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Epidemiology of Oral and Vaginal Candidiasis

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Abstract: ***Objective: The aim of this study was to determine the prevalence of fungal agents, sex distribution and predisposing factors involved in candidiasis. Methods: The samples from 192 clinically suspected patients of oral and vaginal candidiasis were collected from different clinics of Kurukshetra between September 2010 and August 2011. Results: Mycological examination has revealed the confirmation of oral and vaginal candidiasis in 61.5 and 73.1% resp. of the suspected patients. Pruritus has been found as the most common symptom in vaginal candidiasis. Their infection has been diagnosed clinically on the basis of the following symptoms: itching, white discharge, edema, and erythema of the vulva in case of vaginal candidiasis. It has been found to be more prevalent in females in the age group of 25–40 years, higher incidence occurring after menstruation cycle. Oral candidiasis in the form of thrush (whitish, semi-adherent membranes).The fungi involved in infections belonged to Genus Candidaand its different species. Of these, C.albicansis the dominantone. Conclusion: Finally, we can say higher incidence of oral and vaginal candidiasis may be due to number of reasons. So, keeping in view the high prevalence of candidiasis in India, critical diagnosis of the causative agent by employing aseptic and proper culture techniques and susceptibility testing for proper treatment of this disease is the need of the hour.***

Keywords: *Candida*, oral, vaginal candidiasis, epidemiology

1. Introduction

Candidiasis is an infection caused by species of *Candida*, a dimorphic fungus. Candidiasis encompasses infections that range from superficial, such as oral thrush and vaginitis, to systematic and potentially life-threatening diseases. (Fenn, 2007). Infections due to *Candida* and other yeast have increased dramatically in recent years and are of particular importance because of rising number of immuno-compromised individuals and due to the countless medical advances available in medical sciences for example, transplant surgery, anticancer therapies, broad spectrum antibacterial therapies, medical devices that transverse the protective skin barrier, that extended human life expectancy in addition to certain disease states (e.g. malignancy, HIV infection, diabetes mellitus) (Back-Brito *et al*., 2009; Imamura *et al*., 2008).

To the authors' knowledge, oral and vaginal *Candida* carriage prevalence and aetiology studies have not yet been performed in the northern Haryana, India. Thus, the main objective of this study was to evaluate oral and vaginal *Candida* carriage in patients attending various clinics.

2. Materials and methods

A total of 192 suspected patients with vaginal (147) in females and oral (45) in males candidiasis were enrolled in this study. The samples from suspected patients were collected from different clinics of Kurukshetra and Indri. The age of patients ranged from 10 to 70 years.

Their infection has been diagnosed clinically on the basis of the following predisposing factors, onset and duration of complaints, initial appearance and progression of the lesions, treatment taken, marital status, exposure to sexually transmitted diseases and HIV status in relevant cases also noted. Samples we recollected from oral and vaginal sites aseptically by sterile cotton swabs, brought to the Mycology laboratory and processed immediately to have the exact nature of fungal flora involved.

2.1 Mycological investigations

Mycological investigation of the fungal pathogens involved in oral and vaginal candidiasis was carried out in the Mycology Laboratory, Department of Microbiology, Kurukshetra University, and Haryana. The samples were processed for direct examination of the *Candida* spp. on malt yeast extract agar (MEA) media. For direct microscopic examination, a small portion of the specimen was mounted in 10% KOH and observed microscopically to see the presence or absence of budding cells and the sporulating structures. For selective isolation of a *Candida* spp., the samples were inoculated on four different media: Malt yeast extract agar, Candidchrom agar, Biggy agar, Cornmeal with tween 80 agar. For isolation, sample swab was rolled and inoculated over the surface of agar plates of all the four media and incubated at 25^0 C, 37^0 C and 40^0Cfor 24-48 hrs. The plates were examined for the presence of growth and sporulating structures. Isolation was considered significant only if the fungal growth coincided with the inoculation streaks and same fungus was obtained. The purified isolates were identified on the basis of cultural (colour, exudates, texture of colony) by consulting various books, monographs and identification of yeasts was done on the basis of morphological characteristics in lactophenol cotton blue wet-mount microscopy (presence of budding). All the isolates were purified on MEA plates. Three different species of *Candida* were identified from the patients

3. Results

A total of 192 suspected patients with vaginal (147) in females and oral (45) in males candidiasis were enrolled in this study. The age of patients ranged from 10 to 70 years. The mean age of patients was 39.5, largest number of cases in the 31-40 year old age group (34.6) followed by 41-50 age group (27.7), and 21-30 and 51-60 (12.0) **(Table-1)**

Out of total 147 vaginal samples studied, 108 patients of vaginal candidiasis were found positive, among all, 37 (34.6%) were in the age group of 31-40 years followed by

30 (27.7%) in the age group of 41-50 years, 13 (12.0%) in the age group of 21-30 years, 12 (12.0%) in the age group of 51-60 years and few patients in the age group of 61-70 and 10-20 years. Pregnancy and HIV were factors responsible in 36 (33.3%) and 32 (29.6%) respectively. Prolonged treatment with antibiotics results in 18 (14.8%) followed by diabetic patients 16 (16.6%) and few cases for intake of steroids i.e. 6 (5.5%)**(Table-2).**

Out of total 45 oral samples studied, 26 patients of oral candidiasis were found positive, among all, 9 (34.6%) were in the age group of 10-30 years and 8 (30.7%) in the age group of 31-40 years **(Table-3).**Of all the male patients, 12 (46.1%) were tobacco chewers, 5 (19.2%) were smokers, 4 (15.3%) were drug addictors and 5 (19.2%) were children with oral thrush. A total of 134 samples from vaginal and oral patients were found to be positive, of which 79 (73.1%) were found to be positive for the presence of yeasts during examination **(Table-4).**

A total of 134 samples from vaginal (108) and oral (26) patients were found to be positive, of which 73.4% from vaginal and 57.7% from oral were found to be positive for the presence of yeasts during examination.

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Table 1: Percent infection with vaginal candidiasis (in females) among the patients studied.

Age range (years)	Total no. of samples collected (n=147)	No. of samples (females) +ve with vaginal candidiasis w.r.t. percentages (%) (n=108)
10-20	12	9 (8.3)
21-30	19	13 (12.0)
31-40	45	37 (34.6)
41-50	36	30 (27.7)
51-60	20	12 (12.0)
61-70	15	7 (6.4)

Table 2: Predisposing factors of vaginal candidiasis

Predisposing factors	Total No. of cases	Percentage of infection
Steroids	6	5.5
HIV	32	29.6
Antibiotics	18	14.8
Pregnancy	36	33.3
Diabetes	16	16.6

Table 3: Percent infection with oral candidiasis (in males) among the patients studied.

Age range (years)	Total no. of samples collected (n=45)	No. of samples (males) +ve with oral candidiasis w.r.t. percentages (%) (n=26)
10-20	14	9 (34.6)
21-30	12	9 (34.6)
31-40	19	8 (30.7)

Table 4: Predisposing factors of oral candidiasis

Predisposing factors	Total No. of cases	Percentage of infection
Tobacco chewers	12	46.1
Smokers	5	19.2
Drug addictors	4	15.3
Oral thrush	5	19.2

4. Discussion

Medical progress has led to an expanding population of susceptible hosts with impaired immunological defenses against infection in the community and hospitals. These populations are at heightened risk for many opportunistic fungal diseases including candidiasis. The incidence of fungal infections is increasing at an alarming rate, presenting an enormous challenge to healthcare professionals. In our study, vaginal candidiasis was evident in 73.4% of the suspected patients and oral candidiasis was 57.7% confirming the findings of the other researchers who reported almost similar results such as Nyirjesy, 2008 found vaginal candidias is in 75% patients, Eckert, 2006reportedin 67-80% patients. The most commonly reported clinical symptoms are vulvar irritation or itching, vaginal burn, unusual appearance of vaginal discharge and dyspareunia (Bohbot *et al.*, 2011). In the study of Akortha *et al*., 2009; Saldanha *et al*., 2011 and Srujana *et al*., 2007 revealed the highest incidence rate of candidiasis 48.4%. In our study, the highest frequency of (34.6%) vaginal candidiasis was observed in the age group of (31-40) years. Lower frequency results (6.4%) were obtained in the age group of 61-70 years in our study. The study of Ako *et al*., 1993, supports that vaginal candidiasis occurs most frequently in the age group (20- 35), and the reports of Babin *et al*., 2013 also showed the age group 31-45 years had the highest incidence of vaginal candidiasis.

In a study conducted by Khandhari *et al*, it was found that (20.4%) of *Candida* cases, had diabetes as the risk factor. Katsambas and Papadavid found 30% incidence of vaginal candidiasis in pregnant women included in the study. *Candida albicans*is responsible for 90% of vulvovaginal candidiasis, the remaining 10% corresponds to *C. glabrata* and *C. tropicalis* (Eckert *et al*., 1998). The results of Enweani *et al*, 1998 showed a greater percentage of the vaginal yeast detected in pregnant women (51.5%) compared to non-pregnant women (40.6%) this study showed a significant statistical difference in the results between the two examined groups, which is fully consistent with our findings and proves that pregnancy, as a risk factor, increases the possibility of vaginal candidiasis. Sobel *et al*. 1998, indicated that a number of risk factors enhance the ability of non-*C.albicans* species to cause infections. These include uncontrolled use of antifungal agents in the prevention of *Candida* infections.

Candida spp. have been predominantly isolated from oral cavity of healthy individuals (31%to 55%). Oral candidiasis occurs in 70% of patients infected with humanimmunodeficiency virus (HIV) (Sanguinetti *et al*., 2005). Samaranayake (1994), found the oral prevalence of yeasts to be 24%, with *C. albicans* forming 77% of all yeasts isolated.

The presence of *C. albicans* on the oral mucosa in 66.9% of the studied patients must be considered as a representative high prevalence of this microorganism in persons wearing dental prosthesis. The *C. albicans* carriage (61.7%) is more frequent than that of other species. Even so, the percentage of carriage non-*Candida albicans* species was high (36.4%), which could be explained by the larger percentage

(68.1%) of diabetic patients than other groups, since previous studies associated diabetic patients with oral carriage of a range of *Candida* species (Manfredi *et al*., 2002). Another factor that has influenced this result was age, since 70.3% (64/91) were ±51- years-old. The frequency of *C. albicans* in patients with increasing age decreases while non-*C.albicans* yeasts increases (Qi *et al*., 2005). Previous research suggests that intensity of carriers were greater among older individuals than in a lower age range(15–18 years-old). Besides that, 94.3% (133/141) were dental prosthesis users and in previous research, more diverse yeast species were isolated from the oral cavities of patients with dentures (either full or partial) than from dentate patients (Torres *et al*., 2003).

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