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FREQUENCY OF MICROORGANISMS INVOLVED IN UTI AMONG DIABETIC PATIENTS AT A TERTIARY CARE CENTER

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ABSTRACT

Aim of study: The prevalence of asymptomatic and symptomatic UTI is very high among diabetic patients. This study was conducted to assess the frequency of microorganism involved in urinary tract infection among diabetic patients. **Methodology:** It is cross-sectional study done at Pathology department and Diabetic OPD of Nishtar Hospital Multan for a period of 6 months from December 2018 to April 2019. Total 250 samples of Urine was collected from patients visiting diabetic OPD. Patients having symptoms of UTI or having more than 5 WBC/HPF on urine analysis were selected for the study and urine culture was performed on their samples. Using a standard quantitative loop, urine samples (1 µL and 10 µL) were used to inoculate Cysteine lactose electrolyte deficient (CLED) agar (Oxoid, Basingstoke, UK), MacConkey, 5% Sheep Blood agar, and chromogenic UTI (Oxoid) agar plates. Plates were incubated for 24 h at 37°C and the outcome was judged as significant/nonsignificant growth, or contaminated (discarded). Significant bacteriuria was defined as urine culture plates showing ≥105 colony-forming units (CFU)/mL of single bacterial species. **Results:** Total 250 urine samples of diabetic patients were selected for study. Among these patients 162 (64.8%) were female and 88 (35.2%) were males. 171 (68.4%) patients were having symptoms of urinary tract infection and remaining 79 (31.6%) were asymptomatic. Asymptomatic patients were having more than 5 WBC/HPF on complete urine analysis. 31 patients were having HbA_1c with in target range (i.e. 6-7), 100 patients were having HbA_1c 7-8 and remaining 119 patients were having HbA_1c above 8. After 24 hours of intubation in the required media we found 20 sample were having mixed growth/contaminated, 195 (78%) sample were having E.coli growth, in 64 (25.6%) patients were Klebsiella spp, Staphylococcus in 31 (12.4%), Pseudomonas in 15 (6%), Proteus in 9 (3.6%), Streptococcus in 2 (0.8%), Enterococcus spp. in 3 (1.2%) and Candida spp. in 1 (0.4%). **Conclusion:** UTIs are frequent in patients with diabetes. The most frequent microorganism is *E. coli* and fungal infections are least common in diabetic patients in our study. Symptomatic UTI are more common in patients due to late presentation to hospital. Among asymptomatic UTI cases, female were more common as compared to male.

KEYWORDS: UTI, Diabetes mellitus, CLED, E, coli, asymptomatic, symptomatic.

INTRODUCTION

Diabetes mellitus has become a major health challenge worldwide. As the prevalence of diabetes mellitus increases worldwide, complications associated with it, also have equal importance. Diabetes mellitus has long been considered to be a predisposing factor for urinary tract infection (UTI)[1] and the urinary tract is the principle site of the infection in diabetic patients with increased risk of complications of UTI such as emphysematous cystitis, severe urosepsis, pyelonephritis and renal papillary necrosis etc.[2] The mechanisms which potentially contribute to UTI in these patients are impairments in the immune system,[3,4] poor metabolic control of diabetes.[5,6] and incomplete bladder emptying due to autonomic neuropathy,[7,8] Factors that were found to enhance the risk for UTI in diabetics include age, metabolic control, and long term complications, primarily diabetic nephropathy and cystopathy.[9] Females are more prone to UTIs due to short urethra, pregnancy and sexual activity. In pregnancy most females develops gestational diabetics which leads to UTIs. Canadian and Danish studies shows diabetics were mostly hospitalized with urinary tract infections.[10] Asymptomatic bacteriuria (ASB) and incidence of urinary tract infections (UTIs) is high in diabetic patients.[11] The most common cause of UTI in men and women with and without DM is *Escherichia coli*. According to a study the organisms causing UTI in diabetic female are *Escherichia coli* 54.1%, *Enterococcus* spp 8.3%, *and Pseudomonas spp 3.9%.*[1]

The diagnosis of UTI should be suspected in any diabetic patient if these symptoms are present e.g. frequency, urgency, dysuria, and suprapubic pain, costovertebral

angle pain/tenderness, fever, and chills. A urine culture should be obtained in all cases of suspected UTI in diabetic patients, prior to initiation of treatment. The preferred method of obtaining a urine culture is from voided, clean-catch, midstream urine.[12] Increase in incidence of urinary tract infection due to increase in diabetic patients worldwide, may impose a substantial burden on medical costs.[13] In addition, the high rates of antibiotic prescription, including broad-spectrum antibiotics, for UTI in these patients may further induce the development of antibiotic-resistant urinary pathogens.[14] The Objective of current study is to assess the type of microorganisms and their antimicrobial susceptibility in diabetic patients at a tertiary care unit.

METHODOLOGY

It is cross-sectional study done at Pathology department and Diabetic OPD of Nishtar Hospital Multan for a period of 6 months from December 2018 to April 2019. Total 250 samples of Urine was collected from patients visiting diabetic OPD. Sample was collected in wide mouth leak proof container. Mid-stream urine sample (15-20ml) collected from non-catheterized patients. Labeled sample along with filled pre-formed questionnaire deposited to Pathology Lab within an hour. Informed consent was taken from the candidates.

Inclusion criteria

Patients having symptoms of UTI or having more than 5 WBC/HPF on urine analysis were selected for the study and urine culture was performed on their samples.

Exclusion criteria

Patients having pregnancy, any renal pathology, took antibiotics within last 15 days, history of any surgery in recent days, or having any other infection e.g. respiratory, skin or mucous membrane were selected in the study.

Using a standard quantitative loop, urine samples (1 µL and 10 µL) were used to inoculate Cysteine lactose electrolyte deficient (CLED) agar (Oxoid, Basingstoke, UK), MacConkey, 5% Sheep Blood agar, and chromogenic UTI (Oxoid) agar plates. Plates were incubated for 24 h at 37°C and the outcome was judged as significant/nonsignificant growth, or contaminated (discarded). Significant bacteriuria was defined as urine culture plates showing ≥105 colony-forming units (CFU)/mL of single bacterial species. Statistical analysis was done by using SPSS version 20.0.

RESULTS

Total 250 urine samples of diabetic patients were selected for study. Among these patients 162 (64.8%) were female and 88 (35.2%) were males. 171 (68.4%) patients were having symptoms of urinary tract infection and remaining 79 (31.6%) were asymptomatic. Asymptomatic patients were having more than 5 WBC/HPF on complete urine analysis. 31 patients were having HbA_1c with in target range (i.e. 6-7), 100 patients were having HbA_1c 7-8 and remaining 119 patients were having HbA_1c above 8. After 24 hours of intubation in the required media we found 20 sample were having mixed growth/contaminated, 195 (78%) sample were having E.coli growth, in 64 (25.6%) patients were Klebsiella spp, Staphylococcus in 31 (12.4%), Pseudomonas in 15 (6%), Proteus in 9 (3.6%), Streptococcus in 2 (0.8%), Enterococcus spp. in 3 (1.2%) and Candida spp. in 1 (0.4%).

Table 1: gender of 250 samples selected for the study.

Gender	Number of patients	Percentage
Male	88	35.2%
Female	162	64.8%

Table 2: number of patients presented with symptomatic or asymptomatic UTI.

	Number of patients	Percentage
Symptomatic UTI	171	68.4%
Asymptomatic UTI	79	31.6%

Table 3: diabetes status on the basis of HbA_1c value among these 250 cases.

Diabetes status	Number of patients	Percentage
HbA_1c range 5.6-6.5 (controlled)	31	12.4%
HbA_1c range 6.5-8 (uncontrolled)	100	40%
HbA_1c above 8 (uncontrolled)	119	47.6%

Microorganism	Number of sample	Percentage
E. Coli spp.	195	78%
Klebsiella spp.	64	25.6%
Staphylococcus spp.	31	12.4%
Pseudomonas spp.	15	6%

Proteus spp.	9	3.6%
Streptococcus spp.	2	0.8%
Enterococcus spp.	3	1.2%
Candida spp.	1	0.4%
Contaminated/mixed growth samples	20	8%

DISCUSSION

The ratio of symptomatic patients was higher than asymptomatic bacteriuria in this study as compared to a study reported in Ethiopia.[15] However, the frequency of ASB was higher in our study (31.6%) than previous studies (varied from 6.1% to 26.6%).[16] In our study, prevalence of UTIs in diabetic women was about 2-fold higher compared with that in diabetic men, which was related to the characteristics of female urinary tract, such as the greater length of the urethra, the greater distance between the urogenital meatus and the anus, and the antibacterial properties of the prostatic fluid.[17] Generally, compared with non-diabetic patients, diabetic patients have a higher incidence of UTI and asymptomatic bacteriuria.[18,19] The susceptibility of diabetic patients to UTI could be explained by diminished neutrophil response, lower urinary cytokines, and leukocyte concentrations, which might facilitate the adhesion of microorganisms to uroepithelial cells.[17,20] In our study we observed that with increasing the value of HbA1c, incidence of UTI increase as compared to some studies in which HbA1c seems not to be associated with the risk of UTIs.[21,22] while some studies suggested that HbA1c may be a risk factor of asymptomatic bacteriuria.[23,24] In this study, from 250 samples E.coli was most common (78%) followed by Klebsiella (25%), staphylococcus spp. (12%), Pseudomonas aeruginosa (6%) and Proteus spp (3.6%). A study conducted by Bonadioet al. showed that 54.7% of UTIs were caused by E.coli and our findings are in accordance with these mentioned studies.[25,26] Another case-control study, conducted in New Delhi, India, that evaluated the prevalence of UTI and renal scarring in 155 patients with diabetes, also found that *E. coli* was the most commonly involved organism (64.3%), followed by *Staphylococcus aureus* (21.4%) and *Klebsiella pneumoniae* (14.3%)27. Similar findings were observed by Ramana and Chaudhary.[28] Bapat et al, found that E. coli was the most commonly isolated organism (64. 3%), followed by Staphylococcus aureus (21.4%), and Klebsiella pneumonia (14.3%)[29] Lloyds et al, have shown that Enterococci spp. Accounted for 35% of urinary tract isolates. We found a very low prevalence of UTI caused by fungi (*Candida* species). It is known that diabetes is a predisposing factor for fungal infections of the urinary tract. One of the most important explanations for this predisposition is glycosuria.[30] The majority of UTIs caused by fungi are clinically asymptomatic. In our study only one case showed fungal growth and that was too asymptomatic.

CONCLUSIONS

UTIs are frequent in patients with diabetes. The most frequent microorganism is *E. coli* and fungal infections are least common in diabetic patients in our study. Symptomatic UTI are more common in patients due to late presentation to hospital. Among asymptomatic UTI cases, female were more common as compared to male. Because of the great proportion of asymptomatic UTIs and increasing antimicrobial resistance among diabetic patients, we suggest that urine culture should be performed in all diabetic patients.

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