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General Medicine

CLINICAL SPECTRUM OF URINARY TRACT INFECTION IN DIABETICS AND NON DIABETICS

Dr. Lakshminarayana Udduru*	III Year Postgraduate Department Of General Medicine, Santhiram Medical College And General Hospital, Nandyal. *Corresponding Author
Dr. P. Nagarjuna Reddy	Assistant Professor Department Of General Medicine, Santhiram Medical College And General Hospital, Nandyal.
Dr. G. Vijaya Kumar	Professor and HOD, Department Of General Medicine, Santhiram Medical College And General Hospital, Nandyal.

ABSTRACT

BACKGROUND: Diabetics are more prone for infections than their non diabetic counterparts. Susceptibility increases with longer duration and greater severity of Diabetes. Urinary tract infection (UTI) is the most important and most common form of infection in diabetic patients. Diabetic patients have been found to have five fold frequency of acute pyelonephritis at autopsy than non-diabetics.1 Most of the urinary tract infections in patients diabetes are relatively asymptomatic. This asymptomatic infection can leads to severe kidney damage and cause renal failure. Some of the microorganisms become more virulent in a high glucose environment. Another mechanism which can increase the prevalence of infections in diabetic patients is an increased adherence of microorganisms to diabetic compared to nondiabetic cells.8

AIM: To investigate Clinical spectrum of urinary tract infection (UTI) between diabetic and non-diabetic patients.

Materials and Methods: A Hospital-based Prospective study was conducted in the Department of Medicine, on Patients who visit Santhiram Medical College and General Hospital in Out Patient Department and those patients who are admitted as Inpatients for a 5 months period. Universal Sampling Technique was used for the selection of study subjects. Detailed history regarding the symptoms and signs of Urinary tract infection and history of Diabetes mellitus was taken. 120 diabetics (65 females and 55 males) and 80 non-diabetics (49 females and 31 males) admitted in Santhiram Hospital were studied randomly. All proven diabetics with postprandial (2 hr) venous glucose >200 mg/dl and fasting venous glucose > 126 mg/dl were included in the study irrespective of reason for admission. All patients with a history of diabetes and those who are on treatment were also eligible for admission.

RESULTS: Fever was found to be present in diabetic and non diabetic subjects and was significantly associated with the presence of UTI. The majority of the diabetics with UTI (81.6 per cent) had glycosylated haemoglobin (HbA1c) > 6.5 per cent with $p < 0.02$. More than 50% of patients with recurrent UTI had glycosylated Hb ≥8.0.The isolation rate of Escherichia coli (E. coli) from urine culture was higher (62.5 per cent) among diabetic patients followed by Klebsiella (12per cent) and Enterococcus (10 per cent).

CONCLUSION: The factors of host found to be associated with UTI are female sex, presence of fever, presence of diabetes, poor glycemic control, and past history of UTI. No correlation was noted with age. An elevated glycosylated Hb correlates with occurrence of UTI. The number of patients with UTI who had Glyco Hb below 6.5% were very small in the presence or absence of predisposing factors. A Glyco Hb >8.0% is unacceptable in patients with diabetes mellitus as it increases the chance of developing UTI and its recurrence. Escherichia coli was the most frequent uropathogen responsible for UTI and recurrent UTI in both diabetics and non-diabetics. Klebsiella and Enterococcus were the other common organisms.

KEYWORDS :

INTRODUCTION :

Diabetic patients have a higher incidence of UTI than their nondiabetic counterparts with a higher severity UTI which can be a cause of complications, ranging from dysuria (pain or burning sensation during urination) to organ damage and sometimes even death due to complicated UTI (pyelonephritis). In women, premenopausal and postmenopausal periods aside with sexual activity are considered increased risk factors for developing UTI. Finally, diabetic women have up to four times more UTI risk when they are in oral treatment or insulin injection.[3]

Potential explanation of the increased UTI in diabetic patients might be the nerve damage caused by high blood glucose levels, affecting the ability of the bladder to sense the presence of urine and thus allowing urine to stay for a long time in the bladder and increasing infection probability. Disturbances (low complement factor 4, decreased cytokine response) in humoral innate immunity have been described in diabetic patients.[9] However, the clinical relevance of these findings is not clear. Another explanation is that high glucose levels in urine improve the growth of the bacteria in the urine. Despite the fact that *E. coli* is the most frequent bacterium in UTI, other aggressive pathogens are highly prevalent in diabetic UTIs such as fungal infections, *Klebsiella*, enterococci, Gram-negative rods, group B *streptococci*, *Pseudomonas*, and *Proteus mirabilis*. Most of the urinary tract infections in diabetic patients are relatively asymptomatic. This asymptomatic infection can lead to severe kidney damage and cause renal failure[10]. Hence the study was conducted to compare clinical, microbiological and predisposing features of UTI in diabetics and non diabetics.

AIMS AND OBJECTIVES :

To investigate Clinical spectrum of urinary tract infection (UTI) between diabetic and non-diabetic patients.

MATERIAL AND METHODS:

A Hospital-based Prospective study was conducted in the Department of General Medicine, Santhiram Medical College, and General Hospital for a 5 months period after taking approval from the Hospital Ethics and Research Committee.

SAMPLING TECHNIQUE AND SAMPLE SIZE:

Universal Sampling Technique was used for the selection of study subjects. Patients who visit Santhiram Medical College and General Hospital in Out Patient Department and those patients who are admitted as Inpatients. Detailed history regarding the symptoms and signs of Urinary tract infection and history of Diabetes mellitus. 120 cases during the study period were taken into study after satisfying the inclusion and exclusion Criterias.

INCLUSION CRITERIA

1. Culture positive urinary tract infections.
2. Age > 18 years.

EXCLUSION CRITERIA

1.) Culture negative urinary tract infections.
2.) Age < 18 years.

3.) Patients who were diagnosed and treated outside.

DATA ANALYSIS

All patient profiles were recorded in proforma, and findings were tabulated, SPSS24 was used for the analysis of the data.

RESULTS :

The study included 120 diabetics (55 males and 65 females) and 80 Non- diabetics (31 males and 49 females).

Table 1: Sex distribution

	DM	NDM
MALE	55	31
FEMALE	65	49
TOTAL	120	80

Table 2: Mean Age ± SD (Years)

Mean Age ± SD (Years)	DM	NDM
Male	59.41 ± 12.15	58.83 ± 13.64
Female	54.53 ± 17.18	54.42 ± 18.37

Mean age among diabetic and non diabetic patients was 56.77 ±15.22 years and 56.13 ± 16.75 years.

Table 3:PRESENTING SYMPTOMS

Symptoms	DM	NON-DM	P value
Fever	64(53.3%)	48 (60.00%)	0.352
Dysuria	46(38.33%)	32 (40.0%)	0.597
Increased frequency	26(21.66%)	23(28.75%)	0.268
Abdominal pain	21(17.50%)	20(25.00%)	0.166
Vomiting	28(23.33%)	15(18.75%)	0.364
Hematuria	6(5.0%)	3(3.75%)	0.676
Pyuria/turbiduria	4(3.3%)	2(2.50%)	0.735
Incontinence	17(14.2%)	9(11.25%)	0.547
Retention	4(3.3%)	3(3.75%)	0.875

Fever was found to be present in 53.3% of DM and 60% of non diabetic subjects and was significantly associated with the presence of UTI.

Correlation of recurrent UTI with glycemic control:
Table 4: Level of glycemic control and recurrent UTI

Glyco Hb	No. of patients	Percentage
<6.5	1	5.2%
6.5-8.0	7	36.7%
>8.0	11	57.9%

In our study of diabetics with UTI majority (81.6 %) had Glyco Hb > 6.5% with p <0.02. A very high proportion of patients (90.9 %) with Glyco Hb <6.5 and UTI had other underlying factors which predisposed them to UTI.Thus occurrence of UTI in diabetics seems to be related to the glycemic control in the recent past- over a period of weeks to months. Further a Glyco Hb < 6.5% was infrequently associated with UTI in the absence of other underlying predisposing factors. More than 50% of patients with recurrent UTI had glycosylated Hb ≥8.0. Mean Glyco Hb in DM with recurrent UTI was 9.26 ±3.83 (i.e. > 8.0)

MOST COMMON UROPATHOGENS IN DM AND NON-DM:
Table :13 Uropathogens in DM and NDM

	DM	NDM	P value
Ecoli	75	43	0.21
Klebsiella	18	17	0.25
Enterococcus	12	5	0.35
Pseudomonas	2	9	0.003
Acinetobacter	2	0	0.82
Citrobacter	1	2	0.34
Proteus	2	1	0.81
CONS	2	2	0.68
Coag. Positive Staph	3	1	0.53
Candida	3	0	0.54

Escherichia coli was the most frequent uropathogen isolated, responsible for UTI in 67.3% and 58.5% of diabetic males & females and 58.1% & 51.1% of non-diabetic males & females. Klebsiella and Enterococcus were the other common organisms.

DISCUSSION :

The present study included 120 diabetic and 80 non-diabetic patients with culture positive urinary tract infections.

In this study, we have tried to determine whether there are differences in the clinical and microbiological patterns of UTI concerned with diabetic and non-diabetic patients. Mean age among diabetic and non diabetic patients was 56.77 ±15.22 years and 56.13 ± 16.75 years. There was no significant correlation between the age of patient and the incidence of UTI in both diabetic and non-diabetic patients, but the incidence is more in females. Srinivas M Aswani et al.(2014)[2] and Bonadio M et al. (2006)[5] also made a similar observation in their study. Fever was found to be present in 53.3% of DM and 60% of non diabetic subjects and was significantly associated with the presence of UTI. So the presence of fever should prompt a look at the urinary tract as a possible source of infection.There was no significant difference in clinical symptoms and signs between diabetic and non diabetic subjects .

In our study of diabetics with UTI majority (81.6 %) had Glyco Hb > 6.5% with p < 0.02. A very high proportion of patients (90.9 %) with Glyco Hb <6.5 and UTI had other underlying factors which predisposed them to UTI.Thus occurrence of UTI in diabetics seems to be related to the glycemic control in the recent past- over a period of weeks to months. Further a Glyco Hb < 6.5% was infrequently associated with UTI in the absence of other underlying predisposing factors. Tseng CC et al (2002)[3] in their study on factors predisposing to E.Coli UTI in diabetic population have noted that a Glyco Hb > 8.1 % was associated with an increased risk for UTI.

In those patients of UTI with Glyco Hb < 6.5%, upto 90% had underlying predisposing factors. Thus, achieving a Glyco Hb < 6.5% particularly seems to protect those diabetics who do not have an underlying predisposing factor, from UTI.

Escherichia coli was the most frequently isolated uropathogen, responsible for UTI in 67.3% and 58.5% of diabetic males & females and 58.1% & 51.1% of non-diabetic males & females. In the study conducted by Mario Bonadio et al[5] the isolation rates of E.coli were: diabetics (males 32.5% vs females 54.1%) and non diabetics (males 31.4% vs 58.2%). The incidence of E.coli ESBL is higher in diabetics (60%) Vs non- diabetics (20%) which is almost similar to study conducted by Md. Hamzar et al[6] in diabetics (50.6%) vs non-diabetics (9.5%).

Fungal UTI among diabetic population are more common in patients with prolonged hospital stay, catheterisation and prolonged parenteral antibiotic use.[7] In the present study three patients had UTI due to Candida. These patients had other factors predisposing to UTI and/or prolonged hospital stay.

CONCLUSION :

The following findings from this study;

1.) The host factors that are significantly associated with UTI are female sex, presence of diabetes, poor glycemic control, presence of fever and past history of UTI.
2.) There was no correlation noted with age, duration of diabetes and type of treatment for diabetes.
3.) An elevated glycosylated Hb correlates with occurrence of UTI. The predisposition of the diabetic to UTI, probably depend on the degree of glycemic control over a period of weeks to months.
4.) The number of patients with UTI who had Glyco Hb below 6.5% were very small in the presence or absence of predisposing factors. Therefore, achieving a Glyco Hb < 6.5% appears to protect those diabetics who do not have another underlying predisposing factors for UTI. A Glyco Hb >8.0% is unacceptable in patients with diabetes mellitus as it increases the chance of developing UTI and its recurrence.
5.) Escherichia coli was the most frequent uropathogen responsible for UTI and recurrent UTI in both diabetics and non-diabetics. Klebsiella and Enterococcus were the other common organisms.

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