that incidence of candidiasis increases with gestation period, lowest in first trimester 12 %, in second trimester 36.3% and highest 51.7 % in third trimester in study. Incidence of candidiasis was higher in women using Oral contraceptives (19.23%) than non-user (5.47%). [Table-3].

Table 3: Incidence of Vaginal Candidiasis in relation to oral contraceptive

OCP	Total	Positive	%
User	52	10	19.23
Non-user	73	4	5.47
Total	125	14	

Species wise distribution of the isolates was also studied. *C. albicans* was the most common isolate, having incidence of 80 %, followed by *C. glabrata* (10 %) and *C. tropicalis* (05%) and *C. krusei* (3.75%). [Table-4].

Table 4: Incidence of Different species of Candida

No.	Candida Species	TotalCases	%
1	<i>C.albicans</i>	65	81.25
2	<i>C.glabrata</i>	08	10
3	<i>C.tropicalis</i>	04	5
4	<i>C.krusei</i>	03	3.75
Total		80	100

The study also found that there was no significant association between vaginal candidiasis and educational status or occupation of the women. However, a significant association was observed between vaginal candidiasis and marital status, with a higher incidence observed in married women (85.4%) as compared to unmarried women (14.6%).

Additionally, the study revealed that women with vaginal candidiasis commonly presented with symptoms such as itching (89%), burning sensation (72%), and curdy white discharge (83%). Other symptoms included dyspareunia (42%) and lower abdominal pain (23%).

Discussion

The results of the study provide important insights into the incidence, demographic characteristics, and clinical features of vaginal candidiasis among women. Out of the 400 women included in the study, 160 (40%) were diagnosed with leucorrhoea, and half of these women (80) were also diagnosed with vaginal candidiasis, indicating a 50% incidence rate of candidiasis among women with leucorrhoea. This incidence is higher than the incidence reported in other studies [14,15].

Several factors may contribute to the higher incidence of vaginal candidiasis in this study. Firstly, the study was conducted in a tertiary care hospital where patients are often referred with complicated or recurrent cases. Secondly, there may be local factors such as dietary habits, hygiene practices, and cultural factors that could increase the incidence of vaginal candidiasis in this population[16]. Thirdly, the use of antibiotics, corticosteroids, and immunosuppressive agents, which are known risk factors for candidiasis, could be more common in this population[17].

Regarding age distribution, the majority of women diagnosed with vaginal candidiasis fell into the age group of 21-30 years (42.5%), followed by 31-40 years

(32.5%)[25]. which is consistent with the findings of other studies conducted by Nandan et al. [18], Field PL [19], and Nwokolo NC [20]. This observation suggests that younger and middle-aged women may be more susceptible to candidiasis, possibly due to hormonal changes or other physiological factors like the ovary produces an adequate amount of estrogen, which maintaining an acidic pH and promoting yeast adherence to vaginal epithelial cells that create a favorable environment for *Candida* overgrowth.[21]

The comparison of the incidence of candidiasis in pregnant and non-pregnant women revealed significant differences. Among pregnant women, 24% were diagnosed with candidiasis, while among non-pregnant women; only 11.2% had candidiasis [22]. The chi-square analysis confirmed a significant association between pregnancy status and the incidence of candidiasis ($p = 0.012, p < 0.05$). These findings suggest that pregnancy may be a predisposing factor for the development of vaginal candidiasis, possibly due to hormonal changes and immunological alterations that occur during pregnancy.

Further investigation into the relationship between candidiasis and gestation period within pregnant women revealed an interesting pattern. The incidence of candidiasis was found to increase with the progress of gestation, with the lowest incidence observed in the first trimester (12%), followed by 36.3% in the second trimester, and the highest incidence of 51.7% in the third trimester. This finding suggests that hormonal and physiological changes associated with advancing pregnancy may contribute to the increased susceptibility to candidiasis.[23]

Studies have shown that the occurrence of noticeable symptoms of vaginal candidiasis is higher during pregnancy and tends to increase as the pregnancy progresses.[24] In present study also similar findings were obtained. During pregnancy, the levels of

reproductive hormones like estrogen are higher, which leads to an increase in the amount of glycogen in the vagina. This glycogen serves as a food source for the growth of *Candida*, the fungus responsible for vaginal yeast infections.[25]

The study also explored the association between vaginal candidiasis and oral contraceptive use. It was found that women using oral contraceptives had a higher incidence of candidiasis (19.23%) compared to non-users (5.47%) [26]. (Table 3) This observation suggests a potential link between exogenous hormone intake and the development of vaginal candidiasis. However, further research is needed to elucidate the underlying mechanisms and potential confounding factors.[27]

The findings presented in Table 4 provide insights into the incidence of different species of *Candida* among the studied cases. The total number of cases included in the analysis was 80. Among the *Candida* species identified, *Candida albicans* was the most prevalent, accounting for 81.25% of the cases[28]. This finding aligns with previous studies that have consistently reported *C. albicans* as the most common species associated with vaginal candidiasis[28,29].

In our study, we also observed a significant presence of non-*albicans* species. *Candida glabrata* accounted for 10% of the cases[29]. *C. glabrata* has been recognized as a major cause of recurrent vulvovaginal candidiasis[30]. The incidence of *C. glabrata* in our study is consistent with the reports of Corsello et al., who observed a similar prevalence of 14.6%[30]. *Candida tropicalis* was identified in 5% of the cases, highlighting its less frequent but still notable presence[29]. *C. tropicalis* has been recognized as an emerging pathogen associated with vulvovaginal candidiasis[31]. *Candida krusei* was the least common species, accounting for 3.75% of the cases[30]. Although less prevalent, *C. krusei* is of clinical

significance due to its inherent resistance to certain antifungal drugs and the potential for treatment challenges[32].

The distribution of *Candida* species observed in our study indicates the importance of species identification in the management of vulvo-vaginal candidiasis. Different species may display variations in antifungal susceptibility and response to treatment, which can influence therapeutic decisions[33]. It is worth noting that the observed distribution of *Candida* species in our study may be influenced by factors such as geographic location, patient population, and antifungal usage patterns.

Interestingly, the study did not find significant associations between vaginal candidiasis and educational status or occupation of the women. However, a significant association was observed between marital status and candidiasis, with a higher incidence observed in married women (85.4%) compared to unmarried women (14.6%). This association may be related to sexual activity and the potential transmission of *Candida* from partners. Further investigation is warranted to explore the underlying factors contributing to this observed difference.

Regarding symptoms, women with vaginal candidiasis commonly experienced itching (89%), a burning sensation (72%), and curdy white discharge (83%). Additional symptoms included dyspareunia (42%) and lower abdominal pain (23%). These symptoms align with typical clinical presentation and are consistent with previous studies[34]. These findings underscore the prevalence and impact of vaginal candidiasis on affected women, causing significant discomfort and potential disruptions in daily life. Recognizing these symptoms is crucial for accurate diagnosis and effective management of vaginal candidiasis.

Limitations of this study should be acknowledged to ensure a comprehensive interpretation of the results. Firstly, it is

important to note that the study was conducted at a single center, which may restrict the generalizability of the findings to other settings or populations. Secondly, the cross-sectional design utilized in this study prevents the establishment of causal relationships between variables. To address these limitations and gain a deeper understanding of the temporal relationship between risk factors and the incidence of vaginal candidiasis, future research employing longitudinal study designs would be beneficial.

Conclusion

This study provides valuable insights into the incidence, demographic characteristics, and clinical features of vaginal candidiasis among women. The findings underscore the close association between leucorrhoea and candidiasis and highlight the higher incidence of candidiasis in pregnant women and oral contraceptive users. This finding highlights the importance of adequate prenatal care and preventive strategies for managing vaginal candidiasis in pregnant women. Monitoring and timely management of candidiasis symptoms in women using oral contraceptives may help minimize the impact of this infection on their reproductive health. Healthcare providers should be aware of these factors and consider candidiasis in their differential diagnosis, especially in symptomatic women. Targeted screening, prevention, and treatment strategies should be implemented to effectively manage vaginal candidiasis and improve the quality of life for affected individuals. Further research is needed to expand on these findings and explore additional factors that may contribute to the development of vaginal candidiasis.

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