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Infection frequency of Candida SP. in Iraqi patients suffering from UTI

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***Abstract*---**One of the most opportunistic mycosis globally is the Candida ssp., which is considered as the most agent that cause nosocomial urinary tract infections (UTIs), oral candidiasis and genitourinary candidiasis. This study included 100 samples of Iraqi subjects suffering from urinary tract infections. Identification of Candida have been done by different methods such as; characteristic of colony on culture, gram stain, and microscopically. This study aimed to isolation and identification of *Candida* spp from urine sample of UTI patients and find the relevance of ages and blood group of patients with the infections rate, also determine the effect of age on ESR and CRP levels in the patients. The results showed the higher frequency of blood group was the O- group (33%) and the lower frequency shown by the blood group O+ (2%). Candida species showed higher frequency of C. albicans (88%) followed by 4% of C. krusei, 3% of C. glabrata, then both C. guilliermondii and C. parapsilosis were shown (1%).

***Keywords*---**CRP, ESR, NACA, VITEK2.

Introduction

One of the most common microbial disease nowadays is the urinary tract infections (UTIs) that has a direct affect the urinary tract—the kidneys, bladder, urethra, and prostate (Flores-Mireles *et al.*, 2015). This disease spreading globally and has a direct economic effect and it became a main causative of morbidity. It is estimated that UTIs affect about 150 million people each year in the world. The healthcare costs are over $6 billion (Goel and Mukherjee 2016). These human

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diseases are second only to respiratory tract infections (Hanna-Wakim et al. 2015). UTIs is the main factor that lead 1 million case of examination in the emergency department in the USA (Mohammed et al. 2016).

It is well-known that urinary tract candidiasis is one of the most common nosocomial fungal infection worldwide. And this fungal infections caused majorly by *Candida albicans*; however, a fast alteration in the dissemination of *Candida* species is happening. Instantaneously, the higher infection by urinary tract candidiasis has led to resistance of Candida species of antifungal (Behzadi, Behzadi, and Ranjbar 2015).

Bothe infection that caused by Candida albicans and non–*C. albicans* are considered as one of the major normal flora in the oral cavity, alimentary canal and vagina. Additionally, they inhabit on the external parts of the urethral (Behzadi, Behzadi, and Ranjbar 2015). The imbalance between the Candida Spp. and the normal flora can be caused by Immune deficiencies (Fisher et al. 2011).

Methods

This study included 100 samples of urine collected from patients suffering from urinary tract infection and visiting the urology department of Al-yarmook teaching hospital. Their age ranged from 22 to 67 years. The identification of Candida has been done according to different chemical and microscopically methods. The identification of the candida Sp. have been done by Automated VITEK 2 compact system and susceptibility profile related to the organism (bioMérieux, France) by the cards YST-21343 and AST-YS07. For a short time, inoculum was prepared by sterile saline at turbidity equal to 2.0 McFarland standards, as measured using a DensiChek instrument (bioMérieux). Then the cards (YST-21343 and AST-YS07) were filled with culture suspension, sealed, and incubated by the VITEK 2 instrument. C-reactive protein has been estimated by the Roche machine (integra-400) using the Integra 400 C-Reactive Protein Package Insert kit (CRPLX 2016-02, V 11.0).

Statistical analysis

The study infection rate was represented by as number and percentage with the perspective P- Value. Age of subjects have been classified into two categorical and then P-value calculated by Non-parametric binomial test. ESR and CRP were expressed as mean with S.E. and the T-student test were used to find the difference between the mean levels of CRP and ESR of the subjects' groups.

Results

The age groups, shown in table (1) of the subjects has been classified into two groups, the first group is higher than 50 years which showed higher frequency (78%) and the second group is lower than 50 years (22%). This difference was significant (p= 0.001).

Table 1: Frequency of subjects according to their age groups

age group	Number (percentage)	P-Value
>50	78 (78%)	0.001
<50	22 (22%)	

The frequencies of blood group for the subjects are summarized in table (2). The higher frequency was shown by the O- group (33%) followed by AB+ (19%), A+ (16%), B+ (10%), AB- (9%), A- (6%), B- (5%), and the lower frequency shown by the blood group O+ (2%).

Table 2: Blood group frequencies in the subjected groups

Blood group	Number of samples (%)	P-Value
A+	16 (16%)	0.0001
A-	6 (6%)	
B+	10 (10%)	
B-	5 (5%)	
AB+	19 (19%)	
AB-	9 (9%)	
O+	2 (2%)	
O-	33 (33%)	

The status of previous births is shown in table (3), the higher percentage are shown by both the women who had 4 previous births and who had 5 (27%) followed by the women with 3 births (15%) and then the 2 births (8%).

Table 3: Distribution of samples according to number of previous births

number of previous births	number of samples	P-Value
No previous births	19 %	0.001
1	4 (4%)	
2	8 (8%)	
3	15 (15%)	
4	27 (27%)	
5	27 (27%)	

The co-infection with other pathogens is shown in table (4). The results showed 66% of the samples were not infected with other pathogens, the toxoplasmosis was revealed with 21% of the samples, and 13% of the samples were infected with Rubella.

Table 4: The percentages of other infections in the included subjects

Status of other diseases	Number of samples (%)	P-Value
Non	66 (66)	0.001
Toxoplasmosis	21 (21)	
Rubella	13 (13)	

The mean and S.E. of CRP level have been estimated for the age groups and the group of higher than 50 years showed higher level of CRP compared to the group that less than 50 years (50.48 and 48.40, respectively).

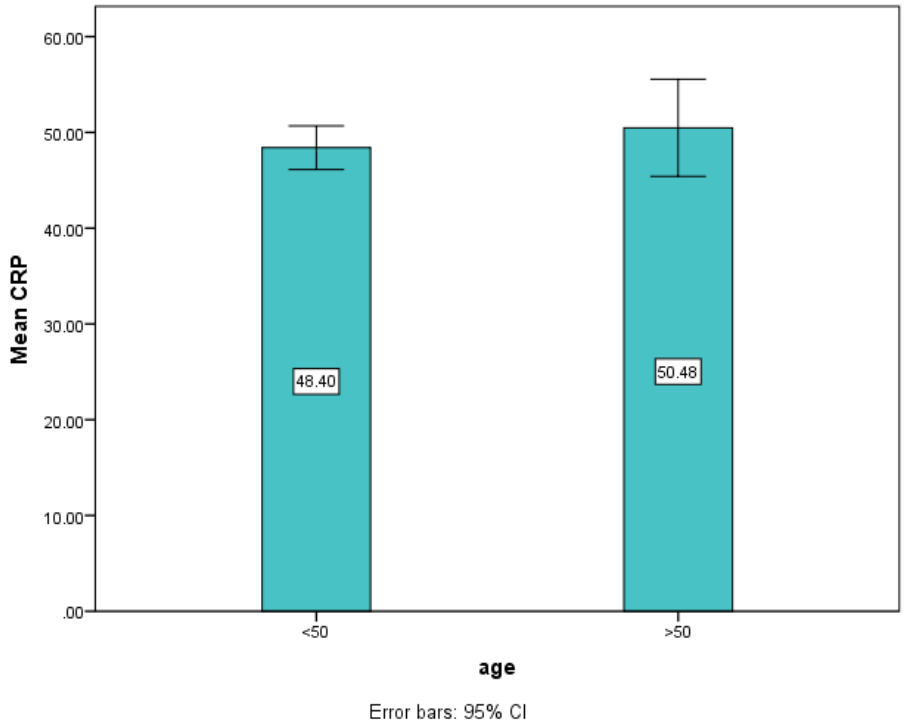

Figure (1): Difference between the serum levels of CRP according to the age group

The level of ESR with relation to age are shown in figure (2) represented as mean and S.E. The results non-significant higher level within the group that are younger than 50 years than the group of older than 50 (26.69 and 25.7, respectively).

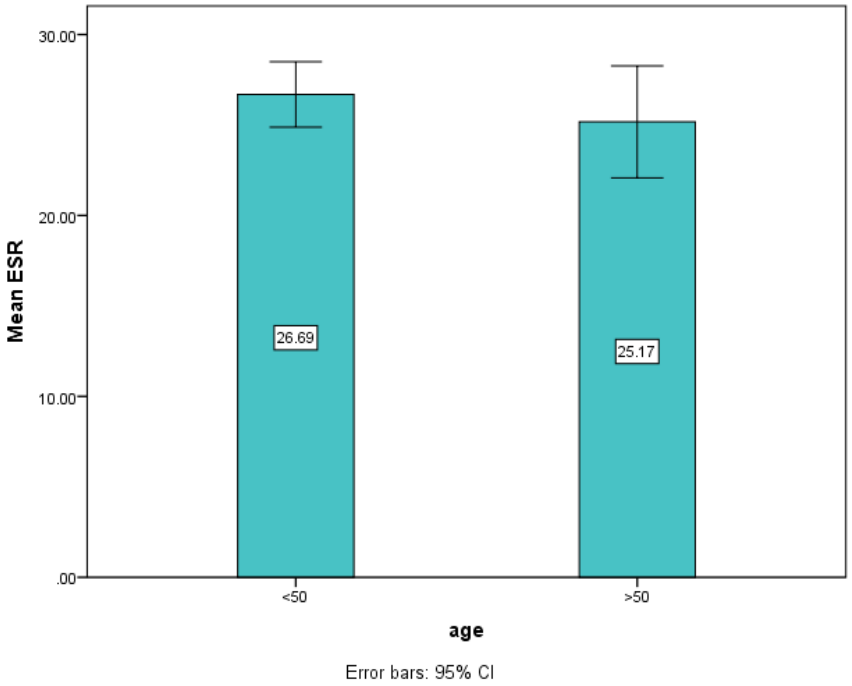

Figure (2): Difference between the serum levels of ESR according to the age group

For the VITEK tests only 62 samples were positive. The results of species frequency are summarized in (table 5). The results showed higher frequency (88%) of *C. albicans* followed by 4% of *C. krusei*, 3% of *C. glabrata*, then both *C. guilliermondii* and *C. parapsilosis* shown in 1% of the samples. Additionally, all the samples were sensitive to the antifungal susceptibility testing.

Table (5): Numbers and frequencies of the isolated Candida species

55 (88%)	*C. albicans*
3 (4%)	*C. krusei*
2 (3%)	*C. glabrata*
1 (1%)	*C. guilliermondii*
1 (1%)	*C. parapsilosis*

Discussion

The results of this study succeeded to isolate different species of Candida and showed higher frequency *C. albican* within the Iraqi patients of UTI; the study also showed 4 of *C. krusei* and other minor frequencies of other species. This result agreed with another previous study established in Iraq but in renal failure disease and had showed that 14.8% of urine sample are positive for Candida spp. And the higher frequency of infection are caused by the species *C. albicans* (16.6%), but it also showed higher frequency of *C. glabrata* than the results of this study (16.6%), nonetheless showed higher frequency of *C. krusei* (22.2%) and *C. parapsilosis*

(11.11%) (Othman and Abdullah Shorsh 2018). But both, our study and the study conducted by Othman and Abdullah concluded that the most common pathogenic fungi in urinary tract system was *C. albican* as Candida spp. is the most common species. Another study also also showed higher frequency of *C. albican* since their results showed 40% urine sample positive and 20% of the samples were *C. albicans* (20%), but the second most higher frequency is *C. parapsilisos* (20%), followed by *C. glabrata* (32.72%), and *C. krusei* (27.27%) they used different diagnostic techniques for characterization of *Candida* spp. Culture characteristic, gram stain, Germ tube, CHROM agar candida and scanning electronic microscopic (Hadi 2020).

It is well-known that diagnostic test for the UTI is the urine culture. but this method is costly, and time-consuming. And since the CRP is an inflammatory marker and an acute phase reactant, the results of CRP supported what it has mentioned in numerous studies that mentioned C-reactive protein often becomes elevated within few hours after tissue injury which can be caused by fungal infections (Simon et al., 2004). For further detailes, previous study investigated the function of CRp and find that CRP opsonize C. albicans for phagocytosis by polymorphonuclear leukocytes (Richardson, Gray, and Shankland 1991). The ESR level failed to show a significant difference between the groups, this results of ESR in this study disagree with a previous study that showed higher level of ESR (Guo et al. 2019). The non-significant difference between the groups of the study according to the ESR can be concluded due to there has been no recognized standard control sample for monitoring the test, for this reasons, it is recommended to use CRP as diagnosis test rather than using ESR.

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