

Frequency of Candiduria in Hospitalized Patients of Intensive Care Unit at
Rehman Medical Institue, Peshawar, Pakistan

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Abstract

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BACKGROUND: Candida species have emerged as the predominant fungi found in urine samples. Notably, they have become a significant cause of urinary tract infections, especially in hospitalized patients, with a particular focus on those in intensive care units. The objective of our study is to find out the frequency of candiduria patients in ICU, s of Rehman Medical Institute Peshawar. **METHODOLOGY:** The observational cross-sectional study was carried out in Rehman Medical Institute. 182 patient’s data were taken.

The secondary data have been taken through a self-administered questionnaire. **RESULTS:** In our study total 182 patients were included, 34((18.7%) patients were positive and 148 (81.3%) patients were negative. Out of 182 patients 100 were male and 82 were females. Out of 100 male Patients 11 (11%) were positive and 89 (89%) were

negative while in 82 females, 23 (28.04%) were positive and 59 (71.95%) were negative.

CONCLUSION: In our research study we concluded that the frequency of candiduria were high in females as compare to male and also the frequency was high in those who were above the age of 60.

KEY WORDS: Candida, Candiduria, UTI, ICU.

INTRODUCTION

Candida species, referred to as opportunistic pathogens(1). Under normal physiological conditions they inhabit the external genitalia and mucosal surfaces of both male and female individuals (2). Candida species have emerged as the predominant fungi found in urine samples. Notably, They have emerged as a major contributor to UTI, especially in those patients who are hospitalized, with a particular focus on those in intensive care units (3). Candiduria is the medical term used to describe the presence of Candida species in the urine. The condition can vary in severity, ranging from asymptomatic candiduria, where there are no noticeable symptoms, to clinical sepsis, a severe and potentially life-threatening infection(4). Candiduria is precisely defined as the condition where there are more than 10⁴ colony-forming units of Candida per millilitre of urine. This quantitative threshold serves as a specific criterion for diagnosing the presence of Candida in urine samples(2). Candiduria can, in some instances, lead to systemic infection and candidiasis of particular concern is the development of candidemia, carrying a high risk of morbidity and mortality(1). Candida species are responsible for around 10–15% of UTIs acquired within healthcare facilities (nosocomial UTIs)(5). While urinary tract infections are primarily caused by bacterial pathogens. Candida, which is often overlooked, is gaining recognition as a contributing factor. There is mounting evidence suggesting that the proportion of urinary tract infections attributed to Candida species is on the rise, especially among critically ill patients(1). The occurrence of candiduria in patients from a surgical intensive care unit can serve as an early indicator of disseminated candidiasis, as evidenced by a recent study. In this investigation, patients initially diagnosed with candiduria later progressed to candidemia. The study found that 1.3–10% of patients with prior funguria experienced candiduria, and among these cases, 0.4% eventually succumbed to the death(6). As indicated by certain reports, candiduria impacts a significant number of patients, with approximately 78% of those using urinary devices being affected(4). In urine samples, Candida albicans is the predominant yeast, constituting 50% to 70% of candida isolates in different studies. Subsequently, Candida glabrata and Candida tropicalis are frequently observed among the identified species in urine cultures samples(7). Non Albicans Candida species, which are increasingly developing resistance to anti-fungal medications(5). For example, some

species of *Candida*, including *Candida krusei* and *C. glabrata*, show their nature resistance to fluconazole(8).

CAUSES OF CANDIDURIA

As indicated by certain reports, candiduria impacts a significant number of patients, with approximately 78% of those using urinary devices being affected like placing Foley catheters. Some other insertions like double-J stenting, suprapubic catheters, nephrostomy tubes, and undergoing haemodialysis were identified as factors that increase the likelihood of candiduria.(4).

The widespread utilization of broad-spectrum antimicrobial agents and the use of immune-suppressing drugs after organ transplants was found to raise the likelihood of urinary tract infections by candida. Corticosteroids are also administered alongside immune-suppressive medications like azathioprine and cyclosporine. These drugs work to dampen the natural immune responses of the host against various organisms. The belief was that reduced host immunity led to heightened fungal virulence. Urinary infections are more frequently observed in females because of anatomical and functional factors.(9). Being of advanced age is recognized as an additional risk element for the onset of candiduria. Likewise, diabetes mellitus and dialysis have been identified as a factors that increase the risk of developing of candiduria(10).

DIAGNOSIS

The initial indication of a fungal infection could be the detection of yeast through microscopic examination. To examine a centrifuged sample, it's recommended to utilize a Gram stain. When examining urine samples, *Candida albicans*, along with less frequent species like *Candida parapsilosis* and *Candida tropicalis*, typically appear as budding yeasts ranging from 4 to 10 micrometers in diameter, often exhibiting the formation of hyphal elements. In contrast, smaller budding yeasts measuring 2 to 4 micrometers in diameter and lacking hyphal structures are likely to be *C. glabrata*.

Standard urine culture methods commonly employed in clinical labs to identify bacteria are also effective in detecting yeasts in urine, except for *C. glabrata*. While *C. glabrata* thrives on blood agar, it has a slow growth rate, and colonies may not become visible until 48 hours or longer. This growth delay often occurs after the time when many laboratories typically discard culture plates initially arranged to assess bacterial growth in urine(11).

In medical mycology, Sabouraud glucose agar is a commonly utilized medium for isolating the majority of fungal pathogens. Nonetheless, accurately identifying yeasts based on colony characteristics on this medium proves challenging, and discerning mixed cultures is difficult. A novel specialized culture medium named 'CHROMagar

Candida' has emerged, enabling the selective isolation of yeasts and simultaneous identification of *Candida albicans*, *Candida glabrata*, *Candida tropicalis*, and *Candida krusei*(12).

Various molecular methods have been employed to identify and categorize *Candida* species, encompassing both DNA and non-DNA approaches. DNA-based methods produce precise and consistently reproducible typing information, including microsatellite length polymorphism and multi-locus sequence typing(13).

EPIDEMIOLOGY

Candida has been identified as the primary nosocomial pathogen found in the urogenital tract of patients in ICU's. The occurrence of candiduria in ICU patients ranges from 19% to 44%, as reported in various studies. In a specific study conducted in Spain, 22% of patients who spent more than seven days in the ICU experienced candiduria(1). In a research examination *Candida* species found in the urine of patients who are hospitalized in the United States, *Candida albicans* constituted the majority at 52% of all yeasts, with *Candida glabrata* following at 16%, *candida tropicalis* at 8%, *Candida parapsilosis* at 4%, and *Candida krusei* at 1%. Conversely, a study conducted in Turkey reported a greater occurrence of *Candida albicans* (44%) among all yeast species, with *Candida tropicalis* (20%), *Candida glabrata* (18%), *Candida krusei* (6%), *Candida famata* (5%), *Candida parapsilosis* (4%), *Candida kefyr* (2%), and *Candida guilliermondii* (1%) as the subsequent frequencies. In Ethiopian hospitalized patients who were diabetic, the prevalent *Candida* species identified were *Candida albicans* (42.0%), *Candida glabrata* (34.2%), and *Candida tropicalis* (15.8%)(14).

According to Artiaga Kobayashi et al. in Brazil, Hassaneen et al. in Egypt, and Dalen et al. in the Ottawa Canada, the ratio of candiduria among women was 57.8%, 61.9%, and 76%, respectively. Various global reports indicate variability in the prevalence of candiduria among different countries, with rates of 14% in Egypt and 22% in Brazil (4).

RATIONALE

The previous study shows that there are mounting evidence suggesting that the proportion of UTI caused by *Candida* species is on the rise particularly those in ICU. No such study has been conducted in Khyber Pakhtunkhwa. The rationale behind this study is to address the growing concern of candiduria in Rehman Medical Institute. The study's findings will provide valuable insights into the epidemiology of candiduria in the specific setting of RMI hospital, Peshawar.

MATERIAL AND METHODS

Study Design

Our study design was an observational cross-sectional study.

Study Settings

We collected secondary data from the clinical laboratory of Rehman Medical Institute.

Study Duration

The study was conducted for the duration of 3-4 months.

SAMPLE SELECTION**Inclusion Criteria**

Patients admitted in different ICU of RMI

Candida identified in urine samples.

Exclusion Criteria

Candida identified in other than urine sample in ICU patients.

Sample Size

We calculated the sample size through the formula $n = \frac{p(1-p)z^2}{e^2}$ and our sample size was 182.

Sampling Technique

All samples were collected by non-probability convenient sampling.

Data Collection Procedure

This cross-sectional study was conducted for 3-4 months at Rehman Medical Institute Hayatabad Peshawar. Data was collected through a self-administered Questionnaire.

Ethical Approval

Institutional consent was taken from the department of microbiology at Rehman Medical Institute (RMI) Peshawar, Pakistan. Data is kept confidential and only used for academic purposes.

Data Analysis

For data analysis we use SPSS (Statistical Package for Social Sciences) software version 23.0.

RESULTS

Candida species have emerged as the predominant fungi found in urine samples. This study shows the prevalence of CANDIDURIA in different ICU's of RMI hospital Peshawar.

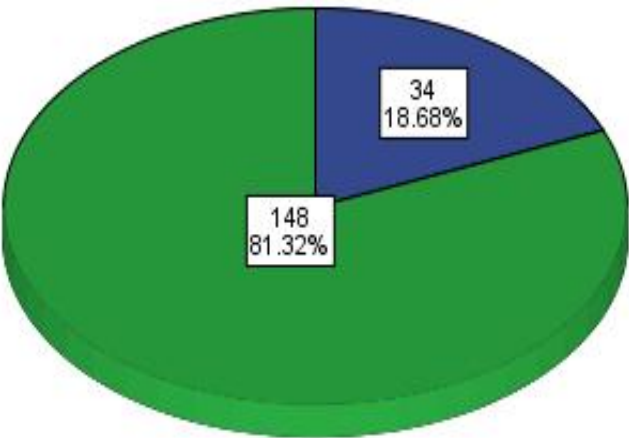


Figure 1: Frequency of Candiduria in in ICU Patients.

Out of 182 patients, 34 (18.7%) patients were positive, and 148 (81.3%) patients were negative as shown in (figure 1).

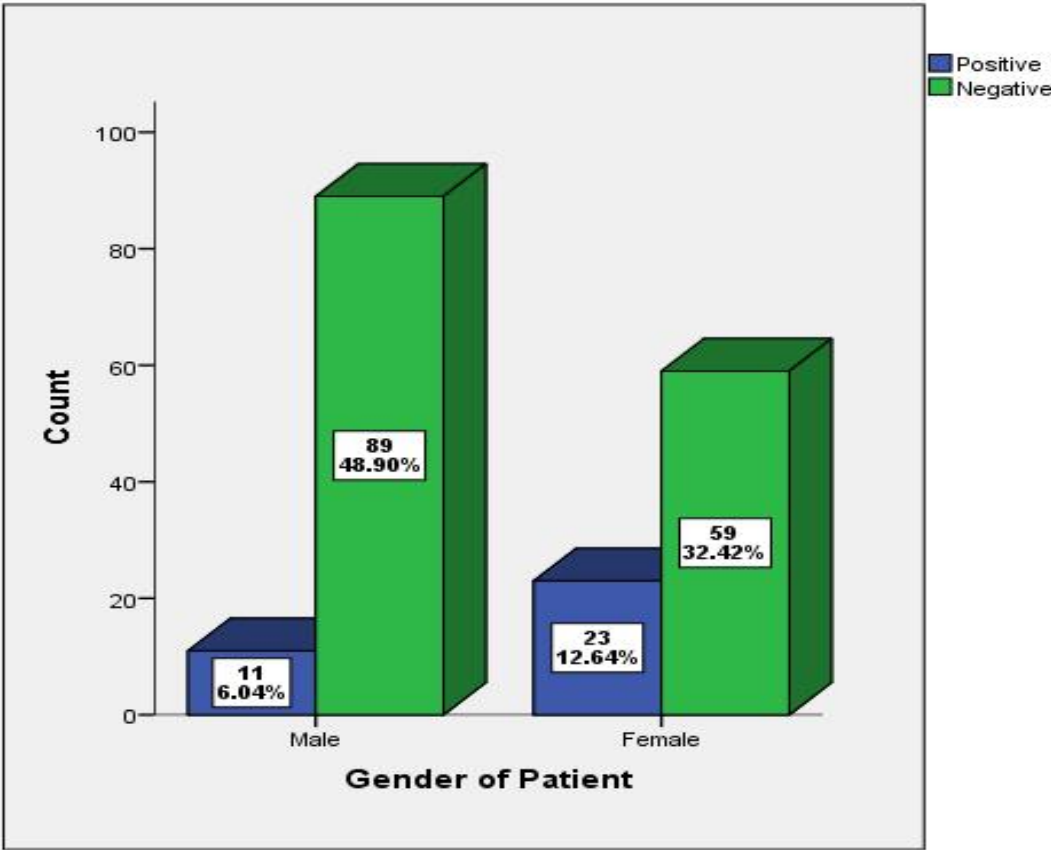


Figure 2: Gender distribution of Candiduria patients in ICU.

Out of 182 patients 100 were male and 82 were females. Out of 100 male Patients 11 (11%) were positive and 89 (89%) were negative while in 82 females, 23 (28.04%) were positive and 59 (71.95%) were negative. This chart shows high ratio of positivity in females over males as shown in (figure 2).

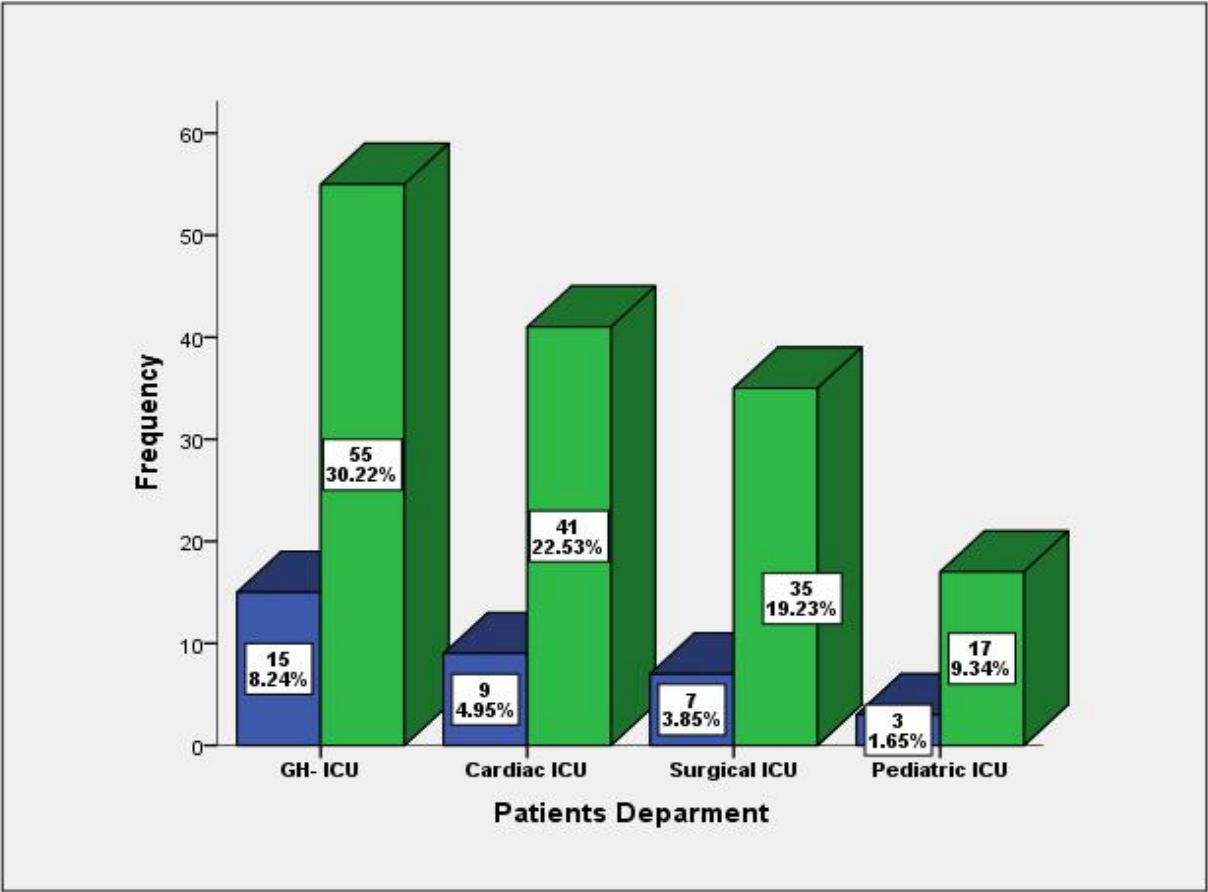


Figure 3: Frequency of Candiduria patients in different ICU's.

GH-ICU: Among total 70 patients 15(21.42%) were positive and 55(78.58%) were negative as shown in figure.

Cardiac ICU: Among the total 50 patients 9(18%) were positive and 41(82%) were negative as shown in the figure.

Surgical ICU: Among the total 42 patients 7(16.66%) were positive and 35(83.33%) were negative as shown in the figure.

Pediatric ICU: among the total 20 patients 3(15%) were positive and 17(85%) were negative as shown in the figure.

Table 1: *Age distribution of Candiduria Patients in ICU.*

Age	Group	Test Result		Total
		Positive	Negative	
31-45	1-15	3(1.65%)	17(9.34%)	20(10.98%)
	16-30	3(1.65%)	16(8.79%)	19(10.42%)
	31-45	9(4.95%)	27(14.84%)	36(11.78%)
	46-60	6(3.30%)	35(19.23%)	41(22.52%)
	>60	13(7.14%)	53(29.12%)	66(36.26%)
Total		34(18.68%)	148(81.31%)	182(100%)

Among total 34 patients which are candiduria positive, we found 3(1.65%) patients from 1-15 age group and 16-30 age group, 9(4.95%) patients from 31-45 age group, between 46-60 there were 6(3.30%) patients and 13(7.14%) were above age of 60. However out of 148 patients which are candiduria negative, we found 17(9.34%) patients from 1-15 age group, 16(8.79%) from 16-30 age group, 27(14.84%) from 31-45 age group, 35(19.23%) from 46-60 age group and 41(22.52%) were above the age of 60. The table 1 shows high ratio of candiduria in patients who are above the age of 60.

DISCUSSION

Candida species have emerged as the predominant fungi found in urine samples. As in this study 182 patients were taken. The frequency of candiduria was 18.68% Among 182 patients 34 (18.68%) were positive, while 148(81.31%) were negative. Ghasemi et al in their study analysed 200 urine samples, 23 patients (11.5%) tested positive for Candida sp. in the culture. Specifically, 19 urine samples were from patients in ICUs, and 4 were from patients in other wards in Iran (16). Claudia Castelo Branco Artiaga Kobayashi et al reported in their study that among the 205 urine samples subjected to culture, fungi were detected in 22% (45 patients), with Candida species being the isolated microorganisms(3).

In results we found 18.68% positivity, in which male were 6.04% and female were 12.63%. Out of 182 patients, 100 male patients, 11(11%) patients were positive and 89(89%) were negative while in 82 female's patients, 23 (28.04%) were positive and 59(71.95%) were negative. We found high frequency of candiduria in female patients. V. C. Abishek et al found that Among 2,500 patients exhibited diverse growth, and a total of 50 Candida strains were identified. The prevalence is higher among females (66%) compared to males 34% (17). Ghasemi et al in their study analysed 200 urine samples,

23 patients (11.5%) tested positive for *Candida* sp. in the culture. *Candida* sp. was detected in 88 (39%) of the male patients and 112 (61%) of the female patients (16).

In this research we found that the frequency of candiduria were high in General ICU. Out of 182 patients, 15 (8.24%) were positive in GH-ICU and 55 (38.22%) were negative. In Cardiac ICU 9 (4.95%) were positive and 41 (22.53%) were negative. 7 (3.85%) were positive in surgical ICU and 35 (19.23%) were negative and in pediatric ICU the positivity was 3 (1.65%) and 17 (9.34%) were negative. The pediatric ICU was having the low frequency of candiduria.

Hassaneen et al conducted their research in Clinical Pathology laboratories and various departments within Zagazig University hospitals in Egypt. The study involved 300 patients who were hospitalized and 50 healthy individuals as a control group. The internal medicine ICU exhibited the highest incidence of candiduria at 27%, followed by the surgery ICU at 18%, the internal medicine ward at 14.7%, and the lowest occurrence was observed in the pediatrics department at 4% (18).

In result we found that the frequency of Candiduria was 18.68% in which greater positivity 13 (38%) were among those who were above the age of 60 years. we found that 3 (8.82%) patients from 1-15 age group were positive. From 16-30 age group 3 (8.82%) patients were positive. From 31-45 age group 9 (26.37%) were positive. Between 46-60 there were 6 (17.64%) patients positive. Yashavanth Rai et al in their study of 2900 urine samples a total of 66 (2.27%) *Candida* species were identified. 4 (6.06%) samples were from 1-15 age group, 8 (12.12%) samples were from 16-30 age group, 15 (22.72%) samples were from 31-45 age group, 18 (27.27%) were from 46-60 age group, The age group above 60 years exhibited the highest rates of *Candida* which was 21 (31.81%) (5).

CONCLUSIONS

In our research study we concluded that the frequency of candiduria were high in females as compared to male and also the frequency was high in those who were above the age of 60.

REFERENCES

1. Nabili M, Moazeni M. P433 Identification of *Candida* species isolated from hospitalized patients with candiduria. *Med Mycol.* 2022;60(Supplement_1).
2. Gajdács M, Dóczy I, Ábrók M, Lázár A, Burián K. Epidemiology of candiduria and *Candida* urinary tract infections in inpatients and outpatients: Results from a 10-year retrospective survey. *Cent Eur J Urol.* 2019;72(2):209–14.

3. Kobayashi CCBA, De Fátima Lisboa Fernandes O, Miranda KC, De Sousa ED, Do Rosário Rodrigues Silva M. Candiduria in hospital patients: A study prospective. *Mycopathologia*. 2004;158(1):49–52.
4. Gharaghani M, Taghipour S, Halvaezadeh M, Mahmoudabadi AZ. Candiduria; a review article with specific data from Iran. *Turkish J Urol*. 2018;44(6):445–52.
5. Yashavanth R, Shiju MP, Bhaskar UA, Ronald R, Anita KB. Candiduria: Prevalence and trends in antifungal susceptibility in a tertiary care hospital of Mangalore. *J Clin Diagnostic Res*. 2013;7(11):2459–61.
6. Da Silva EH, Ruiz LDS, Matsumoto FE, Auler ME, Giudice MC, Moreira D, et al. Candiduria in a public hospital of São Paulo (1999-2004): Characteristics of the yeast isolates. *Rev Inst Med Trop Sao Paulo*. 2007;49(6):349–53.
7. Kauffman CA. Candiduria. 2005;41(Suppl 6):371–6.
8. Bongomin F, Gago S, Oladele RO, Denning DW. Global and multi-national prevalence of fungal diseases—estimate precision. *J Fungi*. 2017;3(4).
9. Guler S, Ural O, Findik D, Arslan U. Risk factors for nosocomial candiduria. *Saudi Med J*. 2006;27(11):1706–10.
10. Fazeli A, Kordbacheh P, Nazari A, Daie Ghazvini R, Mirhendi H, Safara M, et al. Candiduria in hospitalized patients and identification of isolated candida species by morphological and molecular methods in Ilam, Iran. *Iran J Public Health*. 2019;48(1):156–61.
11. Kauffman CA, Fisher JF, Sobel JD, Newman CA. Candida urinary tract infections - Diagnosis. *Clin Infect Dis*. 2011;52(SUPPL. 6).
12. Willinger B, Manafi M. Evaluation of CHROMagar Candida for rapid screening of clinical specimens for Candida species. *Mycoses*. 1999;42(1–2):61–5.
13. Alam MZ, Alam Q, Jiman-Fatani A, Kamal MA, Abuzenadah AM, Chaudhary AG, et al. Candida identification: A journey from conventional to molecular methods in medical mycology. *World J Microbiol Biotechnol*. 2014;30(5):1437–51.
14. Voltan AR, Fusco-Almeida AM, José M, Mendes-Giannini S. Candiduria: Epidemiology, Resistance, Classical and Alternative Antifungal Drugs SOJ Microbiology & Infectious Diseases. 2014; Available from: www.symbiosisonlinepublishing.com
15. Shirvani F, Fattahi M. Molecular identification of Candida species isolated from candiduria and its risk factors in neonates and children. *Curr Med Mycol*. 2021;17(3):9–12.

16. Ghasemi et al R. Candiduria: Prevalence, Identification of Isolated Candida Species and Trends in Antifungal Susceptibility in Hospitalized Patients. Nov Biomed. 2020;8(2):71–6.
17. Abishek VC, Mohanram K, Preethy R. Prevalence of Candiduria and Characterisation of Candida Species in Tertiary Care Center. Saudi J Pathol Microbiol. 2019;4(7):573–6.
18. Hassaneen AM, Ghonaim RA, Hassanin HM, Salama NA, Elgohary T. Different aspects of candiduria as an important nosocomial infection. Med J Cairo Univ. 2014;82(1):199–204.