



## Prevalence of Vaginal Candidiasis among Female Students of University of Jos, Plateau State, Nigeria

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### Abstract

Vaginal candidiasis is the most common opportunistic mucosal infection that affects large numbers of healthy women worldwide. This cross-sectional study was aimed at determining the prevalence of vaginal candidiasis among female students of University of Jos between the period of September and November 2019. There were 132 female students who consented and participated in the study. Structured questionnaires were administered to obtain the subjects' socio-demographic and clinical information. High vaginal swabs were collected from each participant and cultured on Sabouraud dextrose agar. Identification of the isolates was based on morphological appearance, microscopy and germ tube formation. The overall prevalence of vaginal candidiasis was 34 (25.8%). Out of 34 yeasts isolates, 10 (29.4%) were *Candida albicans* while 24 (70.6%) were non-*Candida albicans* species. The age group of 20-30 years had the highest prevalence of 28(26.9%). It showed that the prevalence of vaginal candidiasis was higher in Medical Laboratory Science Department 18(30.0%) than in Nursing Department 16(22.2%). There was statistically significant relationship between vaginal candidiasis and antibiotic therapy and also with vaginal discomfort/discharge ( $P < 0.05$ ) but there was no significant relationship between vaginal candidiasis and previous infection with vaginal candidiasis, vaginal douching, oral contraceptive and tight nylon pant. This study established the presence of vaginal candidiasis among students of University of Jos and recommends good personal hygiene and enlightenment of the risk factors of vaginal candidiasis to the study population.

**Keywords:** Vaginal Candidiasis; Students; University of Jos

## INTRODUCTION

Vaginal candidiasis is a fungal or yeast infection of the female lower genital tract, the vulva and the vagina caused by *Candida* spp [1]. It can be referred to as moniliasis or sometimes vulvovaginitis [2]. It can be recurrent or relapsing and its prevalence has been observed to be on increase [3]. This infection has been reported as the common cause of vaginitis, second to bacterial vaginosis [4] and generally the infection occurs when there is an imbalance in the pH of the vagina that is when the p<sup>H</sup> of the vagina increases thereby reducing the acidity of the vagina (from 4.0 to 5.5) giving room for opportunistic fungi such as *Candida* which is a normal flora in the vagina to thrive and cause infection. The over growth of this fungus in the vagina leads to a burning sensation in the vagina vulva, the production of heavy white/yellow curd like discharge and/or an itchy vulva, pruritus, dyspareunia, dysuria, irritation, soreness of the vulva and other discomforting symptoms that will ensure frequent hospital visits [5]. It has been revealed that *Candida albicans* cause about 90% of the infection and the other 10% is caused by other species of *Candida* that are non *albicans* species with *Candida glabrata* consistently been the leading species [5-7]. About 75% of women will experience at least one episode during their lifetime. It was reported that 70%-75% of healthy adult women have at least one episode during their reproductive life and half of college women will by the age of 25 years have had one episode diagnosed by a physician [8]. Vaginal candidiasis is not considered a sexually transmitted disease, because it does affect children and celibate women, and also *Candida spp.* is seen as normal vagina flora in healthy women. However, this does not mean that *Candida* cannot be sexually transmitted [9,10]. Vaginal candidiasis has been reported globally as a condition afflicting women. Most of the reported epidemiological data available only revealed a lack of laboratory confirmation of the infection which further compounds the problem [11]. This increase has been suggested to be due to multiple interacting risk factors for the infection. Extended use of broad spectrum antibiotics, pregnancy and underlying diseases such as poorly managed diabetes mellitus and HIV/AIDs, contraceptives, tight fitting nylon pants, poor female hygiene as well as the use of tampons and vaginal douching have been observed by researchers as risk factors or socio-economic factors associated with vaginal candidiasis [12]. Poorly associated risk factors including the use of intrauterine devices (IUDs), diaphragms, sponge, orogenital sex, condoms, intercourse and

diet with high glucose content has been mentioned [13]. The main reservoir for *Candida* is thought to be the rectum but vaginal colonization is also common [14]. The factors associated with the evolution from colonization to symptomatic infection are multiple and involve a combination of host susceptibility, host inflammatory responses, and *Candida* virulence factors.

Diagnosis of vaginal candidiasis based solely on patient history and genital examination is not possible because of the low specificity of signs and symptoms, since other causes mimic vaginal candidiasis, like leukorrhea and pruritus vulvae [10] therefore, to have a definitive diagnosis of vaginal candidiasis, cultural isolation and identification of *Candida* spp. are crucial.

The normal vagina is characterized by dynamic interrelationships between *Lactobacillus acidophilus* and other endogenous flora, estrogen, glycogen, vaginal pH, and metabolic by-products of these microbiomes. *Lactobacillus acidophilus* produces hydrogen peroxide (as a by-product of metabolism), which is toxic to pathogens and keeps the healthy vaginal pH acidic. Vaginitis occurs when the vaginal microflora has been altered by invading pathogens or biochemical changes in the environment [15]. Changes in the vaginal environment encourage the *Candida* population, enhance their adherence to vaginal epithelial cells, and facilitate germination of daughter yeast cells [8]. These changes may transform asymptomatic colonization into symptomatic *Candida* infection. Vaginal candidiasis, like many vulva diseases, has the potential to cause great psychological distress and negatively impact a person's quality of life.

Vaginal candidiasis is an opportunistic fungal infection of the female lower genital tract caused by *Candida species*. Mucosal candidiasis, especially vulvovaginal candidiasis, is the most common fungal disease in normal healthy women. *Candida* is the most common cause of fungal infections and also an important cause of community and health care associated infections [16]. Vaginal candidiasis is not a reportable disease and is often diagnosed without confirmatory tests and most often treated empirically and thus the exact incidence is unknown [17].

Vaginal candidiasis is an endemic problem globally. In Nigeria, little data is available on the prevalence especially among apparently healthy females [2]. Most reported studies are limited to patients seen in hospital settings. The study will contribute to our

understanding of the natural history, risk factors and prevalence of candidiasis among female students of the Faculty of Health Science and Technology of University of Jos, Nigeria.

## Materials and Methods

### Study area

The University of Jos is a federal institution in Nigeria for higher education, learning, and research that provides excellent educational experience with a high impact on society. It is situated in the North central region of Nigeria in Plateau State to be specific. It is located in the Jos North area of the state, situated in Bauchi Road. It has a longitude of 9.94947°N, a latitude of 8.8892°E, and an elevation of 1173 meters (3848 feet). It has a humidity of 73% and a temperature ranging between 22°C and 24°C which is mostly cloudy [18].

A cross-sectional study of 132 female students was randomly recruited from the Faculty of Health Science and Technology consisting of the Medical Laboratory Science Department and Nursing Department of the University of Jos during September and November 2019. Ethical clearance was obtained from the ethical clearance committee of Plateau State Specialist Hospital and individual consent was sought from the female students of the Faculty of Health Science and Technology of the University of Jos.

All healthy female students of the Faculty of Health Science and Technology of the University of Jos who consented to participate in the study. A closed form of questionnaire was given to the participants to ensure consistency of responses from them. Questions were designed to address the following; age, antibiotic therapy, marital status, pregnancy, personal hygiene/lifestyle and health status.

High Vaginal Swab (HVS) samples were collected from a total of 132 students with their informed consent. Using a commercially prepared swab sticks for each subject. All collected samples were transported immediately to the laboratory and inoculated on Sabouraud dextrose agar medium and incubated at 37°C for two days. Following inoculation, wet microscopy was carried out to observe for the identification of budding yeast cells present. After incubation, the plates were examined macroscopically and microscopically after two days. Yeast growths were identified by the characteristic colonial morphology of *Candida* on Sabouraud's dextrose agar. Growths were then confirmed to be budding fungal

cells by wet mount. A germ tube experiment was used as a rapid tool for the identification of *Candida albicans*. Germ tube and pseudohyphae were positive indications for *Candida albicans* [19]. Statistical Packages for Social Sciences (SPSS) version 21 and Chi-square was the tool used for the analysis to compare variables. Statistically significant level was set at  $P < 0.05$ .

## Results

A total of 132 high vaginal swab (HVS) samples were collected among students of Faculty of Health Science and Technology of University of Jos and examined. Out of the 132 female students examined, 34 were positive for *Candida* giving a prevalence of 25.8%. The high vaginal swab (HVS) was also analyzed for both *Candida albicans* and non-*Candida albicans*. The results of this work are presented in the tables below.

Table 1 shows the prevalence of vaginal candidiasis about age group. Out of the 132 samples examined, 104 samples were among the age group of 20-29 years with the highest prevalence of 28(26.9%) positive. 14 samples were examined among 15-19 years which has a prevalence of 2(14.3%) positive, 12 samples were examined among 30-39 years with a prevalence of 4(33.3%) positive and 2 samples were examined among 40 and above with a prevalence of 0(0.0%) positive which shows the lowest prevalence.

Table 2 shows the prevalence of candidiasis with departments. 60 Medical Laboratory Science students were examined with prevalence of 18(30.0%) positive and 72 Nursing students were examined with prevalence of 16(22.2%) positive of vaginal candidiasis.

Table 3 shows the prevalence of vaginal candidiasis with previous infection of vaginal candidiasis. 49 samples were examined from those that had previous infection with a prevalence of 14(28.6%) positive and 83 samples were examined from those that do not have a previous infection with a prevalence of 20(24.1%) positive.

Table 4 shows the prevalence of vaginal candidiasis in relation to antibiotic therapy. 13 samples were examined from those that are on antibiotic medication with prevalence of 8(61.5%) positive and 119 samples were examined from those that are not on antibiotic therapy with prevalence of 26(21.8%) positive.

Table 5 shows the prevalence of vaginal candidiasis in relation to vaginal douching. 11 samples were examined from those that

practice vaginal douching with prevalence of 3(27.3%) positive and 121 samples were examined from those that do not practice vaginal douching with prevalence of 31(25.6%) positive.

Table 6 shows the prevalence of vaginal candidiasis in relation to oral contraceptive. 2 samples were examined from those that use oral contraceptive with prevalence of 1(50%) positive and 130 samples from those that do not use oral contraceptive with prevalence of 33(25.4%) positive.

Table 7 shows the prevalence of vaginal candidiasis in relation to tight nylon pants. 29 samples were examined from those that use tight nylon pants with prevalence of 7(24.1%) positive and 103 samples from those that do not use tight nylon pants with prevalence of 27(26.2%) positive.

Table 8 shows the prevalence of vaginal candidiasis in relation to vaginal discharge/discomfort. 25 samples were examined from those that have symptoms with prevalence of 25(100%) positive and 107 samples from those that do not have symptoms with prevalence of 9(8.4%) positive.

Table 9 shows the prevalence of *candida albicans* and non *candida albicans*. Out of the 34 samples that were positive for *candida*, *candida albicans* have a prevalence of 10(29.4%) while non *candida albicans* have a prevalence of 24(70.6%).

Age group(years)	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
15-19	14	2	14.3	0.554	3	2.091
20-29	104	28	26.9			
30-39	12	4	33.3			
≥40	2	0	0.0			
Total	132	34	25.8			

**Table 1:** Age distribution of vaginal candidiasis among the students.

Department	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
MLS	60	18	30.0	0.309	1	1.035
Nursing	72	16	22.2			
Total	132	34	25.8			

**Table 2:** Distribution of vaginal candidiasis among students of faculty of health science and technology.

Key: Medical Laboratory Science.

Previous infection	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
Yes	49	14	28.6	0.570	1	0.323
No	83	20	24.1			
Total	132	34	25.8			

**Table 3:** Prevalence of vaginal candidiasis in relation to previous infection with vaginal candidiasis.

Antibiotic therapy	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
Yes	13	8	61.5	0.002	1	9.654
No	119	26	21.8			
Total	132	34	25.8			

**Table 4:** Prevalence of vaginal candidiasis in relation to antibiotic therapy.

Vaginal douching	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
Yes	11	3	27.3	0.904	1	0.014
No	121	31	25.6			
Total	132	34	25.8			

**Table 5:** Prevalence of vaginal candidiasis in relation to vaginal douching.

Oral contraceptive	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
Yes	2	1	50	0.430	1	0.624
No	130	33	25.4			
Total	132	34	25.8			

**Table 6:** Prevalence of vaginal candidiasis in relation to oral contraceptive.

Tight nylon pants	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
Yes	29	7	24.1	0.821	1	0.051
No	103	27	26.2			
Total	132	34	25.8			

**Table 7:** Prevalence of vaginal candidiasis in relation to tight nylon pants.

Symptoms	No examined	No positive	Prevalence (%)	P-value	Df	X <sup>2</sup>
Yes	25	25	100	0.000	1	88.895
No	107	9	8.4			
Total	132	34	25.8			

**Table 8:** Prevalence of vaginal candidiasis in relation to vaginal discomfort/discharge.

Candida seen	No positive	Prevalence (%)
<i>Candida albicans</i>	10	29.4
Non <i>candida albicans</i>	24	70.6
Total	34	25.8

**Table 9:** Prevalence of *candida albicans* and non *candida albicans*.

## Discussion

The results of this study have established the prevalence of vaginal candidiasis among female students of the Faculty of Health Science and Technology of University of Jos with a prevalence rate of 25.8%. This study corresponds with the work done by [20] who recorded a prevalence of 26.0%. This is contrary to the work done by [2,16] who recorded a prevalence of 19.1% and 20% respectively. The high prevalence of vaginal candidiasis in this study could be attributed to low socioeconomic status, improper hygiene and less education/knowledge about the risk factors.

*Candida* was observed mostly between the age group of 20-29 years with a prevalence rate of 26.9%. This finding is similar with that of [2,21] which reported highest prevalence in 22-26 years age group 32.3% and 39.08% in 26-30 years age group respectively. It was followed by 33.3% with the age range of 30-39 years, 14.3% within the age range of 15-19 years and 0% within the age range of 40 years and above. It may be due to high sexual activity, poor personal hygiene, the use of contraceptives and drug abuse among this age group 20-29 years. This study revealed that students who are at the beginning and peak of their reproductive years are more vulnerable to infections. This observation is consistent with the reports of [2,5] who revealed that women in their reproductive years were more prone to vaginal candidiasis compared to other age groups. This is because estrogen which induces the lining of the vagina to mature contains glycogen, a substrate on which *Candida albicans* thrives. Thus, the reduced or lack of estrogen production in older women 40 years and above makes vaginal candidiasis much less common in this age group. They also rarely use oral contraceptives to prevent pregnancy, they are less sexually active and they seldom misuse drugs [22]. There was no statistically significant relationship between the prevalence of vaginal candidiasis with age ( $P = 0.554$ ).

Medical Laboratory Science Department had a prevalence of 30% while Nursing Department had a prevalence of 22.2%. Reasons why Medical laboratory science department had a higher prevalence might be due to lack of proper knowledge of the risk factors of *Candida* and personal hygiene. There was no statistically significant relationship between the prevalence of vaginal candidiasis with department ( $P = 0.309$ ).

The relationship between the prevalence of vaginal candidiasis and some risk factors were evaluated in this study. Previous

infection with vaginal candidiasis had a prevalence rate of 28.6%. This could be that the yeast infection did not respond to the first course of treatment as a result of being resistant to treatment, this most seen in chronic yeast infection. It could also be as a result of incomplete medication so that the required dose of antifungal drug prescribed to fully destroy the yeast infection was not adhered to and thus giving room for the infection to survive and reoccur [23]. There was no statistically significant relationship between the prevalence of vaginal candidiasis with previous infection with vaginal candidiasis ( $P = 0.570$ ).

This study showed the prevalence of antibiotic therapy with vaginal candidiasis was 61.5%. This finding is in conformity with the fact that prolonged antibacterial use can destroy the normal flora (*Lactobacillus acidophilus*) in the vagina which suppresses the growth of *Candida albicans*. This microbial flora has been known to secrete acidic materials which help to keep the  $P^H$  of the vagina under check. Alteration of the normal  $P^H$  influence the over growth of *Candida* leading to vaginal candidiasis [24]. Although wide spread use of antibiotics has been suggested as one of the major factors contributing to the rising incidence of vaginal candidiasis [25]. There was statistically significant relationship between vaginal candidiasis and antibiotic therapy ( $P = 0.002$ ).

It also showed the number of vaginal candidiasis case that practice vaginal douching was 27.3% which was similar to the study done by [2]. Most chemical ingredients found in douching solutions have been reported to cause irritation of the vagina and subsequent alteration of the vagina normal flora, leading to the development of yeast infection [12]. There was no statistically significant relationship between the prevalence of vaginal candidiasis with vaginal douching ( $P = 0.904$ ).

Prevalence rate of 50% was recorded among students that use oral contraceptives. A previous study has revealed that pills and estrogen hormone replacement therapy often alter the  $P^H$  of the vagina, weakening the immune system and promoting the growth of *Candida albicans* [23]. Women of reproductive age often use oral contraceptive as birth control. Thus, these students may be at risk of developing vaginal candidiasis as observed in this study since most of them were at the peak of their reproductive ages. There was no statistically significant relationship between the prevalence of vaginal candidiasis with oral contraceptive ( $P = 0.430$ ).

The use of tight nylon pants had a prevalence rate of 24.1%. The use of nylon pants has been reported to foster fungal growth [3]. This is because these tight fitting nylon pants discourage vagina aeration, increasing the moisture of the region and making the vagina warmth and dark. These conditions have been observed to support and promote the growth of *Candida albicans* in the vagina, resulting in infection [13]. There was no statistical significant relationship between vaginal candidiasis and tight nylon pants ( $P = 0.821$ ).

Subjects with vaginal discomfort/ discharge had a high prevalence rate of 100% of *Candida* positive cultures than those with no vaginal discomfort with a prevalence rate of 8.4%. This report is in agreement with findings of [21] and was found to be statistically significant  $p > 0.005$ . These symptoms are mostly caused as a result of alteration in the normal vaginal flora which promotes the growth of *Candida*. There was statistically significant relationship between vaginal candidiasis and vaginal discomfort and discharge ( $P = 0.000$ ).

This study revealed that the prevalence of *Candida albicans* among the study population to be 29.4% which was lower than that of non *Candida albicans* 70.6%. This finding is in agreement with the findings of [5] who also observed a concomitant increase in the prevalence of non *Candida albicans* species in their study. Vaginal candidiasis induced by non *Candida albicans* species is clinically indistinguishable from that caused by *candida albicans* [26]. The reason for the increase in incidence of vaginal candidiasis by non *Candida albicans* species is thought to be single dose antifungal treatment, low dosageazole maintenance regimens, and the use of over the counter antimycotics [27]. Therefore, for effective control of vaginal candidiasis it is advisable to identify the *candida* spp alongside clinical symptoms before planning for treatment [5].

## Conclusion

The result from this study indicated a high prevalence of vaginal candidiasis among Faculty of Health Science and Technology students of University of Jos. Out of the 132 high vaginal swab (HVS) samples collected and examined, 34 samples were positive for *candida* with prevalence of 25.8%. This high prevalence rate might be due to poor personal hygiene, the use of oral contraceptive, misuse of antibiotics, vaginal douching, the use of tight nylon pants and recurrent vaginal candidiasis infection. Also, from the results obtained in this study, there is a significant relationship between

antibiotic therapy and vaginal discomfort/discharge with vaginal candidiasis.

## Recommendations

From this study, it is recommended that in elimination and reduction of vaginal candidiasis among students, the following steps should be taken;

- Female students generally should be educated on how to maintain a high standard of sanitary hygiene in their physical bodies and undergarments.
- An awareness campaign should be arranged to expose sexually active women to the predisposing factors of vaginal candidiasis.
- Taking drugs like oral contraceptive pills, corticosteroids and prolonged use of antibiotics should be minimized if not proscribed.
- It should however be recommended that female students complaining of abnormal vaginal discharge be assessed and proper laboratory diagnosis carried out for effective treatment.
- There is a need to build on findings generated from this study to identify/characterize the non *albicans candida* spp. isolated and possibly conduct antifungal susceptibility testing.

## Limitation of the Study

The inability to attain the minimum sample size due to the refusal of some female students to participate in the study due to personal reasons as well as the use of questionnaire suggests that individual opinion was assessed which may not be very objective. Also, inability to carry out antifungal susceptibility tests due to financial constraints.

## Bibliography

1. Sobel JD. "Vulvovaginal candidiasis". *Lancet* 369.9577 (2007): 1961-1971.
2. Mbim E N., et al. "Prevalence of Vaginal Candidiasis among female students of a Hostel in the University of Calabar, Calabar". *Applied Life Sciences International* 13.3 (2017): 1-7.
3. Ferrer J. "Vaginal candidiasis epidemiological and etiological factors". *International Journal of Gynecology and Obstetrics* (2000): 200-203.

4. Al-Ahmadey ZZ and Mohamed SA. "Vulvovaginal candidiasis: Agents and its virulence Factors". *Microbiology Research International* 2 (2014): 28-37.
5. Emeribe AU., et al. "Prevalence of Vulvovaginal candidiasis among non pregnant women attending a tertiary health care facility in Abuja, Nigeria". *Research and Reports in Tropical Medicine* 6 (2015): 37-42.
6. Ray D., et al. "Prevalence of *Candida glabrata* and its response to boric acid vaginal suppositories in comparison with oral fluconazole in patients with diabetes and vulvovaginal candidiasis". *Diabetes Care* 30.2 (2007): 312-317.
7. Nelson S. "Vaginal yeast infection overview". *E-medicine Health* (2015): 1-3.
8. Sobel JD., et al. "Vulvovaginal candidiasis: Epidemiology, diagnostic, and therapeutic considerations". *American Journal of Obstetrics and Gynecology* 178 (1998): 203-211.
9. De Leon EM., et al. "Prevalence and risk factors for vaginal *Candida* colonization in women with type 1 and type 2 diabetes". *BMC Infectious Diseases* 2 (2002): 1.
10. Geiger AM., et al. "Chronic vulvovaginal candidiasis: characteristics of women with *Candida albicans*, *C. glabrata* and no *Candida*". *Genitourin Medical* 71.5 (1995): 304-307.
11. Rathod SD., et al. "Epidemiologic Features of *Vulvovaginal candidiasis* among reproductive-age women in India". *Infectious Diseases in Obstetrics and Gynecology* (2012): 85-90.
12. Eckert LO., et al. "Vulvovaginal candidiasis: Clinical manifestations, risk factors, management algorithm". *Obstetrics and Gynecology* 92 (1998): 757-765.
13. Akingbade OA., et al. "Prevalence of *Candida albicans* amongst women attending health centers in Abeokuta, Ogun state, Nigeria". *New York Science Journal* 6 (2013): 53-59.
14. Okonkwo NJ., et al. "Prevalence of vaginal candidiasis among pregnant Women in Nnewi Town of Anambra State, Nigeria". *African Research and Review* 4.4 (2010): 539-548.
15. Odds F and Bernaerts R. "CHROMagar *Candida*, a new differential isolation medium for presumptive identification of clinically important *Candida* species". *Journal of Clinical Microbiology* 32 (1994): 1923-1029.
16. James GD., et al. "Prevalence and antifungal susceptibility profile of vulvovaginal candidiasis amongst women of reproductive age in Jos metropolis Nigeria". *World Journal of Pharmaceutical and Life Sciences* 3.3 (2017): 152-156.
17. Jindal N., et al. "An epidemiological study of vulvovaginal candidiasis in women of childbearing age". *Indian Journal of Medical Microbiology* 25 (2007): 175-176.
18. LatLang. Jos, Nigeria (2019).
19. Rajendran K F. "A study of isolation and identification of non albicans *Candida* species from clinically suspected cases of vulvovaginitis". *International Journal of Current Microbiology and Applied Sciences* 3.12 (2014): 147-159.
20. Maikenti IJ., et al. "The Prevalence of Vaginal *Candida* Colonization among Female Students in Bingham University". *British Microbiology Research Journal* 12.2 (2016): 1-7.
21. Salvi M. "Prevalence of vulvovaginal candidiasis in females in the reproductive age group". *International Journal of Reproduction Contraceptive Obstetric and Gynecology* 8.2 (2019): 647-651.
22. Kristeen C. "Why do yeast infections return?" *Healthline* (2018): 1-7.
23. Spinillo AC., et al. "Effect of antibiotics use on the prevalence of symptomatic Vulvovaginal candidiasis". *American Journal of Gynecology* (1999): 164-171.
24. Foxman B., et al. "Frequency and response to vaginal symptoms among white and African American women: results of a random digit dialing survey". *Journal of Women's Health* 7.9 (1998): 1167-1174.
25. Bauters TG., et al. "Prevalence of vulvovaginal candidiasis and susceptibility to fluconazole in women". *American Journal of Obstetric and Gynecology* 18.3 (1992): 56-74.
26. Reed BD. "Risk factors for *Candida* vulvovaginitis". *Obstetric and Gynecology Survey* 47.8 (1992): 551-560.
27. Nelson M., et al. "Prevalence of vaginal candidiasis and determination of the occurrence of *Candida* species in pregnant women attending the antenatal clinic of Thika District Hospital, Kenya". *Open Journal of Medical Microbiology* 3 (2013): 264-272.