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Prevalence of vulvovaginal candidiasis and its correlation with gestational age and parity in pregnant women at a tertiary care hospital in south India

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Abstract
Introduction: Candida species colonize the vagina in at least 20 % of all women, rising to 30 % in pregnancy and may lead to pregnancy related complications. Several studies have found a high prevalence of both symptomatic as well as asymptomatic vaginal candida infection only during pregnancy. Most episodes of symptomatic Vulvovaginal candidiasis (VVC) occur during the second and third trimesters. The increased risk of VVC in pregnancy is likely sustained by pregnancy-related factors, such as immunologic alterations, increased estrogen levels, and increased vaginal glycogen production. The study aimed to determine the prevalence of VVC among pregnant women attending the antenatal clinic of a tertiary health institution in South India and to emphasize the need for accurate diagnosis and adequate treatment

Materials and methods: This is a 4-month cross-sectional study performed at the Department of Medical Microbiology of the Apollo Institute of Medical Sciences and Research, Chittoor. A total of 160 samples were collected from pregnant women at various periods of gestation by simple random sampling. A pair of high vaginal swabs was collected aseptically from the study subjects which was used for Gram's staining and inoculation into Sabouraud's dextrose agar (SDA). Infection with Candida species was diagnosed by Gram-stained smear and colony growth on SDA and Germ tube test. Statistical analysis was done using SPSS version 21, Chi square test and Fisher's exact test.

Results and Discussion: The frequency of vaginal candidiasis during pregnancy was found to be 25.6%, in which 48.7% were symptomatic and 51.2% were asymptomatic group. 17% of the positive cases had gestational DM. Increased ratio of infection was observed in multigravida and diabetic women which is similar to previous studies. VVC showed a progressive increase with trimester of pregnancy. Candida albicans was the most prevalent species isolated. There were no significant differences in results with respect to age and trimester of pregnancy.

Conclusion: An increased ratio of vaginal candidiasis in multigravida and in diabetic pregnant women requires these women to be routinely screened for vaginal candidiasis regardless of symptomatic status.

Keywords: Vulvovaginal candidiasis, vaginitis, candida albicans, vaginal thrush

1. Introduction

Vulvovaginal candidiasis (VVC) is an inflammation of the vagina and/or vulva in the presence of Candida species and in the absence of any other etiological agent. It is a common infection affecting the quality of life of many women. It is estimated to be the second most common cause of vaginitis after bacterial vaginosis. Approximately 75% of all pregnant women experience at least one episode of VVC during their lifetime and 50% of them suffer recurrent events [1, 2].

The incidence of VVC is doubled in the third trimester of pregnancy and multigravida suffer significantly more than primigravida. Moreover, a significant proportion of women with chronic or recurrent Candidiasis first present with this infection while pregnant [2, 3].

Evidence suggests that VVC in pregnancy may lead to pregnancy related complications such as low birth weight (LBW) and prematurity, preterm delivery, chorioamnionitis, abortion, and congenital infection in the neonate [1, 4-7].

The increased risk of VVC in pregnancy is likely sustained by pregnancy-related factors, such as immunologic alterations, increased estrogen levels, and increased vaginal glycogen production [1, 2, 7]. During pregnancy, levels of both progesterone and estrogen hormones are

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elevated. Progesterone has suppressive effects on the anti-Candida activity of neutrophils, while estrogen have been found to reduce the ability of vaginal epithelial cells to inhibit the growth of Candidia albicans and also decreases immunoglobulins in vaginal secretions resulting in increased vulnerability of pregnant women to vaginal Candidiasis. Increased estrogen level during pregnancy produces more glycogen in the vagina and it also has direct effect on yeast cells, causing it to grow faster and stick more easily with the walls of vagina.

Several additional factors like gestational diabetes, frequent antibiotic therapy, oral contraceptive pills, IUCDs (intrauterine contraceptive device), use of corticosteroids, HIV/AIDS, weakened immune system, topical use of antimicrobial agents, tight clothing, use of vaginal douches and unsanitary living condition also predispose women to acute and chronic VVC [8, 9].

The principal symptoms of VVC are vulvar and/or vaginal pruritus, irritation or burning sensation in the vulval area and a thick curdy white vaginal discharge. However, painful urination and/or dyspareunia are also common [2, 6, 9].

However these clinical signs and symptoms of VVC either individually or collectively are not pathognomonic of the disease. As several other infectious and non-infectious factors may cause identical signs and symptoms, a reliable diagnosis cannot be made on the basis of clinical evidence alone without the corroborative evidence of laboratory tests.

The study aimed to determine the prevalence of VVC among pregnant women attending the antenatal clinic in a tertiary health institution in South India and to determine if any significant association with parity and gestational age and to identify any predisposing factors for VVC in pregnancy.

2. Methodology
This cross-sectional study was conducted at the Department of Medical Microbiology of the Apollo Institute of Medical Sciences and Research, Chittoor, South India, for a period of four months from June 2018- September 2018. The study subjects included pregnant women of all gestational age, both symptomatic as well as asymptomatic who were attending the antenatal clinic for their routine antenatal check-up.

Prior verbal and written consent was obtained from the women before sample collection, and the study was approved by the Institutional ethical committee.

The sociodemographic data of the patients and relevant clinical history including vaginal and urinary symptoms if present, gestational diabetes mellitus, antibiotic use, past contraceptive history were obtained using a pre-structured study proforma.

A total of 160 samples were collected during the study period from the pregnant women at various periods of gestation by simple random sampling.

A pair of high vaginal swabs was obtained from the posterior vaginal fornix of the subjects aseptically with the help of a vaginal speculum. One swab was used for Gram's staining, and the other was inoculated on Sabouraud's dextrose agar (SDA). The specimens were labeled, marked and were immediately transported to the microbiology laboratory for processing. The samples were then cultured according to standard procedures on sterile SDA and chocolate agar which were incubated aerobically at 37°C for 18-48 h. Infection with Candida species was diagnosed by

microscopy of a saline wet mount (which showed multiple pseudohyphae), Gram-stained smear of material from the vagina and colony growth on SDA and chocolate agar. Yeasts are identified in Gram-stained smears as Gram-positive cells. Isolates on the SDA plates were identified and speciated using the germ tube test.

Statistical analysis of the collected data was performed using the SPSS IBM version 21 (IBM Corp., Armouk, NY, USA). The results were expressed in means, percentages, tables, figures and charts. The Chi-square test and Fisher's exact test was used for association at P = 0.05 at 95% confidence interval.

3. Results
Out of the 160 pregnant women sampled, 41 were found to be positive for candidiasis while 119 were negative thus giving a prevalence rate of 25.6 % in the study population. The ages of the women ranged from 18-35 years with a mean age of 28.24 SD±6.14 years. Of 160 patients, 104 (65%) were between the ages of 18-25 and remaining 56 (35%) were between 26-35 years. There was no significant difference with respect to age group (p=0.265). VVC was more prevalent within the age group of 18–25 years 68.3% (28/41).

Among the total number of cases, 66.2 % (106/160) of the patients belonged to low socio-economic status and 33.75% (54/160) were of middle socio-economic status. Out of these, 38 (92.7%) and 02 (4.9%) women positive for candidiasis belonged to low and middle socio-economic respectively.

The parity distribution showed that 71 (44.4%) were primigravida while 89 (55.6%) were multigravida. There was no significant relationship between the parity of the study subjects and the prevalence of VVC as shown in Table 1, even though the multigravida were more affected 78 % (32 /41) than the primigravida 21.9% (09/41), P = 0.453.

Similarly, VVC prevalence was affected by the trimester of pregnancy, as it shows a progressive increase with the duration of pregnancy. (Graph 1) A very high prevalent rate of 65.9% (27/41) was observed in the 3rd trimester of pregnancy compared to a rate of 4.9% (3/41) and 11% in the 1st and 2nd trimesters, respectively. However, this was not found to be statistically significant at P = 0.1.

Amongst the 160 pregnant women, 53 (33.1%) had characteristic symptoms of vaginal candidiasis, while the remaining 107 (66.9%) were asymptomatic. (Table 1) Vaginal discharge was the most common symptom (85.9%), followed by Pruritus (66.1%), soreness (31.1%) and dyspareunia (5.0%). C. albicans was the most prevalent species isolated in 63.4% (26/41) of the women while the rest 36.6% (15/41) were Non-albicans species (NAC) species. (Graph 2)

From the total 160 pregnant women, 7 (4.4%) were diabetic and the remaining 153 (95.6 %%) were non-diabetic. Of the 7 diabetic patients, 6 were symptomatic, 2 among them had positive laboratory diagnoses for fungus (p=0.031), which was significant.

Past history of contraceptive practices could be obtained only from 119 of the study subjects. 73.1% (87/119) of these women reported to have been using either OCP or an IUCD, out of which 19 (67.85%) had VVC whereas only 9 (32.1%) of those reported to have used condom as a contraceptive method were diagnosed with VVC which is a significant difference. (P= 0.029%).

Table 1: Demographic and obstetric characterization of study subjects diagnosed with symptomatic and asymptomatic VVC (n=41)

VARIABLE	GROUP	n= (%)	Symptomatic	Asymptomatic	P value
AGE	18-25	28 (68.3%)	12 (43%)	16 (57.1%)	P= 0.26
	26-35	13 (31.7%)	08 (61.5%)	05 (38.5%)	
SE status	Low	38 (92.7%)	32 (84.2%)	06 (15.8)	P = 1
	Middle	02 (4.9%)	02 (100%)	-	
Diabetes	Present	07 (17%)	6 (85.7%)	01 (14.28%)	P=0.00001
	Absent	34 (83%)	13 (38.2%)	21 (61.7%)	
Parity	Primigravida	09 (21.9%)	03 (33.3%)	06 (66.6%)	P=0.4537
	Multigravida	32 (78%)			
Trimester of pregnancy	I	03 (4.9%)	01 (33.3%)	02 (66.6%)	P=0.1
	II	11 (26.8%)	06 (54.5%)	05 (45.4%)	
	III	27 (65.9%)	13 (48.1%)	14 (51.8%)	
Contraceptive practice	OCP /IUCD	19 (67.85%)	11 (57.9%)	8 (42.1%)	P= 0.292
	Other	09 (32.1%)	09 (100%)	-	
	Nil/ No history	13	-	-	
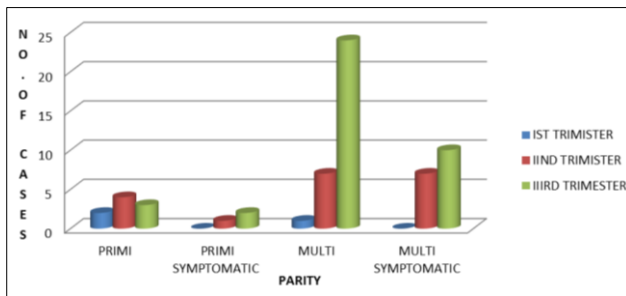
Graph 1: Symptomatic cases in relation to parity and gestational age
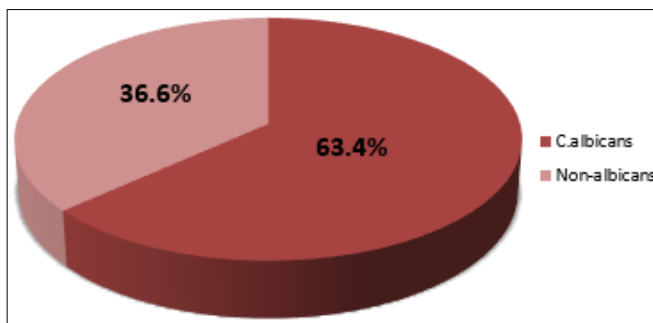
Graph 2: Speciation of candida isolates using germ tube test

4. Discussion

In this study, 25.6% of vaginal candidiasis was found during pregnancy, out of the total 160 pregnant women, 48.7% were clinically symptomatic and 51.2% women were asymptomatic. The main symptoms were vaginal discharge and itching. About 51.2% (21/41) of the women who tested positive for Candida organisms were asymptomatic at presentation. This is hardly surprising because the diagnosis of VVC requires pelvic examination and laboratory support. The combination of thick white discharge and vulvar pruritus is neither sensitive nor specific on its own for diagnosis [9]. Similar results were reported by Ngeow [13] where he found 27% prevalence of vaginal candidiasis with symptoms and 14% without symptoms.

In another study, by Feyi-Waboso and Ahmadi [14], where 42.9% of vaginal candidiasis was found during pregnancy and they observed that primigravida and younger age group suffered more from vaginal candidiasis. On the other hand, we noted younger age group, 18-30 years, and multigravida suffered significantly more. These may be due to early marriages in our population and by the time they reached 30 years of age, they become the multigravida. The higher prevalence rate in some studies may be due to the selection of women who were complaining of vaginal discharge whereas we enrolled, clinically symptomatic and asymptomatic pregnant women, who attended routine antenatal clinic.

In the current study, multigravida suffered significantly more from vaginal candidiasis than the primigravida. Increased ratio of infection was observed in diabetic women. These findings are similar to previous studies [2, 5, 11]. Multigravida have longer sexual history and also number of pregnancies that make them more prone to develop vaginal candidiasis than primi gravidae who have less sexual exposure. Although, no significant relationship was seen with respect to age and trimester of pregnancy, Similar to Marcano and Feo [15], it was observed that most of the women were in their third trimester of pregnancy and belonged to a younger age group (18-30 years) [1, 8, 10, 11]. This could be attributed to higher levels of pregnancy related harmones which reduce the vaginal defense mechanisms and encourage growth of yeast cells. In both studies no significant results with respect to the age, parity and period of gestation were found.

The significantly higher prevalence rate of VVC in low socio-economic group could be attributed to inadequate knowledge, poor personal hygiene, limited diagnostic facilities, poor dietary habits [6].

Candida albicans was the most prevalent species isolated in 63.4% of the women as has been reported previously [1, 4, 9]. C. albicans adheres to vaginal epithelial cells in significantly higher numbers than do other Candida species. This could explain the relative infrequency of the later in vaginal candidiasis. Studies from India have reported a rising trend

in the isolation of NAC vaginitis, which was attributed to the indiscriminate use of anti-mycotic agents which eliminates the more sensitive C. albicans and selects resistant NAC species [1].

5. Conclusions
In this study, the overall 25.6% frequency of vaginal candidiasis was seen during pregnancy, out of which 48.7% were symptomatic and 51.2% were asymptomatic group. Multigravida and diabetic pregnant women were found to have significantly increased infection ratio, therefore, we recommend that multigravida and diabetic women, clinically symptomatic or asymptomatic, should be routinely screened for vaginal candidiasis during pregnancy.

6. Acknowledgement

7. References
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