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Research Article

**RETROSPECTIVE ANALYSIS OF SEASONAL VARIANCE OF  
CANDIDA VAGINITIS IN XINJIANG, CHINA**Yasir Ali Butt<sup>1</sup>, Xiao Dong-Wang<sup>1</sup>, Hadiliya-Hasimu<sup>1</sup>, Qazi Syed Irfanullah Shah<sup>1</sup>,Palida Abulizi<sup>1,2</sup><sup>1</sup> Department of Dermatology, The First Affiliated Hospital of Xinjiang Medical University, Urumqi, Xinjiang, China.<sup>2</sup> Palida Abulizi, Department of Dermatology, The First affiliated Hospital of Xinjiang Medical University, Urumqi, Xinjiang, China. Electronic address: palidae@aliyun.com, mailing address: Xinshi District, Urumqi, NO.393. Telephone:4366117, Fax numbers: 0991-4362974**Article Received:** February 2019**Accepted:** March 2019**Published:** April 2019**Abstract:**

*Candida vaginitis is an ecology-related imbalance of the vaginal tract microbiota that affects most of the ladies of nearly reproductive age. This research-based study was performed among 2661 women having age range between 9 to 85 years that were registered at the first affiliated hospital of Xinjiang province of China from January 2017 to December 2017. The aim of the study was to assess the prevalence of Candida vaginitis, risk factors involved with it and to analyze the type of yeast associated with Candida vaginitis and BV (Bacterial vaginitis). The overall prevalence of Candida vaginitis was increased in the second half of the year among the patients. Douching was statistically related to CV. Also, CV was significantly associated with consistency, odor, and amount of abnormal vaginal discharge. Contraceptives users on anatomical sites were found more prone to CV than those who did not use contraceptives on anatomical sites. Fungal microscopy, trichomonas, Neisseria gonorrhoea, lactobacillus, heterobacillus, Bv sialidase, coagulase, staphylococcus aureus was associated with CV and out of those heterobacillus & Lactobacillus spp. were the predominant organisms. The higher prevalence of CV among symptomatic patients indicates interventions should be applied to reduce the incidence of stillbirth, abortion, and sterility [7][4].*

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**BACKGROUND:**

The term Candida vaginitis refers to the vaginal yeast infection that usually causes the itching. It could appear in multiple ways i.e. vaginal discharge containing many WBCs, harsh itching in vagina, vulvar irritation, vaginal odor, vaginal erythema, dyspareunia, and dysuria. The three most common causes of Candida vaginitis are bacterial vaginosis (BV), being the most prevalent one, followed by candidiasis and trichomoniasis. BV is a common vaginal infection that occurs mostly in women of child-bearing age [3].

Bacterial vaginosis is an ecologic disorder of the vagina which is traditionally characterized by a shift in bacterial ecology from one dominated by lactic-acid-producing several lactobacilli to a predominance of Gardnerella and flora. It is usually a condition that is characterized by a thin, gray/off-white colored vaginal discharge which is clearer after the activity of menses and intercourse. An odor like fish has been noticed during this disorder [1][5][8].

Many cases of BV remain asymptomatic or present with only vaginal Lactic acid produced by the flora, fungus candida albicans, Lactobacillus through H<sub>2</sub>O<sub>2</sub> production, is attributed to the acidic natural milieu of the vagina. This provides a defense mechanism by stopping the new growth of other organisms. Changes in the normal growing vaginal flora cause a change in PH simultaneously that allows a variety of anaerobes fungi and facultative bacteria to grow in excess and causes various chronic infection as well as abnormal vaginal discharge. Lactobacilli also produce antimicrobial substances like lactic acid, H<sub>2</sub>O<sub>2</sub>, and bacteriocin promotes a sound and healthy ecosystem in the vagina by superposing the growth of pathogens.

Other than fungi, Lactobacillus spp., various other bacteria are also abundantly found in the vaginal micro-biota of healthy women. The various other organism found in the vagina of a women are fungus, trichomonas, (NG)Neisseria gonorrhoea, (LB)lactobacillus, (HB) heterobacillus, BV sialidase, coagulase, staphylococcus aureus, Peptostreptococcus spp, Fungal microscopy, (AV)Atopobium vaginae, (GV)Gardnerella vaginalis, Ureaplasma urealiticum, Mycoplasma hominis, and Mobiluncus and few others. When the level of population of lactobacilli decreases below a specified critical level, these opportunistic bacteria may grow in excess becoming the dominant species in the ecosystem of the environment.

During pregnancy, these vaginal infections can be associated with critical complications for both the mother and the neonate that leads to gynecologic and obstetric complications. Candida vaginitis also increases the risk of acquiring Human Immunodeficiency Virus (HIV) and Sexually Transmitted Diseases (STDs). Candida vaginitis may be considered as Sexually Enhanced Disease (SED) rather than STDs, in which the frequency of intercourse plays a key role. Hence, emphasis to explore primary preventive strategies needs to be given more priority.

Main Preventive strategies target the risks factors or behaviors for a disease. Studies suggest that Candida vaginitis is associated with a number of risk factors and behaviors, including age of the women, her marital status, employment status, working occupation, recent antibiotic usage, decrease in estrogen production of the host, douching, sexual intercourse activity, lower age of first intercourse, episodes of receptive oral sex, spermicide use, STDs, working as a sex worker, contraceptives used, smoking, alcohol intake, stress, , frequency of vaginal intercourse, and race/ethnicity. According to observational studies, women using hormonal contraceptives have a reduced risk of recurrence to Candida vaginitis [2][6].

**MATERIALS AND METHODS:****Study Design:**

The study was carried out from January 2017 to December 2017 at the first affiliated hospital of Xinjiang, province of China. The detection and determination of vaginal cleanliness, (WBCs) white blood cells, fungal microscopy, heterobacillus, lactobacillus number, *Trichomonas vaginalis*, clue cells, bacterial density, flora diversity, dominant bacteria, and vaginal pH value were performed in the Department of Laboratory Medicine. All procedures and protocols of this study were approved by the higher authorities within which the work was undertaken.

**Sample Collection & Processing:**

A total of 2661 women were included in this research-based study. Based on age, they were initially divided into four different groups: the younger age group (10–24 years old), the optimum reproductive age group (25–30 years old), the older age group (31–45 years old), and the oldest age group (45–85 years old). Participants of the study were surveyed about their age, condition and status of their pregnancy, married or unmarried, the nature of their vaginal discharge (color, secretion amount, itching, and perineal dysuria), symptoms, past medical history, and treatment history before the gynecological examination. The inclusive

criteria were as follows: natural conception, intrauterine pregnancy proven by B-ultrasound, and no hormones, antibiotics, immunosuppressive agents used in the past 2 weeks, no sexual life, and their history of vulva/vaginal medication in the last 3 days. Women who had pregnancy complications, such as hypertension, diabetes mellitus, surgical complications, placenta previa, placental abruption, miscarriage, or preterm labor, were excluded from the study [9].

Vaginal discharge samples of these 2661 patients were collected on sterile long handle scrapers. Some of these samples were made into smears, and the rest were collected on sterile cotton swabs. All swabs and smears were sent to the Department of Laboratory Medicine of our hospital for fungal morphologic observation and vaginal pH determination. The wet mount was performed to view the presence of motile oval flagellated protozoa, *Trichomonas vaginalis*, clue cells, and white blood cells. For yeasts, Gram staining and germ tube test was done [11][14][17].

### Statistical analysis

The data was analyzed in detail by SPSS Statistics ver.16.0. Different tests were used to analyze the differences in micro ecological factors such as vaginal cleanliness, heterobacillus, Lactobacillus spp., Candida spp., T. vaginalis, clue cells, bacterial density, flora diversity, dominant bacteria, and pH value [1].

### RESULTS:

Upon examination of 2661 female patients with symptomatic vaginal discharge throughout the year, the overall prevalence of CV among the patients was higher from July to December with 1764 registered patients.

In terms of consistency of abnormal vaginal discharge among CV cases, the occurrence of the thin discharge had the highest prevalence (39.8%) while the least was among women with normal discharge (4.9%). The foul discharge was reported in (29.9%) of patients while non-foul discharge was found in (14.3%) of patients. Excess discharge was observed in patients with CV (30%) while scanty discharge was observed in (18.7%). Women with CV were found to be associated with consistency, odor, and amount of vaginal discharge. The results are shown in Table 1.

**Table 1: Sample Distribution on the basis of symptoms.**

Candida Vaginitis			
Vaginal Symptoms	Number (N=2661)	Positive Number (%)	Negative Number (%)
<b>Discharge</b>			
Normal	1064	4.9	95.1
Thin	1330	39.8	60.2
Thick	133	18.8	91.2
<b>Odor</b>			
Foul	1596	29.9	70.1
Non Foul	1068	14.3	85.7
<b>Colour</b>			
White	2394	27	73
Gray	266	14.7	85.3
<b>Amount</b>			
Excess	1329	30	70
Scanty	1330	18.7	86.3
<b>Abdominal Pain</b>			
Yes	1410	26.6	75.4
No	1251	22.1	87.9
<b>Itching</b>			
Yes	932	23.2	74.8
No	1730	25	75

A total of 99 bacteria belonging to 14 different species were isolated from vaginal samples, which are tabulated in Table 2. Among the isolates, 41 (32%) were Gram negative and 58 (45.3%) were Gram positive. Other isolates

including yeasts and parasites which were 29 in number and in percentage they were 22.7. Of the Gram negative bacteria, *Pseudomonas* spp, *E.coli*, and *Acinetobacter* spp. were predominant. *Heterobacillus*, *Lactobacillus* spp. were the dominant Gram-positive bacteria found in vaginal samples.

**Table 2: Prevalence of microorganisms isolated from vaginal swabs among patients.**

Microorganisms	Percentage (%)
<b>Gram negative:</b>	
<i>Escherichia coli</i>	6.3
<i>Klebsiella spp.</i>	3.1
<i>Proteus vulgaris</i>	0.8
<i>Proteus mirabilis</i>	3.1
<i>Proteus mirabilis</i>	3.1
<i>Pseudomonas spp.</i>	7.8
<i>Neisseria gonorrhoeae</i>	3.1
<i>Acinetobacter spp.</i>	6.3
<i>Citrobacter koseri</i>	0.8
<i>Enterobacter spp.</i>	0.8
<b>Gram-positive:</b>	
<i>Streptococcus agalactiae</i>	5.5
<i>Staphylococcus aureus</i>	5.5
CoNS	3.1
<i>Enterococcus spp.</i>	3.9
<i>Heterobacillus spp.</i>	92.7
<i>Lactobacillus spp.</i>	42.7
<b>Others: (yeasts and parasite)</b>	
<i>Candida albicans</i>	3 (2.3)
<i>Candida spp.</i>	12 (9.4)
<i>Trichomonas vaginalis</i>	14 (10.9)

### DISCUSSION:

Globally, *Candida* vaginitis is a common genital problem among women seeking gynecological care. The prevalence rate of CV was found to be 24.4% by Nugent's method. Modak et al. in India reported a similar result, providing a prevalence rate of 24%. Higher prevalence rates of CV than those in the present study were also reported by Gad et al. in Egypt (33%). The variation in the findings might be due to population size, methods of analysis, geographic distribution, and socioeconomic and behavioral differences in the studied population.

The present study revealed that the prevalence of *Candida* vaginitis was high among women of age group 30 to 40 years (8.8%) and least for 10 to 20 and

50 to 60 years' age groups (1.3%). However, the difference between them was not purely statistically significant. Bhattarai in Nepal observed the highest prevalence of CV among the age group of 31–40 years (60.16%) and least among those that were below 20 years of age and 51–60 age group (33.33%) which was similar to the above study. Also, Garba et al. in Nigeria found CV and BV to be most prevalent among 26–30 age group (35.8%) and least in >40 age (10.5%). The highest prevalence in the age group 30–40 years might be due to the age being the most reproductively active age group and high sexual exposure at this age.

According to this study, unmarried women were at higher risk (100% tested positive) compared to married women (24.2%). The finding of the study is

contradicted by Gad et al. in Egypt. However, several studies have documented the occurrence of CV in sexually inactive females or virgins. This provides evidence that sexual activity is not a prerequisite for *Candida* vaginitis. The change in lifestyle, improper perineal care, food habits, tight clothing, lack of attention towards menstrual hygiene, and sedentary factor might be the reasons for the acquisition of CV in unmarried women.

Similarly, uneducated women had the highest *Candida* vaginitis prevalence of 29.1% which differs from Ibrahim et al. who recorded the highest prevalence of 54% in those with primary education in Nigeria. The low economic status, lack of education, lack of a female consultant at the health service center, hesitance to approach medical service, and sociocultural structure might be the cause of the higher prevalence of CV among less educated women. A combination of environmental, contextual and institutional factors and chronic stress may contribute to this disparity.

Moreover, the study revealed that daily smokers were more prone to CV than those who never smoke, but the difference between them was not significant which is contrary to the results of a study carried out by Manandhar et al. in Nepal. Risk of CV and BV increases as the number of cigarettes smoked per day increases. Various chemical constituents of cigarette smoke alter the vaginal microflora or may act by depleting Langerhans cells in cervical epithelium leading to local immunosuppression, thus causing BV. The study showed daily alcohol users had a higher rate of *Candida* vaginitis (38.5%) than those with occasional consumption of alcohol but this association was not significant. However, the finding is consistent with the report of Hellberg et al. in Sweden which stated that alcohol use was not significantly associated with BV. Smoking cigarettes and alcohol intake cause depletion of hydrogen peroxide-producing lactobacilli, therefore increasing the risk. This study showed non-vegetarians had high occurrence (25.2%) than vegetarians (15.7%) which was statistically insignificant. The finding is similar to the finding by Manandhar et al. in Nepal. High fat intake, particularly saturated fat, may increase vaginal pH, thereby increasing the risk of CV.

In this study, it was observed that the prevalence of CV was higher among women whose partners were daily condom users than those who were not. However, no significant association was found. The findings are more consistent with the study conducted by Mascarenhas et al. in Brazil who reported no

association between CV and condom use. One possible explanation for this is that condoms may cause irritation giving the fungi and bacteria a way to get into the vagina and increase risk of having BV.

It was observed that 32.1% of the *Candida* vaginitis positive cases were among women having a daily vaginal douching habit and 23.7% were found positive on those women having the habit of douching sometimes. This confirms that vaginal douches represent a risk factor for CV acquisition. A previous study also suggested a strong association between vaginal douching and BV. The lack of effort and awareness on the health hazards of this incorrect practice might be regarded as the cause of higher possibilities of CV among women having vaginal douches habit.

The study also clarifies that the chance of getting CV increases in those women who have used contraceptives on anatomical sites than those who had not. So, the use of contraceptives on anatomical sites may cause an imbalance in vagina flora and leads to CV. Lowest rate of CV was seen among women using OC pills (9.1%). The estrogen increases the glycogen content of vaginal epithelial cell activity, in turn inhibiting the *in vitro* growth of certain bacteria, which may result in low risk for BV. Similarly, the study also agrees with Thulkar et al. in India who reported protective effects of hormonal contraceptives against BV.

In this investigation, consistency, odor, and amount of vaginal discharge were found to be statistically significant with *Candida* vaginitis. This finding corresponds with the previous study conducted by Garba et al. in Nigeria. White colored vaginal discharge had the highest prevalence than gray colored discharge and was found not to be associated with the diagnosis. There is no specific color of vaginal discharges for the diagnosis of *Candida* vaginitis, experts varied in opinion, but it is important to know that women with BV present abnormal vaginal discharges and the vaginal discharges differ in the consistency, Garba et al. Abdominal pain and itching symptoms were found in 26.6% and 23.2%, respectively, which was consistent with the result reported by Nzomo et al. in Kenya. This study registered no significant relationship between abdominal pain, itching, and *Candida* vaginitis [21][5].

Of the 128 isolates, 35 isolates belonged to *Lactobacillus* spp. and 93 isolates were of opportunistic pathogens. *Lactobacillus* spp. was isolated as the most predominant species and



accounted for 27.3% of the total bacterial isolates. Higher prevalence of *Lactobacillus* in this study also resembles the study done by Razzak *et al.* in Iraq and Larsen and Monif in Omaha. Therefore, *Lactobacillus* plays a protective and probiotic role in treating and preventing vaginal infection by producing antagonizing compounds and is regarded as safe for human.

The second common pathogen was *Pseudomonas* spp., accounting for 7.8% BV cases, followed by many other Gram-negative bacteria, namely, *E. coli*, *Acinetobacter* spp., *Proteus* spp., *Klebsiella* spp., *N. gonorrhoeae*, *C. koseri*, and *Enterobacter* spp. But, the findings of the study contradict with the studies undertaken by Razzak *et al.* in Iraq, Marrazzo *et al.* in Seattle, and Larsen and Monif in Omaha. *Pseudomonas* spp. is potentially opportunistic bacteria within the vagina and may become increasingly prevalent upon minor alterations of the vaginal environment. It is considered as a primary pathogen in compromised hosts, hospitalized patients, and complicated urinary tract infection. Collectively, Mumtaz *et al.* suggest that the presence of members of faecal flora in the vagina is attributed to unhygienic bowel practices [20].

The most common Gram-positive cocci were *Staphylococcus aureus* and *Streptococcus agalactiae* in the study. The incidence was found to be 5.5% of total bacterial isolates each. This is consistent with the findings of Maghsoudi *et al.* in Pakistan, Tiyyagura *et al.* in India, and Al-Mousawi *et al.* in Iraq. The vaginal mucosa colonized by *S. aureus* predisposes them to Toxic Shock Syndrome (TSS). The second most prevalent organism among Gram-positive cocci were CoNS and *Enterococcus* spp. accounting for 3.1% and 3.9%, respectively. The finding is similar to the study conducted by Masood *et al.* in Pakistan. CoNS is also a common vaginal colonizer. It continues to be the most important bacterial cause of bacterial sepsis and meningitis in newborns. Enterococci are an opportunistic pathogen and can cause infection when the immune system is impaired.

Regarding the frequency of yeasts and parasites isolated from patients, *Candida albicans* (2.3%) and other *Candida* spp. (9.4%) were reported. The finding is inconsistent with the reported prevalence of candidal infection by Al-Muk and Hasony in Iraq and similar to Maghsoudi *et al.* *T. vaginalis* was observed in 14 cases (10.9%) by wet mount preparation. These are nearly similar to the study reported by Begum *et al.* in Dhaka (8%).

The levels of these various organisms vary in each woman. The results showed that the presence of lactobacilli together with other opportunistic pathogens may be due to several factors like effects of antibiotics, type of incubation (as some *Lactobacillus* spp. are unable to produce some defense factors under anaerobic incubation), and antagonism among lactobacilli species to maintain dominance. Also, some studies have reported that there can be a chance of overlap of BV and aerobic vaginitis, leading to a mixed condition, but whether one condition can evolve into the other has not yet been determined [18][19].

#### CONCLUSION:

The study suggests that using contraceptives on anatomical sites may confer a higher risk for *Candida* vaginitis. No. of patients suffering from CV increased in the second half of the year from July to December 2017. Some factors, especially vaginal douching, may increase the risk of CV. Fungal infection, *Heterobacillus* & *Lactobacillus* spp. were the predominant isolates found in the vaginal sample followed by a number of *Enterobacteriaceae* members and Gram-positive bacteria. This finding suggests that the colonization of facultative anaerobes is also more likely a consequence in vaginal ecology. More work needs to be done in this field of study for the health of women. So, similar studies must be carried out in order to improve the health status of women, thereby preventing the risk posed towards CV.

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