A Clinical and Microbiological Profile of Urinary Tract Infection in Diabetes Mellitus Patients, a South India Perceptive

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ABSTRACT

Introduction: Asymptomatic bladder infection that is detected by a positive urine culture is also common among diabetes mellitus patient which progress to symptomatic infection and subsequent complication. Therefore it becomes essential to screen urinary tract infection in diabetes mellitus patient so that its progress to complication can be prevented. Hence present study has been designated to know the clinical, microbiological profile and antimicrobial sensitivity pattern of organism that causes UTI in diabetes mellitus patient.

Material and methods: Based on exclusion and inclusion criteria 100 patients were included in this study, A detailed history of the patient were taken with respect to duration of diabetes and its symptoms complication, type and treatment. Regarding urinary tract infection, history was taken with respect to dysuria, burning, suprapubic pain; urgency, increased frequency and haematuria fever with chill rigor and vomiting suggestive of acute pyelonephritis.

Result: Out of 100 patients 36 patients have bacteriuria and 64 patients were without bacteriuria. Patient with HbA1C% above 10, who were suffering from UTI were 43, out of them 21 having bacteria in urine. The P value was 0.0642 and chi-square statistic was 5.496, which is not significant. Regarding relation between FPG and UTI, those patient whose FPG was above 10, who were suffering from UTI were 43, out of them 21 having bacteria in urine. The P value was 0.0642 and chi-square statistic was 5.496, which is not significant.

Conclusion: bacteriuria was more common in female then male and patient above 50 year of age are more affected then younger one. Patient with type 2 diabetes mellitus and treated with oral hypoglycaemic agent are effected more frequently. Bacteriuria was more common in patient whose glycosylated haemoglobin was more than 10% and fasting plasma glucose was more than 200mg/dl. Patients having neuropathy are more prone to UTI. Most common organism isolate were E.Coli and were sensitive to cephalosporins and aminoglycosides.

Keywords: Diabetes Mellitus, Bacteriuria, Urinary Tract Infection, Microbiological Profile

INTRODUCTION

Diabetes mellitus is a chronic disease that occurs; either when the pancreas is not able to produce sufficient insulin or body is not able to use the insulin it produces.¹ The global prevalence of diabetes among adults over 18 yrs of age has risen from 4.7% in 1980 to 8.5% in 2014.² Patient with diabetes mellitus are at higher risk of infection due to multiple abnormalities in the immune system. Patients are not only at higher risk of infection but also the course of infection is also more complicated than normal patients. Various factors are found to be responsible for abnormality in the immune system of diabetes mellitus patients. It has been found in various studies that there is deficiency of C4 compliment in diabetes mellitus. Secretion IL-1 and IL-6 are less by mononuclear cells and monocytes in diabetes mellitus patients. Increased formation of advanced glycowylation end product reduce the expression of class I MHC and impair cell immunity.³,⁴ Chemotaxis of polymorphonuclear cells are also impaired, in addition to this, adhesion phagocytes and killing ability of PMC are also compromised in diabetes mellitus patients.⁵ Autonomic neuropathy due to diabetes mellitus leads to dysfunction of bladder.⁶ These entire factors contribute to the pathogenesis of increase risk of urinary tract infection in diabetes mellitus patient. Asymptomatic bladder infection that is detected by a positive urine culture is also common among diabetes mellitus patient which progress to symptomatic infection and subsequent complication. Therefore it becomes essential to screen urinary tract infection in diabetes mellitus patient so that its progress to complication can be prevented. Hence present study has been designated to know the clinical, microbiological profile and antimicrobial sensitivity pattern of organism that causes UTI.
in diabetes mellitus patient. Primary objective of this study was to study the clinical pattern and risk factor of urinary tract infection and secondary objective to know the causative organism and sensitivity pattern of organism isolated.

**MATERIAL AND METHODS**

Present study was a prospective cross sectional study conducted in the department of general medicine from January 2017 to October 2019. Patients having history of diabetes with fast plasma glucose more than 126 mg/dl and post prandial plasma glucose more than 180mg/dl, with clinical and microbiological evidence of urinary tract infection were enrolled for this study.

**Exclusion criteria**
1. Catheterisation
2. Antibiotic use within 15 days
3. Anomalies of genitor urinary tract.

**Inclusion criteria**
1. Patient with DM
2. Both Sex
3. Symptom of UTI

Based on previous study considering confidence interval 95% power of the study 80% and simplification level of 5% the sample size was calculated to be 84. Before start of the study institutional ethics committee approval was taken and a written informed consent was taken from all patients before enrolling them for study.

**Method**

Based on exclusion and inclusion criteria 100 patients were included in this study. A detailed history of the patient were taken with respect to duration of diabetes and its symptoms complication, type and treatment. Regarding urinary tract infection, history was taken with respect to dysuria, burning, suprapubic pain; urgency, increased frequency and haematuria fever with chill rigor and vomiting suggestive of acute pyelonephritis. All patients were examined for sign of UTI like fever, pulse, BP, suprapubic tenderness costovertebral angle tenderness, examination of abdomen. Under all aspartic condition mid stream urine was collected and sample was sent to laboratory for routine examination and culture. Culture of urine, Mac-conkey’s agar, blood agar and chocolate agar was used and culture urine sample were incubated at 37°C for 24 to 48 hour and isolated organism were identified by colony characteristic, lactose fermentation and biochemical analysis. Kerby-Bauer disk diffusion test was used for antibiotic sensitivity of the organisation. Complete blood count, fasting and post prandial plasma glucose was done and USG of the patient done to know the residual volume and any other pathology associated.

**STATISTICAL ANALYSIS**

Data was collected on excel sheet and analysed by SPSS software version17. For analysis of data chi-square test and compared t-test was used. The p-value less than 0.05 were considered statistically significant.

**RESULT**

During this one year ten month period 100 patients were enrolled in this study based on exclusion and inclusion criteria. Out of 100 patients 36 patients have bacteriuria and 64 patients were without bacteriuria.

As per table 1 regarding relation between the patients of urinary tract infection with bacteriuria and without bactriurea, in relation to sex, out of 50 male,16 have UTI with bactriurea and 34 having UTI without bactriurea. In female patients, 20 have bactriurea and 30 have UTI without bactriurea. This finding is not significant statistically as P value is 0.4046.

In present study, 4 patients having bactriurea were below 40yrs of age and 4 patients have UTI without bactriurea were below...
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40 yrs of age. Twenty two patients were between 41 to 50 yrs of age out of that 8 patients have UTI with bacteriuria and 14 patients have UTI without bacteriuria. Number of patients between 51 to 60yrs were 28, out of that 10 have bacteriuria 18 having UTI without bacteriuria. Patients with UTI between 61 to 70yrs were 32, out of that 12 have bacteriuria and 20 were without bacteriuria. Total ten patients were above 70 yrs of age out of that 2 having bacteriuria and UTI and 8 having UTI without bacteriuria. Regarding type of diabetes and its relation to UTI, out of 100 patients 14 were diagnosed as type-1 out of that 8 having UTI with bacteriuria and 6 have UTI without bacteriuria. Type 2 diabetes patients were 64, out of that 26 were suffering from UTI and having bacteriuria, and, 58 having UTI without bacteriuria. In relation to type of treatment 14 patients who were treated with insulin have developed UTI out of that 8 have bacteriuria and 6 have not bacteriuria. Oral hypoglycaemic were used by 76 patients having UTI out of that 24 patient have bacteriuria in remaining patient there was no bacteriuria. Insulin and oral hypoglycaemic agent both were used in 10 patients out that 4 patients have bacteriuria. This finding was not significant statistically as P value was 0.1799. Patient with HbA1C% from 6.6% to 10% were 52. Out of then 14 have bacteriuria statistically as P value was 0.1799. Patient with HbA1C value above 10, who were suffering from UTI were 43, out of them 38 have no bacterium in urine. Patient with HbA1C% above 10, who were suffering from UTI were 43, out of them 38 have no bacterium in urine. Ischemic heart diseases was present in 24 patients with UTI. In 24 patients with UTI, FPG was less than 110mg/dl, five of them have UTI and four have bacteriuria in urine and one were without bacteriuria. Those patient whose FPG was 111 mg/dl to 200 mg/dl were 41 in number, out of that 14 have bacteriuria and 27 were without bacteriuria. In 54 patient with UTI, FPG was more than 200mg/dl out of 54 patients, 18 have bacteria in urine and 36 patients urine bacteria was absent.

As per table -2, regarding relation between complication of DM and urinary tract infection neuropathy was present in 58 patients. Out of that 24(66.67%) patient have bacteriuria and 34(53.12%) patient have no bacteria in urine. Nephropathy was present in 20 patients with UTI out of that 12 have bacteria and 8 patients have no bacteria in urine. There were 24 patients with UTI who has diabetic food ulcer as well. Out of than 18 have bacteria in urine and 6 were without bacteria. Retinopathy was present in 24 patients with UTI an out of then, 14 have bacteriuria and 10 have no bacteria in urine. Ischemic heart diseases was present in 24 patients with UTI, out of that 10 have bacteria in urine and 14 have no bacteriuria. From table-3, E coli was found in 16 patients that is (44.45%). Klebsiella spp was found in 8 patients that is (22.23%). Out of 36 bacteriuria patients, 4 patients have Enterococcus in urine, pseudomonas was isolated from 4 sample that is (11.22%). Acinetobacter was present in two samples and Candida was isolated from renaming two samples. Regarding resistance to antimicrobial among organism isolated as per table-3, 10 out of 18 E. Coli isolated were sensitive to fluoroquinolones, 6 were sensitive to piperecilline, and 12 were sensitive to piperracillin + tazobactam. Sensitivity to meropenem was found in 14 samples. Klebsiella SPP isolated was sensitive to meropenem, imipiname, ceftriaxone, ceftazidime, aminoglycosides, piperacillin and Fluoroquinolones. Enterococcus were sensitive to imipiname and linazolid. Pseudomonas was sensitive to Fluoroquinolones, imipiname, meropenem. Acinatobactor were sensitive to aminoglycosides,

**DISCUSSION**

As per selection criteria one hundred patients were enrolled for present study, out of them 36 patients have bacteriuria...
and 64 patients have UTI without bacteriuria. This finding is supported by the work of Kalpana D.V. et al and Viswanath et al.9,10 Bacteriuria was more common in female than male but it was not significant statistically. This finding is supported by the work of Bissong ME et al.11 Urinary infection is common between 50 to 70yrs of age and UTI without bacteriuria is more common than bacteriuria. This is supported by the work of Banerjee m et al.12 We have observed that UTI is common with type-2 Dm then type-1 and is associated with oral therapy more commonly. But this finding is not significant statistically which corroborates with the study of Nitzan o et al.13 Regarding glycemic control and UTI with bacteriuria, patients with glycocylated haemoglobin from 6.6% to 10% and above have more incidence of bacteriuria. Similar patient with FPG above 200 have UTI and bacteriuria 11mg/dl. This finding is not significant statistically. Our finding is supported by the work of lenher sm et al.14 Regarding complication of diabetes mellitus and urinary tract infection with, or without bacteria, diabetics neutrophopaty, detroser instability and urothelial dysfunction is major cause of UTI, out of bacteriuria patients 66% has nephropathy and in without bacteriuria group 53.12% has nephropathy, This finding is supported by study of Golbids et al.15 Out of 100 patient 20 have nephropathy, and bacteriuria is more common, this finding corroborates with the study of Zhanel of Kumar R et al but Kiranmala K et al has found Enterococci and Candida. This finding is supported by the work of Vejlsgaard R et al.

CONCLUSION

To conclude bacteriuria was more common in female then male and patient above 50 year of age are more affected then younger one. Patient with type 2 diabetes mellitus and treated with oral hypoglycaemic agent are effected more frequently. Bacteriuria was more common in patient whose glycocylated haemoglobin was more than 10% and fasting plasma glucose was more than 200mg/dl. Patients having neuropathy are more prone to UTI. Most common organism isolate were E.Coli and were sensitive to cephalosporins and aminoglycosides.

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