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PREVALENCE OF VULVOVAGINAL INFECTION AND INVESTIGATIONS ON RISK FACTORS IN PATIENTS FROM CENTRAL INDIA

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ABSTRACT

Introduction: Vulvovaginal candidiasis (VVC) is an opportunistic, second most common mucosal fungal infection to vagina at reproductive age. Knowledge about its causes and the most common risk factors is limited in India, particularly in rural regions. **Objective:** A cross section study was performed to study the prevalence of VVC infection and its species specific distribution. **Methodology**: A total no of 200 patients in the reproductive age group (18-49 years) fulfilling the clinical criteria of VVC are included in this study. Three vaginal swabs were taken; one swab was used for KOH wet mount, other for gram staining and the third for culture on Sabouraud's dextrose agar incubated aerobically at 37 °C for 48 hours. **Results:** VVC was found in 33% of patients. Most susceptible age group form this were 21-30 years followed by 31-40 years. Rate of VVC was also found more in females from rural area, low education, non-working, married and pregnant worman. Non-albican VVC is also more than the C. albicanc VVC. Disease conditions such as diabetes, use of contraceptive devices or pills and previous incidence of VVC also showed more chance of VVC. **Conclusion:** VVC has multiple risk factors and it is very important to identify those. Identifying the causative microorganism during clinical diagnosis may help in proper therapeutic management of VVC. In addition, guidance on personal care and self-

dentification of symptoms and reporting it on time to near-by physicians may help in the prevention of this infection in females from rural areas of India.

Keywords: Vulvovaginal candidiasis, *Candida albicans*, Prevalence, Central India, Risk factors

INTRODUCTION

Vulvovaginal candidiasis (VVC) is an opportunistic mucosal fungal infection and the second most common vaginal infection affecting women of reproductive age.[1] Approximately 75% of the female population experience VVC at least once in their lifetime and up to 50% of them suffer from recurrent candidacies.[2,3] The clinical symptoms and manifestations of VVC include cottage cheese-like vaginal discharge, swelling, pruritus, pain, irritation, burning sensation, dyspareunia, and dysuria of the lower genital tract.[1,4] VVC is caused by uncontrolled overgrowth of candida yeast species. Risk factors for VVC are pregnancy, uncontrolled diabetes, use of antibiotics, oral contraceptive, immune suppression status, over use of perfume and use of contraceptives.[5]

Several studies have shown that prevalence of *Candida* among pregnant women is higher than that in nonpregnant women, and it tends to increase with the progression of the pregnancy.[3,6] Some emerging data have also suggested that VVC during pregnancy might be associated with increased risk of complications, such as premature rupture of membranes, preterm labor, chorioamnionitis, and congenital cutaneous candidiasis.[7] According to most reports, *C. albicans* is responsible for the largest number of VVC, contributing to 85-90% of symptomatic episodes of vaginal candidiasis.[8] Non-*albicans candida* species, including among others *C. glabrata*, *C. tropicalis*, and *C. krusei*, are now emerging as identifiable causes of VVC and differ considerably with regard to epidemiology, virulence, and antifungal drug susceptibility.[9,2,10] *C. albicans* has been documented to be the major cause of VVC, but the proportion of non-albicans *candida* species appears to be increasing in last few decades.

MATERIALS AND METHODS

Sampling criteria

This study was carried out in the Department of Microbiology, RKDF Medical College & Research Center, Bhopal, a tertiary care hospital of central India between February 2018 to March 2019. All female patients in the reproductive age group (18-49 years) fulfilling the clinical criteria of VVC i.e. those with vaginal discharge, irritation, itching with or without pain and willing to give consent for the study were included in the study. Patient with on antimicrobial

therapy, menstruating were excluded from the study.

Specimen collection and and microbiological tests

Three high vaginal swabs were collected from each patient using sterile cotton-tipped swabs. Collected specimen was transported immediately (within 30 minutes) to the laboratory in sterile tubes without using transport media. One swab was used for wet mount and second one for Gram staining.[11] Third swab was used for culture on Sabouraud's Dextrose agar (SDA). Inoculated SDA culture tubes were incubated at 25°C for three to four days. Identification of culture growth was done by colony characteristics for candida (smooth, white to cream coloured colonies). Gram's staining (round to oval Gram positive budding yeast cells with or without pseudo-hyphae were considered as positive for candida). Germ tube test was carried out as a confirmatory test for Candida spp. For species identification Chlamydospore formation, sugar fermentation test, growth on CHROM agar was performed.

RESULTS

Demographic characteristics

A total 200 high vaginal swabs were collected in present study. High vaginal swabs were analysed for both candida albicans and non-albicans candida. Amongst 33% (66) swabs were positive for candida on culture and 67% (134) swabs were negative. The prevalence of VVC was found 33% **(Figure 1)**.

Maximum candida positive cases were seen in females in the age group of 21-30 (41.17%) followed by 31-40 years (28.37%) and 41-50 years (21.2%). We observed that rate of VVC was significantly decreased after 40 years of age ($P<0.01$) **(Table 2)**. Age group 21-30 has maximum number (35%) of positive patients followed by 31-40 years (21%) and 41-50 years (7%). After the age of 30 years prevalence of candidiasis was moderately decreased.

Sociodemographic factors of VVC

Table 3 further elaborates about the prevalence of VVC in different categories of female patients. The distribution of VVC is 60.6% in rural population as compare to 39.4% in urban population. In illiterate patients infection rate was 43.9% and rate was found to be decreased as education level is increased (27.2%, 19.6% and 9% in patients with primary education, secondary education and who attend college, respectively). The working female showed less prevalence of VVC (21.2%) as compared to housewives (78.7%). Similarly, married women showed higher prevalence (86.3%) than unmarried (13.6%). Pregnancy has also affected rate rate of VVC. In pregnant female this was

46.1% as compared to non-pregnant female (31.7%).

Causative microorganism for VVC

In patients who were infected with VVC (n=66, **Figure 2A**), we have identified the causative microorganism for the VVC. *C. albicans* mediated VVC was found in 24 females (36%) and rate of non-albicans VVC was 64% (n = 42) of total case suggesting the significant difference in the prevalence (P<0.001) **(Figure 2B)**. Causative microorganism was identified on the basis of colony characteristics, morphology on corn meal agar, germ tube and chlamydospore formation, fermentation and assimilation reactions. Frequency distribution of candida species in positive culture showed that the most common species were *C. albicans* (36.6%) followed by *C. tropicalis* (24.2%), *C. glabrata* (21.%), *C. dublinensis* (9%), *C. parapsilosis* (6%) and *C. krusei* (3%) **(Figure 2C)**.

Other risk factors such as disease conditions (we selected status of diabetes), intrauterine contraceptive devices (IUCD), use of oral contraceptive (OC) pills and previous incidence of VVC were also analysed **(Figure 3)**. VVC infection was more in diabetic females (30.3%), followed by those who were previously infected with VVC. Some instances were also related to IUCD (24%) and OC pills use (18%).

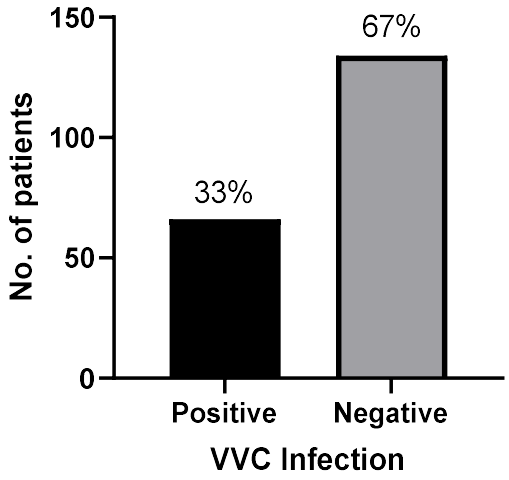

Figure 1: Vaginal swabs were collected from patients and level of *candida albicans* and non-*albicans candida* were analysed. Based on the results swabs were classified as either positive or negative

Table 1: Age-wise distribution of vulvovaginal candidiasis in women

Age Group	Subjects (n=200)	Candida +ve (n=66)	% Prevalence
Up to 20	08	03	37.5
21-30	85	35	41.17
31-40	74	21	28.37
41-50	33	07	21.21

Table 2: Sociodemographic factors responsible for VVC

Demographic factors	Positive, n (%)	Negative, n (%)
Residence		
Urban (n=76)	**26 (39.4)**	**50 (37)**
Rural (n=124)	**40 (60.6)**	**84 (62.6)**
Educational level		
Illiterate (n=84)	**29 (43.9)**	**55 (41)**
Primary (n=52)	**18 (27.2)**	**34 (25.3)**
Secondary (n=42)	**13 (19.6)**	**29 (21.6)**
College/ University (n=22)	**6 (9)**	**16 (11.9)**
Occupation		
Working (n=56)	**14 (21.2)**	**42 (31.3)**
Housewife (n=144)	**52 (78.7)**	**92 (68.6)**
Marital status		
Married (n=155)	**57 (86.3)**	**98 (73.1)**
Unmarried (n=45)	**9 (13.6)**	**36 (26.8)**
Pregnancy		
Pregnant (n=52)	**24 (46.1)**	**28(53.8)**
Non-Pregnant (n=148)	**47 (31.7)**	**101 (68.2)**

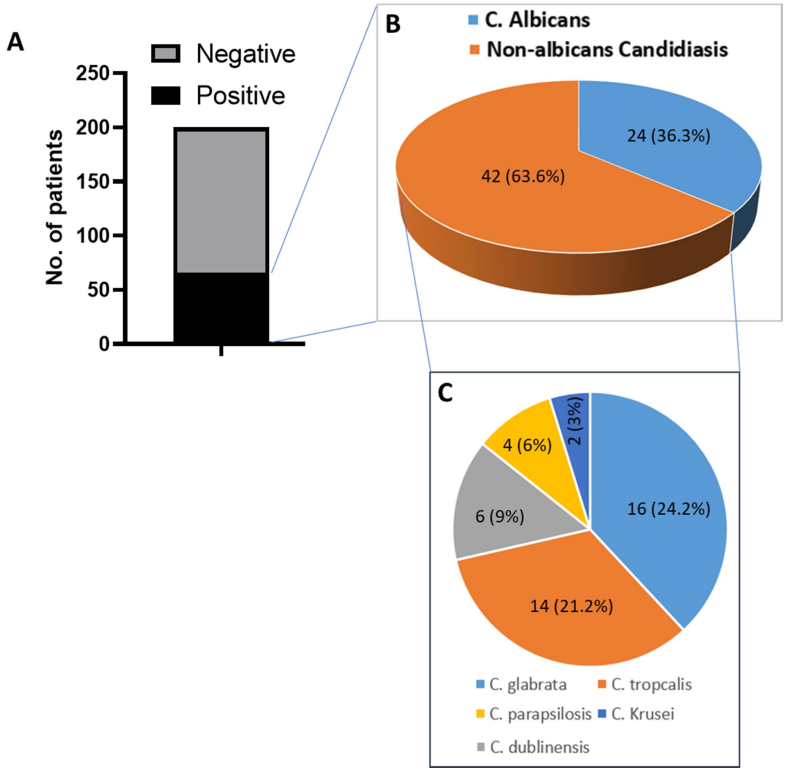

Figure 2: Represents number of positive patients for vulvovaginal candidiasis infection (A). Microorganism responsible for the VVC is identified and classified as either albicans or non-albicans (B) and prevalence rate is calculated. Among the non-albicans different strains are identified and rate is measured (C).

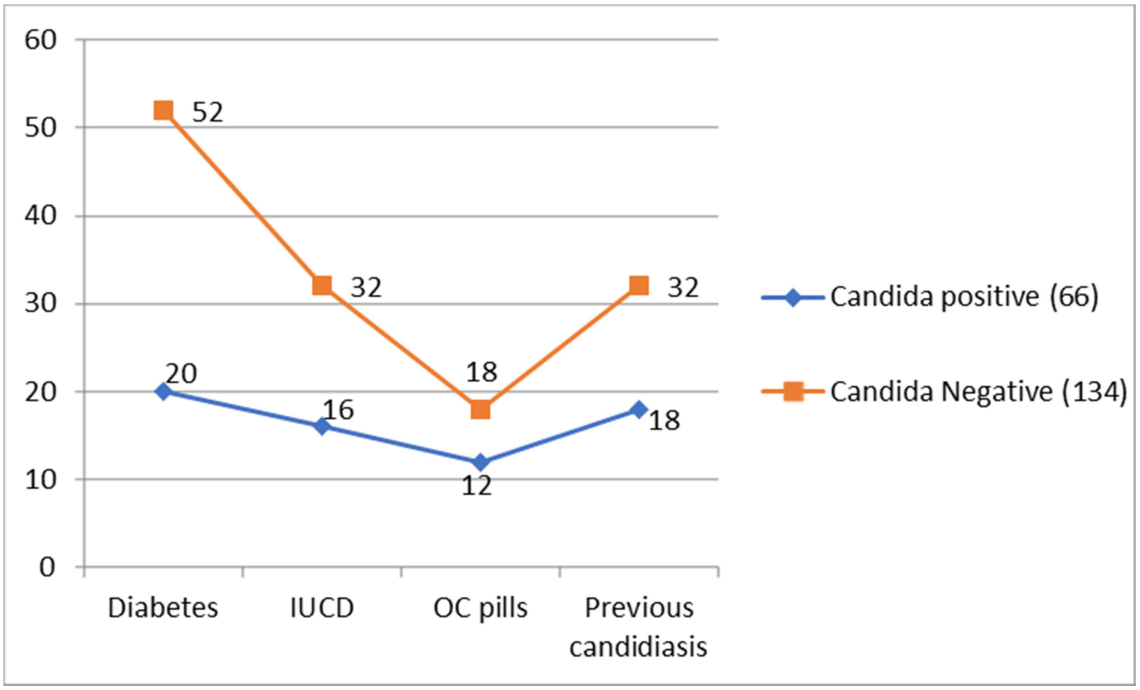

Figure 3: Risk of vulvovaginal candidiasis (VVC) in females suffering with diabetes, who use intrauterine contraceptive devices (IUCD), are on oral contraceptive (OC) pills and who got previously infected with same VVC are measured

DISCUSSION

VVC in the most common fungal infection of lower genital tract in the reproductive age group. In the present study the prevalence of VVC was found in 33% of the symptomatic women similar to reports from Libya (36.1%) and one from India (31.1%).[12] In the present study, the incidence of VVC in age group 21-30 years was 42.5%. Similar prevalence rate of 43.0%[13], 44.89%[14], 73.3%[15], 49%[16], 66.7%[17] was also reported previously in the age group 20-30 years. Women in this age group are mostly multiporus and use contraception which also favours the candidiasis. Age above 40 years reported least infection rate.

On analyzing the predisposing risk factors in the present study we observed that VVC was confirmed in 46.1% of pregnant women ascompared to other risk factors alike earlier reports that indicated pregnancy as common risk factor for VVC.[13,14] In present study, 30.3% of women with diabetes mellitus alone had confirmed VVC and 100% of those who had diabetes mellitus along with bad obstetrics history. Previous studies on diabetic women in developed countries have found widely varying prevalence rates ranging from around 7 to more than 50%[18-20] and most of which were attributed to *C. albicans.*[20] Antibiotics usage is major risk factor (66.5%) followed by IUCD (5.5%) and OCP (4.5%).[21,22]

In the present study *C. albicans* was the commonest species isolated 36.3% among isolates). Earlier report from Egypt (86.6%)[23], Kuwait (73.9%)[24] and Yemen (65.9%)[25] have also reported higher rate of isolation of *C. albicans* in cases of VVC. Non-albicance candidiasis was higher among the isolates than that of *C. albicans* similar to reports published previously.[22,26,27]

CONCLUSION

There are several risk factors that leads to VVC in females. Primarily age, residence and education level are most important to consider to prevent VVC. Identifying the causative microorganism during clinical diagnosis may help in proper therapeutic management of VVC. In addition, guidance on personal care and self-dentification of symptoms and reporting it on time to near-by physicians may help in the prevention of this infection.

Conflict of Interest: None

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