

Relationship between Candida Species and use of Intrauterine Contraceptives Device in Women with Vulvovaginitis

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Abstract

Background: The symptoms of candidiasis include vaginal discharge and itching. The severity of the patient's pain is linked to candidiasis. Isolated Candida species from vulvovaginal exudates to intrauterine contraceptive devices (IUDs) were evaluated.

Methods: Eighty samples of vaginal swabs taken from female patients at a maternity teaching hospital in Erbil City between May and November 2021 complained of vulvovaginitis symptoms, including both intrauterine contraceptive devices (IUCD) and non-intrauterine contraceptive users. The vaginal samples from patients were cultured on Sabouraud Dextrose Agar (SDA), and species identification utilizing an automated VITEK 2 compact system

Results: There are significant differences in the incidence of Candida infection between intrauterine contraceptive women (18.75%) with women who are not used intrauterine contraceptive methods (3.75%). The mean age was 30.67 ± 7.861 years. The highest incidence rate had discovered in the age group of 31-35years 10(32.26%), followed by 26-30 years 7(22.58%), and the lowest rate was observed in less than 20 years which was 2(6.45%). All Candida isolates from positive samples were identified by using Sabouraud Dextrose Agar and a confirmed automated VITEK 2 compact system. The identified Candida spp. was *C. albicans* 18 (22.5%), *C.krusei* 7(8.75%), then *C. spherica* 6(7.5%).

Conclusion: The incidence of vulvovaginal candidiasis and the use of contraceptives are clearly correlated, with *C.albicans* being the most common species.

Keywords: IUCD, Vulvovaginal exudate, candidiasis, age groups, VITEK 2.

1- INTRODUCTION

Vulvovaginal candidiasis is an infection of the lower genital tract brought on by several species of Candida that ordinarily live in the reproductive tracts of healthy women (Sustr et al., 2020, Sasani et al., 2021, Dovník et al., 2015, Rosati et al., 2020). Several Candida species, including *C. albicans* and non-albicans Candida (NAC), have been linked to VVC (Willems et al., 2020). The incidence of genital candidiasis in women appears to have increased in recent years, and many risk factors have been put out to explain this occurrence (Moshfeghy et al., 2020).

One of the most significant options for long-term contraception is the intrauterine device (IUD) (Cuello-Salcedo, 2021). An IUD is a T-shaped implant composed of metal or plastic that is placed inside the uterus and helps to release hormones or copper ions gradually (Junior et al., 2020) and prevents fertility by the changed uterine environment, which interferes with sperm movement through the uterus.

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Every IUDs stimulates the production of prostaglandins in the uterus, which lead to inflammation and smooth muscle contraction (Akintomide et al., 2021). Additionally, prostaglandins suppress the local cellular immune response. The body of the intrauterine device also makes it easier for Candida species to adhere, colonize, and create biofilms (Wei et al., 2021).

Fresh examination for fungal infections is based on direct microscopy (Willinger and Haase, 2013), and the sensitivity is low, from 40-70%, because the result depends on the experience of the microscopist (Papon and Van Dijck, 2021). The use of culture is advised in recurrent cases, but despite being able to identify species, it has a low sensitivity (Pereira et al., 2021). The Sabouraud 2% glucose agar is the commonly used medium for the culture diagnosis of Candida species. The Chrome agar TM and Microstix Candida are additional media that can be used to identify Candida spp. Certain Candida spp. can be recognized by using the chromogenic medium. When two or more yeast species such as *C. albicans* and *C. glabrata* are present simultaneously, depending on their pigmentation, it is easier to identify mixed cultures (Farr et al., 2021). In cases of severe fungal infections, early species identification and quick antifungal susceptibility tests are required. The Clinical and Laboratory Standards Institute and the European Committee on Antimicrobial Susceptibility Testing's standardized broth microdilution techniques have been used as the gold standard for antifungal susceptibility testing (Zaragoza et al., 2011, Cilo and Ener, 2021). Both species identification and testing for antifungal susceptibility are possible with the VITEK 2 system (bioMérieux, Inc., Hazelwood, MO), which is completely automated (Diongue et al., 2020). The aim of the present study is to detect the role of contraceptives in causing candida infection and the relationship between Candida spp. infection with intrauterine contraceptive device

2- Methodology:

2.1-The study area:

The cross-sectional study was done to determine the prevalence of Candida species-caused vulvovaginal candidiasis among women which are used intrauterine contraceptives. Samples were taken from 80 women who were sexually active and suspected VVC (dysuria, dyspareunia, vulvar pruritus, pain, redness, and a cheesy-white discharge) who were attending the outpatient clinic of the Maternity hospital in Erbil city from May to November 2021.

2.2- Sample collection:

2.2.1-Vaginal Swabs:

The sample consists of 40 women who used contraceptives and 40 women who did not use contraceptives. The smears were collected using a wooden spatula to identify the

relationship between an intrauterine contraceptive device and Candida species. The smear was incubated at 37 C for 24-48 hours after being inoculated on Sabouraud dextrose agar (Oxoid, Basingstoke, UK) which was supplemented with 0.05 g/l chloramphenicol. The positive plate showed that the colonies were creamy, smooth white yeast and had a yeast-like odour (Omran et al., 2020, Demirezen et al., 2005).

2.2.2- Identification tests

To ensure the purity and viability of the cultures, a suspension of each isolate was at least twice inoculated onto Sabouraud dextrose agar slants before testing. The VITEK-2 inoculum suspensions were made in sterile saline at turbidity of 2.0 McFarland standards, as determined by a DensiChek instrument (bioMérieux). The VITEK-2 device automatically filled each test card with culture suspension that had been prepared. The cards were incubated at 35.5 °C for 18 hours, and optical density values were taken automatically every 15 minutes. In order to identify the unknown organism, the final profile is compared to the database to obtain the result (Melhem et al., 2013, Al-Asady et al., 2020).

2.3- Statistical Analysis:

Scatter plot graphing software (Graph Pad Prism v.7, CA, USA) is used for data analyses. The Chi-square test was utilized to analyze the data, and a P value ($P < 0.05$) is classified as statistically significant.

3- Result and Discussions

We examined the smears of 80 patients by culture and automated VITEK 2 compact system. These patients were separated into four groups according to the presence and absence of IUCD and Candida cells; table 1 revealed a significant difference between women who used IUCD and those who suffered from VVC (18.75%) and women who are not used IUCD (10%). These agreed with (Jasim, 2020) in Iraq, who revealed that Candida spp. was found in 83 (65.3%) of the 195 women who used contraception, as opposed to 32 (39.7%) of the 103 non-contraceptive users. The relationship between the usage of a contraceptive and not using a contraceptive was statistically significant ($P < 0.001$). Furthermore (Haddad et al., 2021) showed that the prevalence of vaginal candidiasis was higher in women who used contraceptives (84.1%) than in women who had not used contraceptives (15.9%), and there is a significant difference between the two groups. Previously, it was thought that oestrogen and progesterone hormones could manifest in contraceptives and increase vaginal glycogen, exposing it to lactobacilli activity (Lithgow et al., 2022). The pH of the vagina decreases as a result of the lactobacilli's function in the conversion of glycogen to lactic acid, which also inhibits the activities of the bacterial biota and promotes the growth of Candida species (Abdullah and Mohammed, 2020, Jasim, 2020). Furthermore, (Chassot et al., 2008) showed that most parts of the intrauterine contraceptive allow the attachment of candida. The growth of *C. albicans*' biofilm and its adhesion

to various IUD components appear to be key factors determining the development of VVC and recurrent VVC.

In the present study, the mean age was 30.67 ± 7.861 years, and the highest rates of incidence were expressed in the age groups of 31-35 years 10(32.26%), followed by 26-30 years 7(22.58%), and the lowest rates were observed in less than 20 years which was 2(6.45%). Table 2 illustrates the age distribution of women who were initially diagnosed with VVC. These partially agreed with (Salvi, 2019) in the United Arab Emirate, which revealed that out of 224 vaginal swabs taken, 31.6% of women have vulvovaginal candidiasis, and the age groups between 26-30 were found to have the highest percentage of positive cases (39%) followed by those between 31-35 years (30%) and 36-40 (29%) and the age groups above 40 had the lowest percentages of candidiasis infections (14%). But the result disagreed with (Jacob et al., 2018) in France expressed that the highest rates of VVC were revealed in the age groups of 18-25years which was (7.1%), 26-30years (6.8%), and the lowest rate was found in the age group 31-35 years which was (6.9%). As well as a result disagreed with (Jasim, 2020) in Iraq, which revealed that the prevalence rate of candidiasis among specimens in the age group of 23-26 was high (37.3 %) with contraceptive users. Younger women are sexually active and have weaker vaginal defences against Candida species (Salinas et al., 2020, Kent, 1991). In this way, the highest rate of vulvovaginal candidiasis was found in the age group (31-35) years, which was 19.35% in the intrauterine contraceptive

device, and the lowest rate was observed in the age group less than 20 years which was 3.23% in healthy women using IUD. Also, in our observation, after 36 years of age, the prevalence rate of candidiasis declined gradually. Intrauterine contraceptive devices are foreign surfaces that are inserted for long periods into the uterine mucosa, and the tail acts as a yeast cell reservoir (Chassot et al., 2008).

Table 3 revealed the occurrence of vulvovaginal Candida spp. was 31(38.75%) among 80 women. Out of 31 Candida spp., 18 (22.5%) *C. albicans*, 6 (7.5%) *C. Spherica* and 7 (8.75%) *C. krusei* were identified by the automated VITEK 2 compact system. There was no significant association between vulvovaginal candidiasis. These agreed with (Haddad et al., 2021) in Iraq, who revealed that A positive vaginal culture was obtained in 145 (53.7%) of the 270 women who had vaginal secretions. *Candida albicans* was the species that separated from the positive culture study's sample with the highest prevalence (71.7%), followed by *C. glabrata*, *C. tropicalis*, *C. krusei*, *C. famata*, *C. ciferrii*, and *C. lusitaniae*. As well as, (Omran et al., 2020) in Egypt revealed that, *C. albicans* accounted for 60% of solitary isolates among IUD users, followed by *C.glabrata*(16.7%), *C.tropicalis*(13.3%) and *C.krusei*(8.3%). Due to their virulent characteristics, such as dimorphism and phenotypic switching, *C.albicans* can infect adolescent's reproductive tract by producing proteases and phosphatases to improve their attachment to human epithelia (Chassot et al., 2008, Bastianelli et al., 2021).

Table 1: Incidence of Candida spp. isolated from IUC users and non-users

Pathogenic Groups	No of examined samples	Isolation of Candida spp.	Percentage (%)	Negative Cultures	Percentage (%)
Infective with IUC	20	15	18.75	5	6.25
Infective without IUC	20	8	10	12	15
Healthy women with IUC	20	5	6.25	15	18.75
Healthy women without IUC	20	3	3.75	17	21.25
Total	80	31	38.75	49	61.25

P= 0.0006

Table 2: Incidence of vulvovaginal candidiasis in women of different age groups with intrauterine Device

Pathogenic Groups	Age group												
	Isolation of Candida spp	<20	Percentage (%)	20-25	Percentage (%)	26-30	Percentage (%)	31-35	Percentage (%)	36-40	Percentage (%)	>40	Percentage (%)
Infective with IUC	15	1	3.23	2	6.45	4	12.90	6	19.35	1	3.23	1	3.23
Infective without IUC	8	0	0.00	1	3.23	2	6.45	3	9.68	1	3.23	1	3.23

Healthy with IUC	5	0	0.00	0	0.00	1	3.23	1	3.23	2	6.45	1	3.23
Healthy without IUC	3	1	3.23	1	3.23	0	0.00	0	0.00	0	0.00	1	3.23
Total	31	2	6.45	4	12.90	7	22.58	10	32.26	4	12.90	4	12.90

P=0.3542

Table 3: Incidence of C. Albica, C. Spherica and C. Krusei isolated from IUC users and non-users

Pathogenic Groups	C. Albica		C. Spherica		C. krusei		Total	(%)
	No. of Positive sample	(%)	No. of Positive sample	(%)	No. of Positive sample	(%)		
Infective with IUC	11	13.75	3	3.75	4	5	18	22.5
Infective without IUC	4	5	2	2.5	2	2.5	8	10
Healthy women with IUC	2	2.5	1	1.25	1	1.25	4	5
Healthy women without IUC	1	1.25	0	0	0	0	1	1.25
Total	18	22.5	6	7.5	7	8.75	31	38.75

P= 0.9777

4- Conclusion:

According to our findings, vulvovaginal candidiasis is more common in women of reproductive age. There was a significant correlation between vaginal candidiasis and risk factors like an intrauterine contraceptive user. For the majority of Candida species, the VITEK 2 system identified the species after about 15 hours of growth. The VITEK-2 system certified that each test is performed in a standardized manner.

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