

**Republic of Sudan**  
**Ministry of Higher Education and Scientific Research**  
**University of Shendi**  
**Faculty of Postgraduate Studies and Scientific**  
**Research**

**Determination of Vaginal Candidiasis and Risk Factors among  
Female in military hospital in Omdurman**

*A Thesis Submitted in Partial fulfillment of the Requirement for the  
M.Sc. Degree in Medical Laboratory Sciences (Microbiology)*

**By:**

***Esraa Osama Abozaied Haj AL Hassan***  
***B.Sc. in microbiology Sharg elnile collage (2013)***

**Supervisor:**

***Dr. Hadia Abass Eltaib***

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# الآية

قال تعالى:

[وَلَقَدْ خَلَقْنَا الْإِنْسَانَ مِنْ سُلَالَةٍ مِّنْ طِينٍ [12] ثُمَّ جَعَلْنَاهُ نُطْفَةً فِي قَرَارٍ مَّكِينٍ [13] ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَقَةً فَخَلَقْنَا الْعَلَقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ أَنْشَأْنَاهُ خَلْقًا آخَرَ فَتَبَارَكَ اللَّهُ أَحْسَنُ الْخَالِقِينَ [١٤]

صدق الله العظيم

سورة المؤمنون الآية (12-14)

# Dedication

To candle of my life: my mother..My father

My colleagues and my friends

## **Acknowledgment**

*Firstly my great thanks to Allah for guiding me to the straightway in my life. Many thanks and appreciations are extended to my teachers for their support. To my supervisor Dr. **Hadia abass** for his valuable advice and endless efforts to make this work came into reality.*

## **List of Abbreviation:**

UTI: urinary tract infection

C.albican Candida albican

U s United state

SAB Sabouraud Dextrose agar

VVC Vulvovaginal candidiasis

CFU colony forming units

## ملخص الدراسة

### . الخلفيه :

معظم عدوي فطر الكانديده المهلبيه يسببها فطر الكانديده البيكان .  
تعتبر النساء اكثر اصابه به .

**الاهداف:** الهدف من هذه الدراسة هو تحديد مدى انتشار وعوامل عدوى فطر الكانديد للإناث.

### الطريقة:

هذه الدراسة هي دراسة مستعرضة. في هذه الدراسة جمع 100 عينة من البول من مجموعة عمرية مختلفة من الإناث مقسمة إلى أربع مجموعات ، المجموعة الأولى (16-26) سنة ، (27-36) سنة والمجموعة الأخيرة (37-46) سنة.  
تم استخدام صبغة جرام للتعرف على فطر الكانديد واختبار تجرثم أنبوب الفطر للتأكيد.

### النتائج:

أظهرت الدراسة نمو فطر الكانديد في 43 أنثى (43%) و 57 أنثى (57%) لم يظهرن نموًا في ثقافة عينات البول.

### استنتاج:

من نتائج الدراسة الحالية تبين أن نسبة نمو فطر الكانديد كانت أعلى في أعمار الشباب انخفاض الحصانة.

## **Abstract**

### **Background:**

Most vaginal yeast infections are caused by *Candida albicans*. Yeast infections are common in women.

### **Objectives:**

The aim of the study to determine the Candidiasis and risk factors in female attending military in Omdurman hospital during the period of study.

### **Method:**

This study is cross sectional study. A total of 100 sample of urine from different age group of female, divided in to four groups, first group (16-26) years old, (27-36) years old and the last group (37-46) years old. (47-56).

Used gram stain to detect the *Candida albicans* and germ tube test to confirm the fungus.

### **Results:**

The study shows growth of *Candida albicans* in 43 female (43%) while 57 female (57%) did not.

### **Conclusion:**

Candidiasis was higher in young ages

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# **Chapter One**

## **Introduction**

## Introduction

*Candida* yeast are normally present in the vagina in small numbers. It is not classified as a sexually transmitted infection; however, it may occur more often in those who are frequently sexually active. Risk factors include taking antibiotics, pregnancy, diabetes, HIV/AIDS and eating a diet high in simple sugar may also play a role. Tight clothing, type of underwear, and personal hygiene do not appear to be factors. Diagnosis is by testing a sample of vaginal discharge. As symptoms are similar to that of the sexually transmitted infections, Chlamydia and gonorrhea, testing may be recommended.

About 75% of women have at least one vaginal yeast infection at some point in their lives while nearly half have at least two. About 5% have more than three infections in a single year. It is the second most common cause of vaginal inflammation after bacterial vaginosis. Women at risk for candidiasis include those taking strong antibiotics, especially for a long period of time. Antibiotics kill bacteria, which can alter the balance of microorganisms in the vagina, as well as in the mouth, and other places in the body. This can result in a proliferation of yeast and candidiasis. This can also cause yeast infections or thrush in the mouth (oral thrush) and the digestive tract (gastroenteritis). Pregnant women and those with weakened immune systems are also more likely to develop candidiasis and have recurrent bouts of yeast infections. Women with weakened immune systems include those with HIV/AIDS or those taking steroid medications or chemotherapy, which all suppress the immune system. People with diabetes are also more likely to develop candidiasis because the elevated level of sugar in the body provides food for yeast and encourages its overgrowth. Other people at risk include the very young and very old.

Urinary tract infections (UTI) are serious health problems affecting millions of people each year. They are the second most common type of infections in the body, accounting for about 8.3 million visits to the hospitals each year. UTIs are caused by the presence of bacteria in urine, although fungi and viruses could be involved. Majority of women have recurrent infection within one year. Staphylococcus Escherichia coli cause 75-90% of uncomplicated UTIs whereas saprophyticus causes an estimated 5-15% of UTIs frequently in younger women (Enterococcus and other gram negative rods other than E. coli have also been implicated in some cases Significant bacteria is defined as the persistent isolation of > 10<sup>5</sup> colony forming units (CFU) of bacteria per ml of clean voided, mid-stream urine specimens plated clean voided, mid-stream urine specimens plated within 6 h of collection. In females, it is possible that slow growing microaerophiles such as Lactobacillus, Corynebacterium and Streptococcus miler may be involved in the pathogenesis of urinary tract infections. Symptoms are usually precipitated by sexual intercourse UTIs occur in both acute and chronic forms. In the former, patients complain of severe and low back pain that may associate with fever due to the associated bacteraemia, while in the latter, a sensation of perennial fullness is felt. The common causative agent is E. coli but micrococcal infections may account for up to 10 - 20% of cases in sexually active women this infection reaches the bladder by the ascending route, with the main symptoms as urinary frequency and dysuria. Other infections that are due to less common pathogens usually occur in the presence of gross structural abnormality of the urinary tract or neurological effects. Women are at greater risk of developing a UTI than are men The National Women's Health Information Center lists these common causes of urinary tract infections in women

## **1.2 Rational :**

Women infected with candidacies more than men and these due to some possible risk factors associated with vaginal candidacies among female, these study try to detect the problem and determine the risk factors .

## **1.3. Objectives:**

### **1. 3.1. General objectives:**

To determine vaginal Candidiasis in women attending military hospital during the period from March-June 2018.

### **1.3.2. Specific Objective:**

- 1.To isolate and identify the *Candida albican* from female in military hospital during. the period from March-June 2018.
2. To determine the most risk factors associated with canididiasis among the study population.

## **Chapter Two**

### **Literature review**

## **1. Literature review:**

Candidiasis is a very common yeast infection of the vagina. candidacies is caused by a fungal microorganism called *Candida albicans*. Candidiasis may also be called vaginal thrush. The fungal yeast that causes most cases of vaginal candidacies, *Candida albicans*, normally lives in some places in the body, such as the mouth and vagina, in a certain balance with other microorganisms, such as bacteria. However, some factors or conditions may result in an overgrowth of *Candida albicans* and result in candidacies. *Candida albicans* is the most common type of yeast infection found in the mouth, intestinal tract and vagina, and it may affect skin and other mucous membranes. If the immune system is functioning optimally, this type of yeast infection is rarely serious. However, if the immune system is not functioning properly, the candida infection can migrate to other areas of the body, including the blood and membranes around the heart or brain, causing serious candida symptoms. The genital tract is the portal of entry for numerous sexually and non-sexually transmitted diseases. A number of bacterial and non-bacterial infections exist that affect the female reproductive tract and cause vaginal discharge. Vaginal discharge is a common symptom in primary health care and is often the second most common gynecological problem after menstrual disorders. Most women regard any secretion from the vagina as abnormal discharge and the first task for primary health care providers is to ascertain whether it is pathological or physiological (Dodson and Friedrich, 1997).

There are few women who complain of vaginal discharge, discomfort or odour without any objective finding (Dodson and Friedrich, 1997). Such women may be motivated by a neurotic fear of uncleanliness, guilt concerning sexual activities, or anxiety about venereal disease, whether or not sexual exposure has actually taken place. A number of vaginal infection present with few or no

symptoms and yet produce serious effect and can be transmissible to other people.

The non- bacterial pathogens associated with vagina infection are *Trichomonas vaginalis*, *Gardnerella vaginalis* , and fungi like *C. albicans* and viruses like Herpes Simplex Virus *Bacteriodes* spp, *Chlamydia trachomatis*, *Listeria monocytogenes* , and  $\beta$ - hemolytic streptococci (Cheesbrough, 2000). Candidiasis is the most common opportunistic fungal infection (Hedayati and Shafiei, 2010). Vaginitis is one of the principal motives that lead women to seek out an obstetrician or gynecologist. Candidiasis is responsible for 90% of the cases of infectious vaginitis (Adad *et al.*, 2001).

Vulvovaginal candidiasis (VVC) is a fungal infection of the female lower genital tract-the vulva and the vagina, caused by *Candida* species (Sobel, 2007; Akal., 2010).

*Candida* is the fourth most common cause of nosocomial bloodstream infection in the United States (Pappas *et al.*, 2009). *Candida* species that cause vaginitis most often are *C. albicans*, *C. g/abrata* and *C. tropicalis*. *Candida* spp. that rarely causes infection includes *C. parapsilosis*, *C. pseudotropicalis*, *C. krusei*, *C. guilliermondi* and *C. stellatoidea* (Cronje *et al.*, 1994). The bacterial flora of the female genital tract is diverse and varied; normally aerobic lactobacilli appear in the vagina soon after birth and persist as long as the pH remains acidic (Cruickshank and Sharman, 1994) and more acidic (pH 4.5) during early month of pregnancy. The lactobacilli are suppressed Several factors can be associated with increased rate of vaginal colonization by *C. albicans*: these include pregnancy, use of high oestrogen content and oral contraceptives (Akah *et al.*, 2010; Alli *et al.*, 2011), uncontrolled diabetes mellitus (CDC, 2002; Alli *eL al.*, 2011), prolonged use of broad spectrum antibiotics (Mardh *et al.*, 2002; Alli *et al.*, 2011) which kill the good and beneficial bacteria, allowing yeast overgrowth, poor dietary habits and poor personal hygiene. Many practitioners believe that nylon underwear and tight insulating clothing predispose to vaginal



candidiasis by increasing the temperature and moisture of the perineum (Nwankwo *et al.*, 2010; Alli *et al.*, 2011). A study among African women wearing tight clothes reported a higher prevalence of *Candida albicans* in Vulvovaginal candidiasis than those wearing loose clothing (Alli *et al.*, 2011). The same observation was made in the study by Nwankwo *et al.* (2010), where regular users of tight clothings had 88.2% of *Candida albicans* and occasional and non wearers had 68.6% of *Candida albicans*.

Poorly supported risk factors include use of sponge, intrauterine devices (IUDS), diaphragms, condoms, orogenital sex, douching and intercourse (Mardh *et al.*, 2002, Reed *et al.*, 2003; Alli *et al.*, 2011) and diet with high glucose content (de Leon *et al.*, 2002; Akah *et al.*, 2010; Alli *et al.*, 2011). Indeed, evidence in favour of sexual transmission exists. For instance, penile colonization is four times more frequent in male partners of women affected with VVC (McClelland *et al.*, 2009; Alli *et al.*, 2011) and infected partners commonly carry identical strains.

Overgrowth of several species including *C. albicans* can cause infections ranging from superficial, such as oropharyngeal (thrush) vulvovaginal or candidiasis and subpreputial candidiasis which may cause banalities, to systemic, such as fungemia and invasive candidiasis. Oral candidiasis is common in elderly denture wearers. In otherwise healthy individuals, these infections can be cured with topical or systemic infection medications (commonly over-the-counter antifungal treatments like miconazole, clotrimazole). In debilitated or immunocompromised patients, or if introduced intravenously, candidiasis may become a systemic disease producing thrombophlebitis, endocarditic, or infections of the eyes or other organs. Typically, relatively severe neutropenia is a prerequisite for *Candida* to pass through the defenses of the skin and cause disease in deeper tissues; in such cases, mechanical disruption of the infected skin sites is typically a factor

in the fungal invasion of the deeper tissues. Vaginal yeast infection, also known as candidal vulvo vaginitis and vaginal thrush, is excessive growth of yeast in the vagina that results in irritation. The most common symptom is vaginal itching, which may be severe. Other symptoms include , burning with urination white and thick vaginal discharge that typically does not smell bad, pain with sex, and redness around the vagina. Symptoms often worsen just before a woman's period.

Classic symptoms of vaginal candidiasis include vaginal itching and a thick vaginal discharge. For more information on symptoms and complications, refer to symptoms of vaginal candidiasis Making a diagnosis of vaginal candidiasis includes performing a complete medical evaluation and history and physical examination, including a pelvic exam. This includes taking a small sample or swab from the vagina and/or cervix and examining it under a microscope to confirm an overgrowth of yeast. Other infections of the vagina and reproductive system, such as Chlamydia and gonorrhea , are generally tested for at the same time.

Symptoms of candidiasis can differ between individuals and can vary depending on the severity of the infection. Typical symptoms include vaginal itching, a thick vaginal discharge that resembles cottage cheese, vaginal irritation, burning with urination, and swelling of the vulva. Symptoms may also include some vaginal tenderness, especially during sexual intercourse.

Vaginal infections, or vaginitis, are very common — so much so that most women will experience some form of vaginal infection or inflammation during their lifetime.

A healthy vagina has many bacteria and yeast. Candida can be very serious. Recently, a “superbug” candida species known as *Candida auris* has emerged as a dangerous health threat in several countries and many health care facilities in the U.S. This version of candida — which often spreads through candida

biofilms on surfaces such as catheters and bedrails — has proven resistant to multiple drugs, resulting in serious illness.

The common feature of vaginal infection wearers had 68.6% of *Candida albicans*.

Diagnosis of a yeast infection is done either via microscopic examination or culturing. For identification by light microscopy, a scraping or swab of the affected area is placed on a microscope slide. A single drop of 10% potassium hydroxide (KOH) solution is then added to the specimen. The KOH dissolves the skin cells, but leaves the *Candida* cells intact, permitting visualization of pseudohyphae and budding yeast cells typical of many *Candida* species. For the culturing method, a sterile swab is rubbed on the infected skin surface. The swab is then streaked on a culture medium. The culture is incubated at 37 °C (98.6 °F) for several days, to allow development of yeast or bacterial colonies. The characteristics (such as morphology and color) of the colonies may allow initial diagnosis of the organism causing disease symptoms.

Candidiasis is treated with antifungal medications; these include, nystatin, voriconazole, amphotericin B, fluconazole and echinocandins. Intravenous fluconazole or an intravenous echinocandin such as caspofungin are commonly used to treat immunocompromised or critically ill individuals.

The 2016 revision of the clinical practice guideline for the management of candidiasis lists a large number of specific treatment regimens for *Candida* infections that involve different *Candida* species, forms of antifungal drug resistance, immune statuses, and infection localization and severity. Gastrointestinal candidiasis in immunocompetent individuals is treated with 100–200 mg fluconazole per day for 2–3 weeks.

Possible treatments for severe A diet that supports the immune system and is not high in simple carbohydrates contributes to a healthy balance of the oral and intestinal flora. While yeast infections are associated with diabetes, the level of

blood sugar control may not affect the risk. Wearing cotton underwear may help to reduce the risk of developing skin and vaginal yeast infections, along with not wearing wet clothes for long periods of time. or complicated yeast infections include:

- 14-day cream, ointment, tablet, or suppository vaginal treatment.
- two or three doses of fluconazole (Diflucan)
- long-term prescription of fluconazole (Diflucan) taken once a week for six weeks or long-term use of a topical antifungal medication.
- Patients with recurrent infections are often treated with systemic antifungal. While taking antifungal medications people with weakened immune systems, Candida infections can be difficult to treat and may recur. In these cases, candidiasis can sometimes be life-threatening if it passes into the blood and spreads to vital organs like the lungs, kidney, heart and brain, where it can be fatal.
- Avoiding frequent or prolonged use of oral antibiotics if possible.
- Losing weight if obese.
- Keeping blood sugar levels as normal as possible if suffering from diabetes.
- The skin of the vulva and anus should be washed regularly and kept dry after bathing. Other people's towels or washcloths should not be used.
- The use of chemical products such as bubble bath, hygiene spray, irritating soaps, perfumes or talcum powder should be avoided or kept to a minimum.
- Dry cotton or silk underclothes allow better airing and evaporation of excess moisture. Any tight-fitting garments should be avoided, particularly when exercising.
- Vaginal douching should be avoided. The vagina does not require cleansing other than normal bathing. Repetitive douching disrupts the balance of normal organisms that live in the vagina and can actually increase the risk of vaginal infection.

## **Previous study:**

Study done in 2013 show less common frequency .

.  
Study done in 2010 indicated several factors can be increase rate of vaginal colonization by *C. albicans* include pregnancy, use of high estrogen content and oral contraceptives..

Also study in 2002 was show, the prolonged use of broad spectrum Antibiotics increase vaginal candidacies.

Another study in 2011 among African women that wearing tight clothes reported a higher prevalence of *Candida*.

# **Chapter Three**

## **Materials and Methods**

## **3Materials and Methods**

### **3.1. Study design:**

This is cross sectional study.

### **3.2 Study area:**

The study was conducted in military hospital in Omdurman

### **3.3 Study duration:**

The study conducted during the period from March to June 2018 .

### **3.4Study population:**

woman with different age group(16-26) (27-36) ( 37-46) (47-56) during the period of study.

### **3.5Sampling size:**

A total 100 samples were collected.

### **3.6Data collection:**

Data were collected according to the questionnaire

### **3.7Inclusion Criteria:**

Include female

### **3.8Exclusion Criteria:**

Exclude children and male

### **3.9Ethical consideration:**

This study was approved by College of Graduated Studies in Shendi University of permission from hospital was applied and verbal consent was taken from patients involved in this study.

### **3.10 Data analysis:**

Used SPSS for analyzed the data.

### **3.11Method**

#### **3.11.1Collection of sample**

Total 100 urine samples was collected from women. All the specimens were streaked on prepared Sabouraud Dextrose agar (SDA) plates. The plates were incubated at room temperature and at 37°C for 2-3 days.

#### **3.11.2Indirect microscopic examination**

Gram stain was done in steps after culture.

The result is strange gram positive .

#### **3.11.3Identification test**

#### **3.11.4Germ tube test:**

#### **3.11.5Method:**

- 1- Inoculate the serum with yeast.
- 2- Incubate the tube in water bath at 35-37C for 2-3 hours.
- 3- Transfer drop from preparation into slide cover with cover slide and examine it microscopically using 40X

#### **3.12Result:**

Tube like outgrowth from the cell                      Positive germ tube test

No tube like outgrowth from the cell                      negative germ tube test

.



# **Chapter Four**

## **Results**

## Results

The result represented taken from 100 urine sample females participants attending military hospital, their mean age was (30.2 +9.1), participants separated according to age into four groups, group one, group two, group three and group four, represent (16-26) years, (27-36) years, (37- 46) years and (47-56) years respectively. The growth of *Candida albicans* was noticed in 43 female (43%) and the remaining 57 female (57%) did not show a growth in urine sample culture (table 4.1)

Chi-square tests shows significant correlation between growth of *Candida* in urine sample culture and pregnant females, no association with participant of diabetic history was found (P-value= 0.01), respectively see table(4-3).

**Table(4.1): Distribution of Candidacies among age groups.**

<b>Age groups</b>	<b>growth</b>		<b>total</b>
	<b>Yes (%)</b>	<b>No (%)</b>	
16-26	20 (20%)	26 (26%)	46 (46%)
27-36	13 (13%)	16 (16%)	29 (29%)
37-46	6 (6%)	13 (13%)	19 (19%)
47-56	4 (4%)	2 (2%)	6 (6%)
<b>Total</b>	43 (43%)	57 (57%)	100(100%)

- P-value=0.48
- P-value  $\leq 0.05$  considered significant.

**Table(4.-3): distribution of growth frequency with marital status.**

<b>Marital status</b>	<b>growth</b>		<b>total</b>
	<b>Yes n (%)</b>	<b>No n (%)</b>	
<b>Single</b>	19 (19%)	29 (29%)	48 (48%)
<b>Married</b>	24 (24%)	28 (28%)	52 (52%)
<b>total</b>	43 (43%)	57 (57%)	100(100%)

- P-value=0.5
- P-value $\leq$ 0.05 considered significant.

**Table(3-3): distribution of growth frequency with diabetic history.**

<b>Diabetes</b>	<b>growth</b>		<b>Total</b>
	<b>Yes n(%)</b>	<b>No n(%)</b>	
Yes	10 (10%)	16(33%)	26 (26%)
No	33 (33%)	41 (41%)	74 (74%)
Total	43(43%)	57(57%)	100(100%)

P-value=0.58

- P-value $\leq$ 0.05 considered significant.

**Table(4-3): distribution of growth frequency with pregnancy presence.**

pregnancy	growth		total
	Yes n(%)	Non(%)	
Yes	27(27%)	21 (21%)	48(48%)
No	16(16%)	36(28%)	52(52%)
Total	43(43%)	57(57%)	100(100%)

- P-value=0.01
- P-value $\leq$ 0.05 considered significant.

# **Chapter Five**

## **Discussion, Conclusion and Recommendations**

## Discussion

The study taken from 100 urine sample females participants attending in military hospital, separated according to age into four groups group one, group two, group three and group four, represent (16-26) years, (27-36) years, (37-46) years and (47-56) years respectively. The growth of *Candida albicans* was noticed in 43 female (43%) and the other 57 female (57%) did not show a growth in urine sample culture.

The aim of this study determine the vaginal Candidiasis in women attending military hospital during the period from March–June 2018 and also the risk factor associated with vaginal candidiasis, the *Candida* growth was higher among young ages with percentage of 20% of the ages from 16 to 26 years, 13% of percentage was for ages of 27 to 36 years, 6% of percentage was for 37 to 46 years old and the lower frequency was of *Candida* growth was for the ages from 47 to 56 years by percentage of 4% (P value= 0.5), and these due to sexually activities of woman in this age group.

The participants interviewed also for socio-demographic data and History of disease, according to the data set 52 female was married, and 42 was not , moreover there is increased frequency of *Candida* growth in married females than single ones (24 % vs. 19%, respectively),so hormonal change in the other hand chi-square test shows insignificant association between marital status and the growth of *C.albicans* (P-value= 0.5).

Regarding risk factors found that, the pregnancy was consider as risk factors with statistically significant (P.value= 0.01). this due to fact the pregnant women more susceptible to infection during pregnancy period so the immunity was low.

Study done in 2010 indicated several factors can be increase rate of vaginal colonization by *C. albicans* include pregnancy ,so use of high estrogen content and oral contraceptives.



Also study in 2002 was show, the prolonged use of broad spectrum Antibiotics increase vaginal candidacies.

Another study in 2011 among African women that wearing tight clothes reported a higher prevalence of Candida.

## **Conclusion**

The current study show high growth of *Candida albican* among study population concentrated in young .

Also found the pregnancy was conceder as risk factor.

## **Recommendations**

- Control the risk factors associated with candidiasis .
- Further study with large sample size is recommended.
- Decrease consume sugar.
- It is advised that all females should go for regular routine check- up. There should also be regular public enlightenment for young women on the importance of personal hygiene, appropriate use of contraceptive pills and proper choice of cloths to avoid wearing tight fitting underpants that allow the overgrowth of pathogenic organisms like candida albican

**Chapter six**  
**References and Appendix**

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# **Appendix**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

جامعه سندي

كلية علوم المختبرات الطبيه

### Questionnaire

Determination of *Candida albican* and risk factors in vaginal infection of female .

• Date ..... No

• Name .....

• Tel ..... Age

• Year

Social status .....

Other disease

Diabetes Yes NO

Kidney stone Yes NO

UTI Yes NO

Consume antibiotic Yes NO

Hyper tension Yes NO