

# Prevalence of vulvovaginal Candidiasis and its association with Contraceptives

*Prevalencia de candidiasis vulvovaginal y su asociación con anticonceptivos*

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## Abstract

**Objectives:** The current study aimed to investigate the association between the use of hormonal contraceptives and development of vaginal candidiasis infection. **Methods:** Vaginal swabs were collected from 270 women after inclusion and exclusion criteria, of which, 202 women were contraceptive users and 68 women were not using contraceptives. Detailed clinical history and full examination including vaginal examination were done. After clinical diagnosis has been made, appropriate laboratory tests for isolation of *Candida* and its species were done via using the standard procedures. **Results:** Out of 270 women, 145 (53.7%; %95 CI: 40.4- 52.2) were found to have positive *Candida* culture with *Candida albicans* was the dominant species isolated. vaginal candidiasis was more prevalent among contraceptive users as compared to not using contraceptives (84.1% vs. 15.9%) respectively ( $P < 0.001$ ). All *Candida* species were found significantly more prevalent among contraceptive users and *Candida albicans* identified to have the higher proportion ( $P < 0.05$ ). Vaginal candidiasis was significantly more prevalent among women who using (COCP) than those who using injectable or (IUCD) (90.16% vs. 6.56% vs. 3.28%) respectively, with significant prevalence differences of its species regarding contraceptive methods used ( $P < 0.001$ ). **Conclusion:** A strong association have been found between the prevalence of vaginal candidiasis and its *Candida* species and the use of contraceptives. Among contraceptive methods, the Combined Oral Contraceptive Pill (COCP) is the most influencing method that contributes to the vaginal candidiasis.

**Keyword:** Vaginal candidiasis, Contraceptives, Vaginal swab, prevalence.

## Resumen

**Objetivos:** El presente estudio tuvo como objetivo investigar la asociación entre el uso de anticonceptivos hormonales y el desarrollo de candidiasis vaginal. **Métodos:** Se recolectaron hisopos vaginales de 270 mujeres después de los criterios de inclusión y exclusión, de las cuales 202 mujeres eran usuarias de anticonceptivos y 68 mujeres no usuarias de anticonceptivos. Se realizó una historia clínica detallada y un examen completo, incluido un examen vaginal. Detrás del diagnóstico clínico, se realizaron las pruebas de laboratorio adecuadas para el aislamiento de *Candida* y sus especies mediante el uso de procedimientos estándar. **Resultados:** De 270 mujeres, se encontró que 145 (53,7%; 95% IC: 40,4-52,2) tenían cultivo de *Candida* positivo, siendo *Candida albicans* la especie dominante aislada. La candidiasis vaginal fue más prevalente entre las usuarias de anticonceptivos en comparación con las usuarias de no anticonceptivos (84,1% frente a 15,9%) respectivamente ( $P < 0,001$ ). Todas las especies de *Candida* se encontraron significativamente más prevalentes entre las usuarias de anticonceptivos y se identificó que *Candida albicans* tenía la proporción más alta ( $P < 0,05$ ). La candidiasis vaginal fue significativamente más prevalente entre las mujeres que usaban (AOC) que las que usaban inyectables o (IUCD) (90,16% frente a 6,56% frente a 3,28%) respectivamente, con diferencias significativas de prevalencia de su especie con respecto a los métodos anticonceptivos utilizados ( $P < 0,001$ ). **Conclusión:** Se ha encontrado una fuerte asociación entre la prevalencia de candidiasis vaginal y su especie *Candida* y el uso de anticonceptivos. Entre los métodos anticonceptivos, la píldora anticonceptiva oral combinada (AOC) es el método más influyente que contribuye a la candidiasis vaginal.

**Palabra clave:** candidiasis vaginal, anticonceptivos, frotis vaginal, prevalencia.

Vulvovaginal candidiasis (VVC) is a prevalent vaginal infection that affects around 70 -75% of women of reproductive age with at least one episode in their life, and up to 50% of women experience recurrency than known as recurrent vulvovaginal candidiasis (RVVC)<sup>1,2</sup>. For that and other reasons like its unpleasant experience including discomfort, interfering with sexual and work activities, World Health Organization (WHO) considered vulvovaginal candidiasis as pathological condition mainly of sexually transmitted in nature and received an ongoing concern as one of a public health problem<sup>3</sup>.

The main cause of VVC is the abnormal growth of fungi in the mucosa of genital tract leading to infection that characterized by intense vulvar itching, leucorrhea, dysuria, dyspareunia, vulvovaginal edema and erythema. Approximately 80-90% of VVC cases are caused by *Candida albicans* and that only 10-20% of cases are caused by other *Candida* species known as non-*Candida albicans* species like *Candida glabrata*, *Candida tropicalis* or *Candida krusei*. The yeast-like fungi that considered as normal microflora in vagina become pathogenic when its colonization site become favorable to their development<sup>4-6</sup>.

Several factors have been supposed to increase the developing risk of VVC, such as the previous colonization by the yeast, immunosuppressive diseases (HIV), pregnancy, diabetes mellitus (DM), hygienic behavior and other factors including the use of contraceptives<sup>7-10</sup>.

Contraceptives are substances that are used as a measure for avoidance of unintended pregnancies. There are several forms of contraceptive methods includes oral contraceptive pills, intrauterine devices, and injectable contraceptives (Depo-Provera), vaginal tablets and cervical caps<sup>4</sup>. The hormonal contraceptives comprise estrogen and progesterone hormones which increase the vaginal glycogen that converted into lactic acid via lactobacilli leading to decreasing in intravaginal pH level and consequently facilitate the overgrowth of *Candida*<sup>8,11</sup>.

Hormonal contraceptives particularly oral contraceptive pills and injectable contraceptives are highly widespread as well as broadly available method of contraception in Iraq that reach up to 70% among other contraceptive methods<sup>12</sup>, and therefore it may be increasing the risk of developing vaginal candidiasis. Thus, this study aimed to determine the association between the use of hormonal contraceptives and development of vaginal candidiasis infection.

### Subject and method

This cross-sectional design study was conducted to investigate the prevalence of vulvovaginal candidiasis caused by *Candida* species among contraceptive's users. The vaginal swabs were collected from 270 women who sexually active and complaining from vaginal discharge and attending the outpatient's clinic of Obstetrics and Gynecology at Medical City, Baghdad from January through December 2020. This study's sample consist of 202 women who were contraceptive users and 68 women who were not using contraceptives.

Pregnant women and those with diabetic mellites or underlying immunosuppression or those with previous history of candidiasis were excluded from study.

Details regarding clinical history and full examination were recorded beside vaginal examination via Cusco's speculum to examine the vagina and cervix and looking up for any pathology such as discharge, erosions, vaginitis, cervicitis in addition, the color, character, amount and smell of the vaginal discharge were also observed. Then, vaginal discharge was collected using three swabs from the upper third of the vaginal walls and sent for culture at educational laboratories of Medical City that processed for inoculation in culture media, wet mount microscopic examination, and for gram staining to find *Candida* and identify its species.

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Standard approaches of frequencies and percentages were used for quantitative data. Chi-squared test were used to assess the associations between categorical variables of contraceptive users and non-contraceptive users regarding isolation rate of *Candida* and its species. A *P* value of <0.05 was considered a significance level for any test throughout the study.

### Results

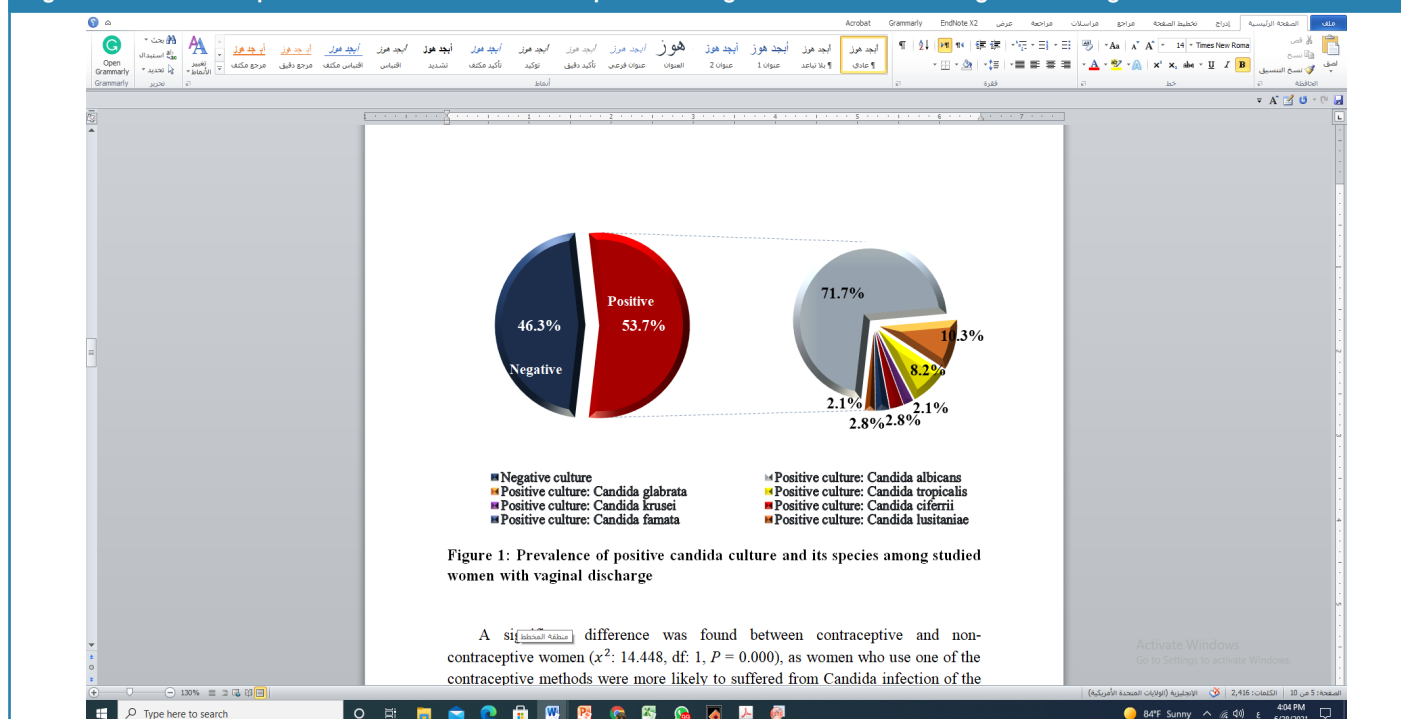
A total of 270 women were recruited in the study behind the inclusion and exclusion criteria, their age was ranged from 15 to 45 years with mean of  $28.35 \pm 8.494$  and more than one thirds were at the age group of 20-30 years old. About three fourths of study's sample were found to use one of the contraceptive methods (74.8%), of which, 73.17% were found using combined oral contraceptive pills (COCP), 17.3% were using injectable method, and only 8.41% of women were using an intrauterine contraceptive device (IUCD) (Table 1).

Table 1. study's sample characteristic (n= 270)

Patients' Characteristics	Description	No. (%)
Age	Mean Range (min-max)	28.35 ± 8.4949 (15 - 45)
Age-group	≤ 20 20 - 30 31 - 40 >40	48 (17.8) 120 (44.4) 69 (25.6) 33 (12.2)
Contraceptive use	No Yes	68 (25.2) 202 (74.8)
Contraceptive methods (n= 202)	COCP Injectable IUCD	150 (74.26) 35 (17.33) 17 (8.41)

Out of 270 women with vaginal discharges, 145 (53.7%; 95% CI: 40.4- 52.2) were found to have positive vaginal culture. *Candida albicans* was the most frequent species isolated among positive culture study's sample (71.7%), followed by *Candida glabrata*, *Candida tropicalis*, *Candida krusei*, *Candida famata*, *Candida ciferrii* and *Candida lusitanae* (10.3%, 8.2%, 2.8% and 2.1%) respectively (Figure 1).

Figure 1 Prevalence of positive candida culture and its species among studied women with vaginal discharge.



A significant difference was found between contraceptive women and those who were not using contraceptives ( $\chi^2: 14.448$ , df: 1,  $P = 0.000$ ), as women who use one of the contraceptive methods were more likely to suffer from Candida infection of the vagina than those who did not use it (84.1% vs. 15.9%) respectively (Table 2).

Table 2. Distribution of women by their vaginal candida isolation and contraceptives usage (n=270)

Candida culture isolation	Contraceptive usage				Total
	Yes (202)		No (68)		
	No.	%	No.	%	
Positive	122	84.1	23	15.9	125
Negative	80	64.0	45	36.0	145

$$\chi^2: 14.448, \text{df: } 1, P = 0.000$$

Similarly, Candida species were significantly more prevalent among contraceptive users' women than those who were not using contraceptives; Candida albicans (75.41% vs. 52.17%), Candida tropicalis, Candida ciferrii, and Candida famata (each 75% vs. 25%), Candida glabrata (73.3% vs. 26.7%), Candida krusei and Candida lusitanae (each 66.7% vs. 33.3%) respectively ( $\chi^2=19.485$ , df: 7,  $P=0.007$ ) (Table 3)

Table 3. Distribution of women by their vaginal candida species isolation and contraceptives usage (n=145\*)

Candida species isolation	Contraceptive usage				Total
	Yes (122)		No (23)		
	No.	%	No.	%	
Candida albicans	92	88.46	12	11.54	104
Candida glabrata	11	73.3	4	26.7	15
Candida tropicalis	9	75	3	25	12
Candida krusei	2	66.7	1	33.3	3
Candida ciferrii	3	75	1	25	4
Candida famata	3	75	1	25	4
Candida lusitanae	2	66.7	1	33.3	3

$$\text{Likelihood Ratio } \chi^2: 19.485, \text{df: } 7, P = 0.007$$

\*Only women with positive candida culture.

Furthermore, the vaginal candidiasis was significantly more prevalent among women who were using combined oral contraceptive pills (COCP) than those who were using injectable or intrauterine contraceptive devices (IUCD) (90.16% vs. 6.56% vs. 3.28%) respectively ( $\chi^2: 53.676$ , df: 3,  $P = 0.000$ ) (Table 4).

Table 4. Distribution of women by their vaginal candida isolation and the type of contraceptives method usage (n=202)

Candida culture isolation	Contraceptive method usage						Total
	COCP (150)		Injectable (35)		IUCD (17)		
	No.	%	No.	%	No.	%	
Positive	110	90.16	8	6.56	4	3.28	122
Negative	40	50	27	33.75	13	16.25	80

$$\chi^2: 53.676, \text{df: } 3, P = 0.000$$

Likewise, candida species were more prevalent among women who using combined oral contraceptives pills than those who using injectable or intrauterine contraceptive devices ( $P < 0.01$ ) (Table 5).

Table 5. Distribution of women by their vaginal candida species isolation and the type of contraceptives methods usage (n=122\*)

Candida species isolation	Contraceptive method usage						Total
	COCP (110)		Injectable (8)		IUCD (4)		
	No.	%	No.	%	No.	%	
Candida albicans	84	91.31	5	5.43	3	3.26	92
Candida glabrata	11	100	-	-	-	-	11
Candida tropicalis	6	66.7	3	33.3	-	-	9
Candida krusei	2	100	-	-	-	-	2
Candida ciferrii	3	100	-	-	-	-	3
Candida famata	2	66.7	-	33.3	1	-	3
Candida lusitanae	2	100	-	-	-	-	2

$$\text{Likelihood Ratio } \chi^2: 74.058, \text{df: } 21, P = 0.000$$

\*Only women with positive candida culture.

## Discussion

The prevalence of vaginal candidiasis among study's sample was 53.7%, of which, the *Candida albicans* species was being the dominant (71.7%) and such findings are within the range that were reported in the literature<sup>1,2,4,6,8</sup>. However, our rate was identified to be higher than what were reported by other studies<sup>13,14</sup> and such differences could be attributed to the differences in research method with adopted inclusion and exclusion criteria.

The study found significant differences between contraceptive women and those who were not using contraceptives regarding their candida infection, as vaginal candidiasis was more prevalent among contraceptive users' women as compared to non-contraceptive users' women (84.1% vs. 15.9%) respectively, and such finding is in consistence to what were reported by other studies<sup>8,13,14</sup>. Moreover, all *Candida* species were found significantly more prevalent among contraceptive users' women as well as *Candida albicans* was identified to constitutes the higher proportion and such results are supported by other studies<sup>13,14</sup>.

Amidst contraceptives users' women, a higher proportion of *Candida* infection was significantly observed in combined oral contraceptive pills users as compared to those using injectables or intrauterine contraceptive device (90.16% vs. 6.56% vs. 3.28%) respectively, with *Candida albicans* species found to be a predominant on the other *Candida* species for COCP than other contraceptive methods used, and such results coinciding with the results of other literature<sup>8,14</sup> that reported a higher prevalence of vaginal candidiasis among oral contraceptives users' women than non-contraceptives users' women.

## Conclusion

376 According to evidence revealed in this study, there is a strong association between the prevalence of candida infection of the vagina and its *Candida* species and the use of contraceptives, where the Combined Oral Contraceptive Pill (COCP) is the most influencing method of contraceptives that contributes to the vaginal candidiasis

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## conflicting interests

Authors disclose that, there is no potential conflicting of interests is exist for such self-funding project.

## References

1. Rosati D, Bruno M, Jaeger M, Oever J, Netea MG. Recurrent Vulvovaginal Candidiasis: An Immunological Perspective. *Microorganisms*. 2020; 8(2):144. doi: [10.3390/microorganisms8020144](https://doi.org/10.3390/microorganisms8020144)
2. Zeng X, Zhang Y, Zhang T, Xue Y, Xu H, An R. Risk Factors of Vulvovaginal Candidiasis among Women of Reproductive Age in Xi'an: A Cross-Sectional Study. *BioMed Research International*. 2018; 2018:9703754. doi: [10.1155/2018/9703754](https://doi.org/10.1155/2018/9703754)
3. Gunther LSA, Martins HPR, Gimenes F, de Abreu ALP, Consolaro MEL, Svidzinski TIES. Prevalence of *Candida albicans* and non-*albicans* isolates from vaginal secretions: comparative evaluation of colonization, vaginal candidiasis and recurrent vaginal candidiasis in diabetic and non-diabetic women. *Sao Paulo Med J*. 2014; 132(2):116-20. doi: [10.1590/1516-3180.2014.1322640](https://doi.org/10.1590/1516-3180.2014.1322640)
4. Sobel JD. Vulvovaginal candidosis. *Lancet*. 2007;369(9577):1961-71. doi: [10.1016/S0140-6736\(07\)60917-9](https://doi.org/10.1016/S0140-6736(07)60917-9)
5. Al Halteet S, Abdel-Hadi A, Hassan M, Awad M. Prevalence and Antifungal Susceptibility Profile of Clinically Relevant *Candida* Species in Postmenopausal Women with Diabetes. *Biomed Res Int*. 2020; 2020:7042490. doi: [10.1155/2020/7042490](https://doi.org/10.1155/2020/7042490)
6. Wei Y, Feng J, Luo ZC. Isolation and genotyping of vaginal non-*albicans* *Candida* spp. in women from two different ethnic groups in Lanzhou, China. *Int J Gynaecol Obstet*. 2010;110(3):227-30. doi: [10.1016/j.ijgo.2010.04.026](https://doi.org/10.1016/j.ijgo.2010.04.026)
7. Venugopal D, Husain K, Mustafa SA, Sabeen S. Epidemiology, risk factors and antimicrobial profile of Vulvovaginal Candidiasis (VVC): A study among women in the central region of Saudi Arabia. *J Mycol Med*. 2020;101049. doi: [10.1016/j.mycmed.2020.101049](https://doi.org/10.1016/j.mycmed.2020.101049)
8. Yusuf MA, Chowdhury MAK, Sattar ANI, Rahman MM. Evaluation of the Effect of Contraceptives on the Prevalence of *Candida* Species on Vaginal Candidiasis in Dhaka, Bangladesh. *Bangladesh Journal of Medical Microbiology*. 2007; 1(2):61-65. doi: [10.3329/bjmm.v1i2.21511](https://doi.org/10.3329/bjmm.v1i2.21511)
9. Ekpenyong C, Inyang-Etoh E, Ettebong E, Akpan U, Ibu J, Daniel N. Recurrent vulvovaginal candidosis among young women in south eastern Nigeria: the role of lifestyle and health-care practices. *International journal of STD and AIDS*. 2012; 23(10):704-9. doi: [10.1258/ijisa.2012.011382](https://doi.org/10.1258/ijisa.2012.011382)
10. Foxman B, Muraglia R, Dietz J-P, Sobel JD, Wagner J. Prevalence of recurrent vulvovaginal candidiasis in 5 European countries and the United States: results from an internet panel survey. *Journal of lower genital tract disease*. 2013; 17(3):340-5. doi: [10.1097/LGT.0b013e318273e8cf](https://doi.org/10.1097/LGT.0b013e318273e8cf)
11. Kim JM, Park YJ. Probiotics in the Prevention and Treatment of Postmenopausal Vaginal Infections: Review Article. *J Menopausal Med*. 2017; 23(3):139-145. doi: [10.6118/jmm.2017.23.3.139](https://doi.org/10.6118/jmm.2017.23.3.139)
12. FP 2020. Iraq FP2020 Core Indicator Summary Sheet: 2018-2019 Annual Progress Report. Family Planning 2020 organization. 2020. Downloaded from: [http://www.familyplanning2020.org/sites/default/files/Data-Hub/2019CI/Iraq\\_2019\\_CI\\_Handout.pdf](http://www.familyplanning2020.org/sites/default/files/Data-Hub/2019CI/Iraq_2019_CI_Handout.pdf)
13. Fayemiwo SA, Makanjuola OB, Fatiregun AA. Vulvo-vaginal Candidosis in a cohort of hormonal contraceptive users in Ibadan, Nigeria. *African Journal of Clinical and Experimental Microbiology*. 2018; 19 (1):38-46. Available at: <https://www.ajol.info/index.php/ajcem/article/view/162947>
14. Salvi M. Prevalence of vulvovaginal candidiasis in females in the reproductive age group. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2019; 8(2):647-651. doi: <http://dx.doi.org/10.18203/2320-1770.ijrcog20190299>