Prevalence of Urinary Tract Infection among Diabetic Patients in North India.

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ABSTRACT

Background: Urinary tract infections are defined as the spectrum of disease caused by invasion of microorganisms of the genitourinary tract. Symptomatic UTI may be present as a severe illness including higher frequency of bacteraemia and bilateral renal involvement with pyleonephritis or unusual clinical presentations of emphysematous cystitis. **Methods:** In sterile container clean voided midstream urine were collected and cultured on CLED agar, incubated at 37^0C overnight for visible growth**. Results:** Out of 100 diabetic patients 40 were males and 60 were females. Among them, 38 patients found to be suffering from UTI, in which 14 (36.84%) and female were 24 (63.16%). *Escherichia coli* 22 (57.90%) was most prevalent causing UTI, followed by *Staphylococcus aureus* 8 (21.05%), *Klebsiella species* 6 (15.79%), *Pseudomonas species* 1(2.63%) and *Enterococcus species* 1 (2.63%). **Conclusion:** High sugar level is the main cause of prevalence of urinary tract infection among the diabetic patients, so we need to control the sugar level in diabetic patients to reduce the prevalence of urinary tract infection in diabetic patients. Proper antibiotic policy in tertiary care hospitals to provide effective treatment as well as prevent the misuse of Antibiotics. However further studies with large sample size is highly recommended to further support the findings from this study.

Keywords: Diabetes, Micro-organisms, Urinary tract infection.

INTRODUCTION

Urinary tract infection are defined as the spectrum of disease caused by invasion of microorganisms of the genitourinary tract.[1] After respiratory tract infection the most common infection is Urinary tract infection.[2] Urinary tract infection are more prevalent in women than males. Predisposing factors for UTI includes diabetes, elderly, pregnant women, spinal cord injuries, patients with catheters and genitourinary tract abnormalities.[3] In worldwide dimension Diabetes is major problem. The assessment of risk of infection and resulting complications are influenced by duration of illness, severity of non-infectious complications, concurrent illness, adequacy of blood glucose control and degree of medical supervision.[4] Urinary tract infection are caused by uro-pathogens like *E.coli*, *Klebsiella*, *Pseudomonas*, *Staphylococcus*, *Enterococcus*, *Serratia* should be suspected if there is a history of recent instrumentation or hospitalization. Candiduria may signify contamination of the urine specimen, benign saprophytic colonization of the catheter and lower UTI, or may be indicative of true invasive infection of the upper or lower urinary tract.[5] The infection can be brief and acute (Cystitis) with classical symptoms of dysuria. Diabetes Mellitus is also a leading a cause of overactive bladder or neurogenic bladder.[6]

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Hospitalization for pyleonephritis occurs 15 times more frequently in diabetic patients.[7] Symptomatic UTI may be present as a severe illness including higher frequency of bacteraemia and bilateral renal involvement with pyleonephritis or unusual clinical presentations of emphysematous cystitis.[8] There is paucity of data on urinary tract infection among the diabetic patients in western Uttar Pradesh. Therefore we conducted this study to determine the prevalence and aetiological agents of urinary tract infection among the diabetic patients at Teerthanker Mahaveer Medical College Teaching Hospital at Moradabad, U.P.

MATERIALS AND METHODS

In sterile container, clean voided midstream urine samples of diabetic patients were collected and processed in the laboratory within 2 hrs. Cysteine lactose electrolyte deficient medium (CLED) media is used for the inoculation of all urine samples and incubated at 37°C overnight for visible growth. More than 10^5 CFU/ml of urine is considered as a significant bacteriuria.[9] Isolated uro-pathogens were further identified by various standard microbial tests and antibiotic sensitivity test.[10]

RESULTS

In our present study we included 100 numbers of both types I and II diabetic patient of any ages from March 2014 to January 2015 in Teerthanker Mahaveer Medical College & Research Centre, Moradabad, U.P. Out of 100 diabetic patients 40 were males and 60 were females. Among them, 38

patients found to be suffering from UTI, in which 14 (36.84%) and female were 24 (63.16%).
Microorganism isolated from urine sample of diabetic patients were *Escherichia coli* 22 (57.90%) were most prevalent followed by *Staphylococcus aureus* 8 (15.79%), *Klebsiella species* 6 (21.05%), *Enterococcus species* 1 (2.63%) and *Pseudomonas species* 1 (2.63%).
Microorganism were isolated from urine sample of male diabetic patients were *Escherichia coli* 10 (71.44%) were most prevalent followed by *Staphylococcus aureus* 2 (14.28%), *Klebsiella species* 2 (14.28%), *Enterococcus species* 0 (0%) and *Pseudomonas species* 0 (0%), and in female were suffering from *Escherichia coli* 12 (50%) were most prevalent followed by *Staphylococcus aureus* 6 (25%), *Klebsiella species* 4 (16.66%), *Enterococcus species* 1 (4.17%) and *Pseudomonas species* 1 (4.17%). In our study, we found UTI was more prevalent in 41-60 age group (22) followed by 21-40 age group (8), 61-80 age group (5) and 0-20 age group (3) [Table 1,2], [Figure 1-4].

Table 1: Antibiotic sensitivity patterns of gram positive bacteria isolated from urine of diabetic patient

Antibiotics	*Staphylococcus aureus* (Sensitivity %)	*Enterococcus species* (Sensitivity %)
Ampicilin	50%	100%
Vancomycin	100%	100%
Gentamycin	75%	00%
Ciprofloxacin	75%	100%
Cotrimoxazole	75%	100%
Cefotaxime	50%	100%
Amoxycillin +clavulanic acid	50%	100%
Linezolid	100%	100%
Chephalin	50%	100%
Teichoplanin	100%	100%

Table 2: Antibiotic sensitivity patterns of gram negtive bacteria isolated from urine of diabetic patient.

Antibiotics	*Escherichia coli* (Sensitive %)	*Klebsiella spp* (Sensitive %)	*Pseudomonas spp* (Sensitive %)
Ampicillin	63%	33%	00%
Imipenem	91%	33%	100%
Meropenem	86%	50%	00%
Etrapenem	91%	50%	100%
Chloramphenicol	88%	33%	00%
Nitrofurantoin	55%	50%	100%
Norfloxacin	64%	50%	100%
Cefazolin	68%	67%	100%
Ceftriaxone	55%	83%	00%
Gentamycin	59%	83%	100%
Polymyxin B	100%	100%	100%

DISCUSSION

Out of 100 diabetic patients 40 were males and 60 were females. Among them, 38 (38%) patients found to be suffering from UTI, in which 14 (36.84%) and female were 24 (63.16%).
From these results, it is observed that urinary tract infection is more common in females than in males. These result corresponds to the results obtained by Kilpatrick ES, Bloomgarden ZT, *et al*, The overall prevalence of UTI was 37%, female preponderance was higher 43% and male was 30%.[11] The prevalence of UTI in diabetic patients in a study made by Prakash D.*et al* and Prakasam A K.C *et al*, found positive result in 41 (69.49%) females, 23 (31.51%) males among (132) and 65% females, 35% male among(200) samples respectively which is similar.[12] Also in a study done by Ramana BV, Chaudhary A *el al*,1200 urine samples of diabetic patients, out of which females (760) and males (440) samples respectively. The overall prevalence of urinary tract infection was 45% and the prevalence rate was higher in females (46%) than males (43%).[13]

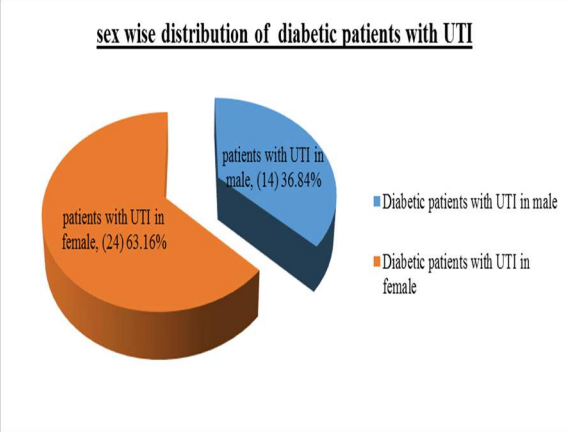

Figure 1: Sex wise distribution of diabetic patients with UTI

In the present study, out of 100 samples, *Escherichia coli* 22 (57.90%) was most prevalent causing UTI, followed by *Staphylococcus aureus* 8

(21.05%), *Klebsiella species* 6 (15.79%), *Pseudomonas species* 1(2.63%) and *Enterococcus species* 1 (2.63%). These results are correlated to the result obtained by Osanyinpeju Samuel, Akinleye Mathew; et al, A total of 61 (17.3%) bacterial *uropathogens* were isolated.

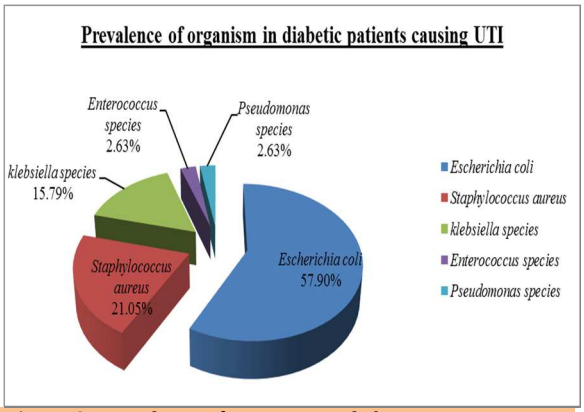

Figure 2: Prevalence of organism in diabetic patients causing UTI

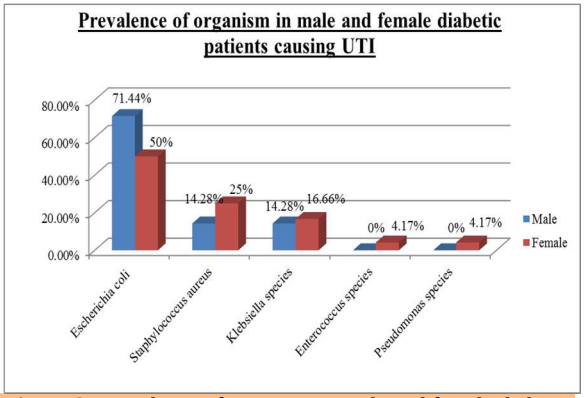

Figure 3: Prevalence of organism in male and female diabetic patients causing UTI.

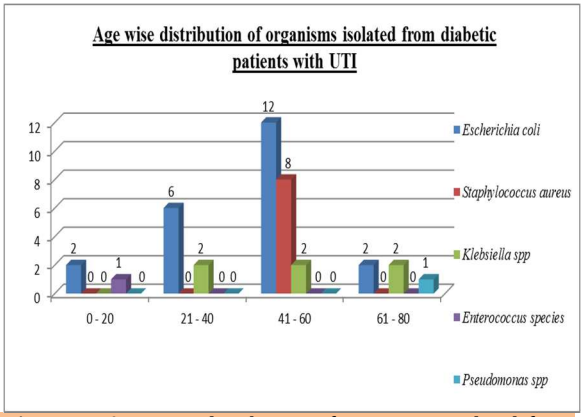

Figure 4: Age wise distribution of organisms isolated from diabetic patients with UTI

Out of bacterial isolate, *Escherichia* coli had the highest isolation rate (45.5%), followed by *Klebsiella spp* (26.2%), *Enterococcus spp* (10.0%), *Staphylococcus aureus* (10.0%) while *Enterobacter spp* (6.6%) and (3.2%) for *Pseudomonas aeruginosa* and *Proteus spp* each respectively.[14]

In this present study, *Pseudomonas aeruginosa* and *Enterococcus* was isolated in only one sample so that sensitivity pattern be digger from other study. On the other hand the Gram positive cocci *Staphylococcus aureus* was susceptible to Vancomycin (100%), Linezolid (100%) and Teichoplanin (100%). Ampicilin, Gentamycin, Amoxycilin calvulanic acid, cifrofloxacin were found to less sensitive (>50%) in *Staphylococcus aureus. Escherichia coli* were found Ampicilin (63%), Imipenem (91%), Meropenem (86%), Etrapenem (91%), chloramphenicol (88%), Nitrofurantoin (55%), Norfloxacin (64%), Cefazolin (68%), ceftriaxone (55%), Gentamycin (59%) and Polymyxin B (100%). *Klebsiella species* were found Ampicilin (33%), Imipenem (33%), Meropenem (50%), Etrapenem (50%), chloramphenicol (33%), Nitrofurantoin (50%), Norfloxacin (50%), Cefazolin (67%), ceftriaxone (83%), Gentamycin (83%) and Polymyxin B (100%). *Pseudomonas species* were found Ampicilin (00%), Imipenem (100%), Meropenem (00%), Etrapenem (100%), chloramphenicol (00%), Nitrofurantoin (100%), Norfloxacin (100%), Cefazolin (100%), ceftriaxone (00%), Gentamycin (100%) and Polymyxin B (100%).

CONCLUSION

Escherichia coli (57.90%) was the predominant organisms isolated from the urine of diabetic patients in our hospital, followed by *Staphylococcus aureus* (21.05%), *Klebsiella* (15.79%), *Pseudomonas species* (2.63%) and *Enterococcus* (2.63%)

High sugar level is the main cause of prevalence of urinary tract infection among the diabetic patients, so we need to control the sugar level in diabetic patients to reduce the prevalence of urinary tract infection in diabetic patients. Antibiotic sensitivity pattern of Gram positive bacteria were more sensitive Vancomycin, Linezolid, Teichoplanin followed by Gentamycin, Cotrimoxazole, Ampicilin. On the other side, the Gram negative bacteria were more sensitive to Polymyxin B, Nitrofurantoin derivatives, Carbapenems, Cefazolin and Gentamycin.

So, we need a proper antibiotic policy in tertiary care hospitals to provide effective treatment as well as prevent the misuse of Antibiotics. However further studies with large sample size is highly recommended to further support the findings from this study.

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