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Vulvovaginal Candidiasis among Women in Makkah City, Saudi Arabia

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Abstract: The most common reason for women to visit their gynecologist is Vaginitis and Vulvovaginal Candidiasis (VVC) is a common cause of vaginal infection in these women. The most common cause of fungal infections are caused by *Candida* sp. which can lead to a range of life-threatening invasive infections as well as non-life-threatening mucocutaneous diseases. Among the *Candida* sp., *Candida albicans* is the most common. *Candida albicans* is a commensal that colonizes the skin, gastrointestinal and reproductive tracts. In addition to *C. albicans*, non-*C. albicans* can also colonize mucocutaneous surfaces and are also emerging as pathogen. Certain vaginal infections can also be a risk for acquiring the human immunodeficiency virus. A total of 491 vaginal swabs were collected from all the women who participated in the study. The age of the patients was from 20-45 years with a mean age of 33 years. Two vaginal swabs were collected from each patient and transported to the microbiology laboratory for processing. The one swab was used for microscopy for wet preparation and gram stain while the other one was used for culture onto Sabouraud's dextrose agar and incubated at 37°C for 24-48 h to see a growth of creamy, greyish moist colonies. Of the 225 positive swabs on culture, 163/225 (72.4%) were positive for *Candida albicans* while 62/225(27.6%) were found to be *Candida* species. Of the 62 that were found to be *Candida* species, 37/62 (16.4%) were *Candida glabrata*, 16/62 (7.1%) were *Candida tropicalis* and 9/62 (4.1%) were *Candida krusei*. Of the 161 pregnant women, 120/161 (74.5%) were positive for *Candida albicans*, 25/161 (15.5%) had *Candida glabrata*, 10/161 (6.2%) *Candida tropicalis* and 6/161 (3.7%) were infected with *Candida krusei*. In conclusion, VVC caused by *C. albicans* as well as non-albicans species of Candida is highly prevalent in the population in Makkah city.

Key words: Vulvovaginal candidiasis, *Candida albicans*, *Candida* species, moist, vaginal

INTRODUCTION

The most common reason for women to visit their gynecologist is vaginitis and Vulvovaginal Candidiasis (VVC) is a common cause of vaginal infection in these women (Yusuf *et al*., 2007). The most common cause of fungal infections are caused by *Candida* sp. (Achkar and Fries, 2010) which can lead to a range of life-threatening invasive infections as well as non-life-threatening mucocutaneous diseases. Among the *Candida* sp. *Candida albicans* is the most common. *Candida albicans* is a commensal that colonizes the skin, gastrointestinal and reproductive tracts. In addition to *C. albicans*, non *C. albicans* can also colonize mucocutaneous surfaces and are also emerging as pathogens. Certain vaginal infections can also be a risk for acquiring the human immunodeficiency virus, an association which has recently been established, the three organisms responsible for vaginal infection are: candidiasis, bacterial vaginosis and trichomoniasis. Bacterial vaginosis has been found to be the most prevailing cause of vaginitis in North America and Northern Europe followed by candidiasis while there is a decline in infections caused by trichomoniasis (Kent, 1991). In the USA and Australia *C. albicans* in symptomatic women is found in approximately 90% of samples. While in Belgium, Turkey and Saudi Arabia it is approximately around 65% (Pirotta and Garland, 2006). However, there is lack of information on the prevalence of vaginitis and the major causes of this infection in many parts of the world.

Little amounts of yeast are always present in the vagina and females may become symptomatic if there is an overgrowth of these. The overgrowth of *Candida* species in women which leads to symptoms is due to several factors. These include use of broadspectrum antibiotics and steroids, being in the luteal phase of the menstrual cycle, pregnancy, nulliparity, use of spermicides, uncontrolled diabetes mellitus, high dose estrogens and contraceptives (which include oral contraceptive pills, intrauterinecontraceptive devices, injectable contraceptives like Depo-Provera, jellies, creams, foams, vaginal tablets and cervicalcaps (Monif, 1985). Recent therapy withbroad-spectrum antibiotics such as. The recent use of broad-spectrum antibiotics such as tetracycline, ampicillin and oral

cephalosporin is also considered a risk factor because it eliminates the protective vaginal flora especially lactobacilli (Foxman, 1990). Other factors which may increase yeast infection include: using douches, perfumed feminine hygiene sprays and topical antimicrobial agents and wearingtight, poorly ventilated clothing and underwear. A decrease in the pH of the vagina occurs as a result of the use of contraceptive pills containing oestrogen and progesterone which increase glycogen in the vagina which is converted into lactic acid by lactobacilli. Thus, over growth of *Candida* species occurs due to decreased pH. Vaginal discharge is not always present in patients with VVC and may be minimal. The most frequent symptoms of yeast infection in women are itching, burning and irritation of the vagina. The thick, whitish-grey discharge is typically described as cottage-cheese-like but in some cases it can vary from watery to thick in consistency (Yusuf *et al*., 2007).

During a woman's lifetime, at least 75% of adult women will experience at least one episode of VVC. Of these women, approximately 40-50% will experience further episodes and 5% will experience the recurrent type (RVVC). In contrast, it has been shown that 20-25% of healthy and totally asymptomatic women exhibit positive vaginal secretion cultures for *Candida albicans*. According to Sobel (1997), 80-90% of VVC cases are caused by *Candida albicans* while 10-20% are due to other non-*C. albicans* yeasts (*Candida tropicalis*, *Candida glabrata*, *Candida krusei* and *Candida parapsilosis*). However, in the last few years it seems that there is an increase in non *C. albicans* yeast frequency in certain populations (Consolaro *et al*., 2004).

The aim of the present study was to determine the role of *Candida* species as the causative agents in vulvovaginitis in Makkah city, Saudi Arabia and correlate the findings with possible risk factors.

MATERIALS AND METHODS

This study was carried out in Makkah city during a 3 months period from March to May 2012. A total of 491 vaginal swabs were collected from all the women who participated in the study. The age of the patients were from 20-45 years with a mean age of 33 years. All women who gave a history of taking any anti-fungal agents during the earlier 2 weeks prior to the study were excluded from the study. A verbal consent was obtained from each participant who also completed a questionnaire with demographic data and possible risk factors such as age, pregnancy, diabetes and history of vaginitis, abortion, antifungal use and smoking.

Two vaginal swabs were collected from each patient and transported to the microbiology laboratory for processing. The one swab was used for microscopy for wet preparation and gram stain while the other one was used for culture onto Sabouraud's dextrose agar and incubated at 37°C for 24-48 h to see a growth of creamy, greyish moist colonies. Saline wet mount preparation of thecolony was made to see budding cells and pseudohyphae. The plates were read after incubation and all colonies suspected of having Candida morphology were gram stained. In addition, a germ tube test was done on all isolated colonies and examined by wet preparation after 2 h incubation at 37°C in serum to confirm that they were *Candida albicans*.

Species identification: The species identification was based on germ tube test, sugar assimilation test and sugar fermentation test according to standard methods described earlier (Chander, 2002).

RESULTS AND DISCUSSION

Out of the 491 vaginal swabs collected 225/491 (45.8%) were positive for *Candida* species. While 266/491 (54.2%) were negative. Of the 225 positive swabs on culture, 163/225 (72.4%) were positive for *Candida albicans* while 62/225 (27.6%) were found to be *Candida* species. Of the 62 that were found to be *Candida* species, 37/62 (16.4%) were *Candida glabrata*, 16/62 (7.1%) were *Candida tropicalis* and 9/62 (4.1%) were *Candida krusei* (Table 1).

Of the 225 positive vaginal swabs for *Candida* species, 161/225 (71.6%) were from pregnant women while 64/225 (28.4%) were from non-pregnant women. Of the 161 pregnant women, 120/161 (74.5%) were positive for *Candida albicans*, 25/161 (15.5%) had *Candida glabrata*, 10/161 (6.2%) *Candida tropicalis* and 6/161 (3.7%) were infected with *Candida krusei*. While of those women that were not pregnant, 43/64 (67.2%) were positive for *Candida albicans*, 12/64 (18.8%) had *Candida glabrata*, 6/64 (9.3%) *Candida tropicalis* and 3/64 (4.7%) *Candida krusei* (Table 2).

Table 1: *Candida* species isolated from 225 vaginal swabs

Candida species	Positive (%)
Candida albicans	163 (72.4)
Candida glabrata	37 (16.4)
Candida tropicalis	16 (7.1)
Candida krusei	9 (4.1)

Table 2: Different *Candida* species isolated from pregnant and non-pregnant women (n = 225)

	Number (%) of Candida isolates		
Candida species	Pregnant women	Non-pregnant women	Total
C. albicans	120 (74.5)	43 (67.2)	163
C. glabrata	25 (15.5)	12 (18.8)	37
C. tropicalis	10 (6.3)	6 (9.3)	16
C. krusei	6 (3.7)	3 (4.7)	9
Total	161 (100.0)	64 (100.0)	225

The present study was designed to determine the role of *Candida* species as the causative agents in vulvovaginitis among women in Makkah city, Saudi Arabia and to correlate the findings with possible risk factors. The findings showed that among 491 women who were studied, *Candida* species were isolated from 225 (45.8%) of them. Of the 225 positive swabs on culture, 163/225 (72.4%) were positive for *Candida albicans* while 62/225 (27.6%) were found to be *Candida* species. Of the 62 that were found to be *Candida* species, 37/62 (16.4%) were *Candida glabrata*, 16/62 (7.1%) were *Candida tropicalis* and 9/62 (4.1%) were *Candida krusei* (Table 1). Of the 225 positive vaginal swabs for *Candida* species, 161/225 (71.6%) were from pregnant women while 64/225 (28.4%) were from non-pregnant women. Of the 161 pregnant women, 120/161 (74.5%) were positive for *Candida albicans*, 25/161 (15.5%) had *Candida glabrata*, 10/161 (6.2%) *Candida tropicalis* and 6/161 (3.7%) were infected with *Candida krusei*. While of those women that were not pregnant, 43/64 (67.2%) were positive for *Candida albicans*, 12/64 (18.8%) had *Candida glabrata*, 6/64 (9.3%) *Candida tropicalis* and 3/64 (4.7%) *Candida krusei* (Table 2).

The highest number of women infected with *Candida* species were in the age group 26-30 years of age 57/225 (25.3%) while the least number of infections were in the age groups <21 and >41, of which there were 14/225 (6.2%) in each of the two age groups.

From studies reported in the literature, it has been established that VVC is the most common fungal disease in the world and there is not much information about the distribution and etiology of candidiasis because laboratories do not routinely test for this. In this study, *C. albicans* was found to be the most common infection in 72.4% of the patients with vulvovaginitis. This is in keeping with other studies in which *C. albicans* was also found to be the most common pathogen causing infection (Buscemi *et al*., 2004; Godoy *et al*., 2003; Saporiti *et al*., 2001; Paulitsch *et al*., 2006). The number of *Candida* species (Table 1) was less in the present study than that reported by other researchers who found them to be more common than *C. albicans* (Okungbowa *et al*., 2003).

In the third trimester of pregnancy the incidence of VVC is twice as that in the first and second trimesters and women who suffer more from this condition are multigravida more than primigravida (Limia *et al*., 2004; Omar, 2001). More important is the fact that a large proportion of women with chronicor recurrent Candidiasis come to the clinic with VVC when they are pregnant. Colonization of Candida and the mechanisms by which this occurs iscomplex (Xu and Sobel, 2004). While estrogen reduces the ability of vaginal epithelial cells to inhibit the growth of *Candidia albicans*, it also on the other hand decreases immunoglobins in vaginal secretions this results inincreased susceptibility of pregnant women to vaginal Candidiasis (Fidel, 2005; Wira and Rossoll, 1995). Of the 225 women, 161 were pregnant and 64 were not pregnant. From the pregnant women, 120/161 (74.5%) were positive for *C. albicans*, 25/161 (15.5%) for *C. glabrata*, 10/161 (6.2%) had *C. tropicalis* and 6/161 (3.7%) were positive for *C. krusei*. While in the non-pregnant group of women, 43/64 (67.2%) were positive for *C. albicans*, 12/64 (18.8%) had *Candida glabrata*, 6/64 (9.3%) *Candida tropicalis* and 3/64 (4.7%) *Candida krusei* (Table 2). In this study, 74.5 and 67.2% of pregnant and non-pregnant women were positive for *C. albicans*. These results are in line with other studies in which 74.4% of women in the childbearing age had positive cultures for *C. albicans* while among the *Candida* species *C. glabrata* was the most common non-albicans species 9.1% (Jindal *et al*., 2007). This is in contrast to the results of this study in which *C. glabrata* was found to be slightly higher (15.5%) and was also the most common of the *Candida* species isolated. Other studies have reported incidence of *Candida* species in pregnancy of between 10-50% (Cotch *et al*., 1998; Frerich and Gad, 1977) while others investigators have reported a range of between 18 and 38% (Hardy *et al*., 1984; McDonald *et al*., 1992; Meis *et al*., 1995). Several additional factors like gestational diabetes, frequent antibiotic therapy, HIV status, contraceptives and reproductive hormones also predispose women to acute and chronic VVC (Aslam *et al*., 2008). There was no significant association between positivity for *Candida* species and the possible risk factors investigated such as history of abortion, vaginitis, diabetes or smoking in any of the women that were studied.

Very little new information is available on the incidence and epidemiology of VVC in pregnancy since it has been excluded from been a sexually transmitted infection and is no longer a notifiable disease (Soble *et al*., 1998).

CONCLUSION

VVC caused by *C. albicans* as well as non-albicans species of Candida is highly prevalent in the population in Makkah city. In addition, the increase in the epidemiology of Candidiasis in pregnant women is a matter of concern. This should prompt researchers to make an accurate diagnosis of this condition. Diagnosis should not only be done on the evidence of clinical grounds or Gram stain/KOH mount alone. Microscopic examination of vaginal secretions or Gram stain together with culture results which is still regarded as the 'Gold standard' should be used for confirmation of VVC.

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