Candiduria in Diabetic Patients in Arar Northern Area, Saudi Arabia

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Abstract: Fungal urinary tract infections due to Candida has increased significantly in the last years. Diabetes mellitus is one of the predisposing factors to fungal urinary tract infections, *Candidaalbicans* is the most common isolated species, but non *Candidaalbicans* also cause fungal UTIs, and in many centers worldwide, non *Candidaalbicans* predominate. **The aim of this study** was to determine the incidence of candiduria in diabetic patients in Arar, Northern area of Saudia Arabia. **Subjects and Methods:** Two hundred diabetic patients from primary health care centers were included in the study. Their ages ranged from 16 years to 68 years (mean = 43 ± 3.12 years). They were 90 (45%) males,and110 (55%) females. All were subjected to: full history, thorough clinical examination and investigations routinely done for check up in diabetic patients. The study also included 50 apparently healthy individuals of matched age and sex as control group.Mid stream urine samples were collected from each one in sterile wide mouthed container. Candida was detected and identified by the usual standard mycological methods. **The result of the study** showed that Candida was detected in 12% (24 out of 200) of diabetic patients, compared to 4% (2 out of 50) in control group. The most common isolated strain of Candida was *C. albicans* (in 41.7%) of cases, followed by *C.glabrata* (29.2%), and *C.tropicalis* (16.7%). The study also showed that female sex and blood glucose level are important risk factors for candiduria in diabetic patients. Candiduria is more in diabetic patients with urinary symptoms than in diabetic patients without urinary symptoms. **Conclusion:** Candiduria is more in diabetic patients than non diabetics. Female sex and high blood glucose level are important risk factors.

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1.Introduction:

Urinary tract infection (UTI) is the most common infection experienced by humans after respiratory and gastro-intestinal infections [(1)].Fungal infections are unusual causes of urinary tract infections in healthy individuals, but common in hospital setting or among patients with predisposing diseases and structural abnormalities of the urinary system. Predisposing risk factors include: female sex, increased age, disturbances of urine flow, whether congenital or acquired, instrumentation of urinary system, diabetes mellitus,previous surgical procedures, antimicrobial therapy, and immunosuppression[(2)]. The most common form of fungal infection of urinary tract is that caused by Candida species. All candida species are capable of causing UTIs, *Candida albicans*is the most common isolated species according to epidemiological studies[(3),(4)]. Non *Candida albicans*also cause fungal UTIs, and in many centers worldwide, non *Candidaalbicans* predominate.The newly emerging non- *Candida albicans*show more resistance to antifungal drugs,especially to the first-line treatments. *Candida glabrata* infection showed an increase in incidence, which may be due to extensive and long term use of antifungal drugs such as azoles[(5)]. Diabetes mellitus (DM) has been associated with reduced responseof T cells[(6)], neutrophil function, and disorders of humoral immunity[(7)]. In general, infectious diseases are more frequent and/or serious in patients with diabetes mellitus[(8) (9)]. **The aim of this study was** to determine the prevalence of candiduria in diabetic patients, and to detect the most common type of candida.Also to study some risk factors for candiduria in diabetic patients.

2.Subjects, Materials and Methods:

The study was conducted during the period from January 2013 to November 2013. The study included diabetic patients who were attending the primary health care units in Arar,Northern area, Saudia Arabia for their diabetic checkup. Those who were receiving antibiotics for the last 2 weeks were excluded from the study.Two hundred diabetic patients were included in the study.Their age ranged from 16 years to 68 years (mean= 43 ± 3.12 years). They were 90 (45%) males, and110 (55%) females. The study also included 50 apparently healthy individuals of matched age and sex as control group.

Every patientis subjected to the following:

1-Medical history

2- Full clinical examination

3- Investigations for diabetic checkup especially: Fasting blood glucose, post prandial glucoselevel, and glycosylated hemoglobin.

Collection of specimens:

Mid stream urine sample was collected from each patient in a sterile screw-capped container.The samples were immediately sent to the microbiology laboratory.

Urine culture:

Urine samples were cultured on Sabouraud's dextrose agar (SDA) medium. The growing fungi were identified according to the standard mycological methods[10].

Data Analysis:

Data were analysed using the SPSS software (Statistical Package for the Social Sciences, version 16.0, SPSSInc, Chicago, III, USA).

The results are shown in Tables 1-4 and Figures 1-2.

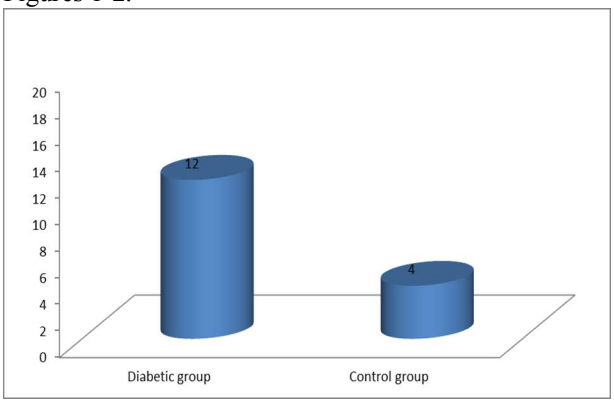

Figure (1): Candiduria in diabetic and control groups.

3.Results:

Table (1): Characters of diabetic patients included in the study.

Characteristics	Number	%
Age (years=y):		
<20	16	8
21-40	84	42
41-60	60	30
> 60	40	20
Sex:		
Male	90	45
Female	110	55
Blood glucose:		
< 126 mg/dl	36	18
> 126 mg/dl	164	82
Duration:		
< 5 years	104	52
> 5 years	96	48
Symptoms of UTI:		
Symptomatic	28	14
Asymptomatic	172	86

Table (2): Candiduria in diabetic and control groups

Group	Number	Positive cases	%	*P* value
Diabetic group	200	24	12	<0.05
Control group	50	2	4	

Table (3): Candida species isolated from urine of diabetic patients.

Candida species	Number	%
C. albicans	10	41.7
C. glabrata	7	29.2
C. tropicalis	4	16.7
C. krusi	2	8.3
C. kefyr	1	4.2
Total	24	100

Table (4): Risk factors associated with candiduria in diabetic patients

Characteristics	Number	%	*p*-value
Age (years=y):			
<20	2	8.3	>0.05
21-40	9	37.5	
41-60	9	37.5	
> 60	4	16.7	
Sex:			
Male	6	25	<0.001
Female	18	75	
Blood glucose:			
< 126 mg%	3	12.5	<0.001
> 126 mg%	21	87.5	
Duration:			
< 5 years	9	37.5	>0.05
> 5 years	15	62.5	
Symptoms of UTI:			
Symptomatic	20	83.3	<0.001
Asymptomatic	4	16.7	

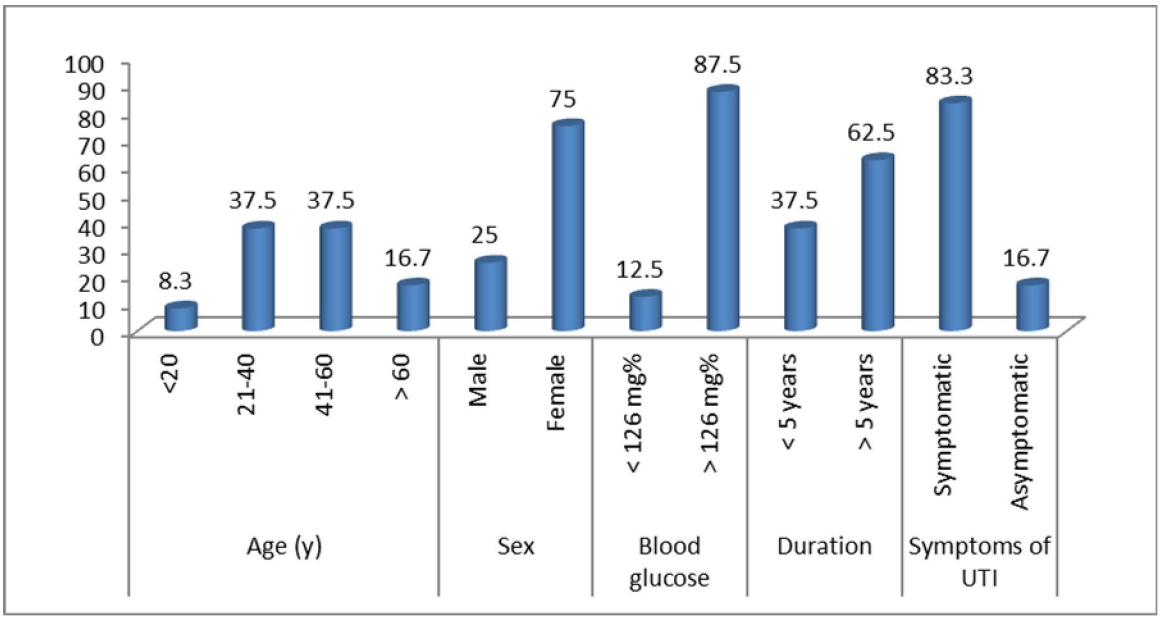

Figure (2): Risk factors associated with candiduria in diabetic patients

4.Discussion:

Two hundred diabetic patients were included in the study.Their ages ranged from 16 years to 68 years (Mean = 43 ± 3.12 years). they were 110 (55%) females and 90 (45%) males. The blood glucose level was < 126 mg/dl in36 (18%), and > 126 mg/dl in 164 (82%) patients. The duration of the disease is < 5 years in 104 (52%)patients, and more than 5 years in 96 (48%) patients. Twenty eight (14%) patients have symptoms of urinary tract infections, and172 (86%) patients were presented with no symptoms of urinary tract infections.

The prevalence of significant candiduria in diabetic patients in this study was 12% (24 out of 200 patients) compared to 4% (2 out of 50), a difference which is statistically significant (*P*= <0.05). Similar results were obtained by Rakhshanda et al[12] in 2008 in Pakistan who examined 100 mid-stream urine samples from diabetic patients attending the diabetic clinic in Karachi Pakistan and isolated candida species in 10.2% of cases.Also significant candiduria was detected in 8% of cases in Saudi Arabia [13]. However higher rate of candiduria was reported in other studies. Debora *et al.*[14] in 2007 examined 210 diabetic patients, and284 non diabetics and detected

candida infection in 30 % of diabetic patients and in 16 % in non diabetics, a difference which is statistically significant (P =0.0003). The difference in rate of candiduria in different studies may be attributed to difference in risk factors.

Infections including candida urinary tract infections are more common in diabetic patients compared to non diabetic. complement 4 (C4) is reduced in diabetic patients [15].Reduction in C4 is associated with polymorph nuclear leucocytes dysfunction [16]. During hyperglycemia there is decrease in mobilization, chemotaxis and phagocytic activity ofpolymorph nuclear leucocytes and other phagocytic cells [17]. Production of inflammatory cytokines is also decreased in diabetic patients, Mononuclear cells and monocytes of persons with DM secrete less interleukin-1 (IL-1) and IL-6 in response to stimulation by lipopolysaccharides [18]. The production of interferon gamma (IFN-γ) and tumor necrosis factor (TNF)-α by T cells is also reduced [19]. The proliferative functions of CD4 (T helper cells), and their response to antigens are impaired [17].

In this study,*Candida albicans* was the most isolated candida species, it accounted for 41.7% (10 of 24) of all candiduria isolates, followed by *C. glabrata* in 29.2% (7 of 24), and *C.tropicalis* in 16.7%. *C.krusi* (8.3%) and *C.kefyr* (4.2%) were the least isolated Candida species (Table 3). Similar results were obtained byYismaw et al[20] who detected *C.albicans* in 42%,*C.glabrata* in34.2% and *C.tropicalis* in15.8% of all candiduria isolates. Similar findings were also reported by Alhussanini et al [21] who reported that Candida albicans was the most common isolated species (54% of positive cases).Nearly the same result was obtained by Bukhary[22].

Regarding risk factors for candiduria in diabetic patients, this study showed that female sex and high blood glucose level are important risk factors.A high proportion of significant candiduria was observed in females than in males. Out of 24 candida species isolated, 18 cases (75%) were in females compared to 6 (25%) in males, a difference which is statistically significant (P < 0.001). This is in agreement with other studies, Gizachew et al in 2013 reported candiduria in females (74.3%) than in males (25.7%). The high prevalence of candiduria in females may indicate the presence of vaginal candidiasis or just colonization since candida is a normal flora of the genitourinary tract in females. Candiduria was also detected in 12.5% (3 out of 24) in diabetic patients with blood glucose level less than 126mg%, compared to 87.5% (21 out of 24) in diabetic patients with blood glucose level than 126 mg% (p< 0.001) indicating that high blood glucose level is a risk factor. Diabetic patients with symptoms of urinary tract infection had higher rate of candiduria than those with no symptoms.

Conclusion:

Candiduria is more in diabetic patients than non diabetics. Female sex and high blood glucose level are important risk factors.

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