

Prevalence and Correlation Rates of Urinary Tract Infections in Type 2 Diabetes - A Cross Sectional Study

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Abstract: An association between urinary tract infection (UTI) and diabetes mellitus was first noted in an autopsy series in 1940's. Many autopsy studies have shown an increased prevalence of urinary tract infection in diabetics. Animal studies have demonstrated the greater susceptibility of diabetic groups than non-diabetic group to bacteriuria and pyelonephritis. However clinical studies to assess prevalence of bacteriuria in diabetics have showed varied results. Many studies have shown an increased prevalence of bacteriuria in diabetics whereas almost equal numbers of studies have failed to show a significant association. Objective was to study the Urinary tract infection in patients suffering from Diabetes Mellitus. 50 patients suffering from diabetic, who were admitted in tertiary care hospital, were chosen for the study, for a period of one year from January 2016 to December 2016. All the patients had a history of diabetes or with fasting venous blood glucose value equal, or more than 126mg/dl and post prandial blood sugar more than or equal to 180mg/dl and clinical and microbiological features of urinary tract infections, were included in the study. Of the 50 known cases of diabetes chosen for the study, with clinical or microbiological evidence of urinary tract infection, there were 57 (57%) patients who had no evidence of bacteriuria, and 43 (43%) patients had bacteriuria (positive urine culture from mid-stream urine). In the present study out of 50 diabetic patients' 28 cases found to be suffering from urinary tract infection. In this study totally 17 diabetic patients was found to be suffering from urinary tract infection. So bacteriuria is more common in female than male diabetics. In the present study, the symptoms like fever, dysuria, urgency, frequency, and hematuria, were statistically significant in bacteriuric patients when compared between non-bacteriuric patients. Predominant bacteria isolated were *E. Coli* (18) and the next common being *Klebsiella* (7). Other organisms isolated included were *Enterococci* (1), and *Pseudomonas* (1). *Candida* was isolated along with *klesiella* in three of the patients. Gender based evaluation of the causative organism also showed *E. Coli* as the most common cause organism in females. The mean specific gravity was 1.0356 (SD \pm 0.0204) for bacteriuria and 1.027 (SD \pm 0.0185) for non - bacteriuric patients. The study results indicate that bacteriuria and UTI occur more commonly in women with diabetes than in women without disease. The most significant conclusion the study highlighted was that majority of the diabetic patients (60%) suffering from symptomatic UTI were having bacteriuria. The study revealed that the duration of type 2 diabetes patients of more than 10yrs had high predilection for development of UTI's.

Keywords: Urinary tract infection, Diabetes Mellitus, Bacteriuria, *E. Coli*.

INTRODUCTION

An association between urinary tract infection (UTI) and diabetes mellitus was first noted in an autopsy series in 1940's. Many autopsy studies have shown an increased prevalence of urinary tract infection in diabetics. Animal studies have demonstrated the greater susceptibility of diabetic groups than non-diabetic group to bacteriuria and pyelonephritis. However clinical studies to assess prevalence of

bacteriuria in diabetics have showed varied results. Many studies have shown an increased prevalence of bacteriuria in diabetics whereas almost equal numbers of studies have failed to show a significant association [1].

The consensus of the studies seems to be that yearly incidence of bacteriuria in diabetic men (1-11% mean 5%) does not differ from that of non-diabetic men

(1-4% mean 3%) whereas there appears to be two to three fold higher incidence of bacteriuria in diabetic women (11-20% mean 15%) compared to non-diabetic women (3-19% mean 9%). Many factors predispose to the development of urinary tract infection in diabetic patients. Neurogenic bladder secondary to diabetic neuropathy is the best recognized. Although some studies have suggested that control of diabetes duration of diabetes and severity of diabetes to be associated with UTI this has not been seen consistently in other studies. The microbiologic profile of UTI in diabetics was seen to be similar with E. coli being the predominant organism. Only exception is that group B streptococcus has been found to have a high association with bacteremic pyelonephritis in diabetics. Also majority of UTI in diabetics have been found to be asymptomatic.

Urinary tract infection in diabetics' cause of concern since upper UTI is common and once established parenchymal damage is extensive and local complications common. A study using antibody coated bacteria as an indicator of upper versus lower UTI found that upper tract was involved in 43% of women on initial evaluation which progressed to 79% of infected subjects during a pre-treatment assessment of 7 weeks [2].

UTIs invariably enter via the ascending route. Asymptomatic bacteriuria has been reported to be commoner in women with diabetes, although data are less convincing for men. Many studies have also shown that bacteriuria in diabetic women involves the upper urinary tract more frequently. However most authors believe that asymptomatic bacteriuria in patients with diabetes does not lead to complications and therefore screening and treatment is not warranted, except perhaps in pregnant women [3].

The term asymptomatic bacteriuria refers to the presence of high quantities of a uropathogen in the

urine of an asymptomatic person. Initial studies showed that colony counts 10⁵ cfu/mL more often predicted persistently high levels of bacteriuria compared with lower colony counts [4].

OBJECTIVE

To study the Urinary tract infection in patients suffering from Diabetes Mellitus

METHODOLOGY

50 patients suffering from diabetic, who were admitted in tertiary care hospital, were chosen for the study, for a period of one year from January 2016 to December 2016. All the patients had a history of diabetes or with fasting venous blood glucose value equal, or more than 126mg/dl and post prandial blood sugar more than or equal to 180mg/dl and clinical and microbiological features of urinary tract infections, were included in the study.

The term "bacteriuria" means, uncentrifugated gram stained urine containing atleast one organism per oil immersion field, correlating with a colony count of >10⁵ cfu/ml. And the term "none or without bacteriuria" means uncentrifugated gram stained urine that contain atleast one organism per oil immersion field, correlating with a colony count of <10⁵ cfu/ml.

RESULTS

Of the 50 known cases of diabetes chosen for the study, with clinical or microbiological evidence of urinary tract infection, there were 57 (57%) patients who had no evidence of bacteriuria, and 43 (43%) patients had bacteriuria (positive urine culture from mid-stream urine).

In the present study out of 50 diabetic patients' 28 cases found to be suffering from urinary tract infection.

Table 1: Distribution of cases

Diabetic patients	Number	Percentage
With UTI	28	56%
Withou UTI	22	44%
Total	50	100%

Table-2: Gender wise distribution of cases

Diabetic patients	Male	Female	Percentage
With UTI	11	17	56%
Withou UTI	10	12	44%
Total	21	29	100%

In this study totally 17 diabetic patients was found to be suffering from urinary tract infection. So

bacteriuria is more common in female than male diabetics.

Table-3: Symptoms of urinary tract infections

UTI symptoms	With Bacteruria (n=28)		Without Bacteruria (n=22)	
	Number	Percentage	Number	Percentage
Asymptomatic	4	14	2	9
Fever	21	75	18	81
dysuria	18	64	12	54
Frequency	16	57	11	39
urgency	7	25	3	13
hematuria	6	21	1	4
pyuria	3	11	1	4
suprapubic pain	1	3	1	4
flank pain	1	3	1	4

In the present study, the symptoms like fever, dysuria, urgency, frequency, and hematuria, were

statistically significant in bacteruric patients when compared between non-bacteruric patients.

Table-4: Organisms isolated in urine culture

Organism	Number	Percentage
E-Coli	18	64.5 %
Klebsiella	7	25 %
Enterococci	1	3.5 %
Pseudomonas	1	3.5 %
Candida	1	3.5 %

Predominant bacteria isolated were E.Coli (18) and the next common being Klebsiella (7). Other organisms isolated included were Enterococci (1), and Pseudomonas (1). Candida was isolated along with klesiella in three of the patients. Gender based evaluation of the causative organism also showed E.Coli as the most common cause organism in females. The mean specific gravity was 1.0356 (SD ±0.0204) for bacteruria and 1.027 (SD ±0.0185) for non –bacteruric patients.

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Kitami *et al.* did a study where IVU and urinalysis were done for 173 diabetics and 17 controls. Normal vesical function was seen only in 13 of the 173 diabetes. In addition to the increased volume at first desire to void and decreased maximal vesical pressure, they also found overactive bladder (14.5%) and low compliance bladder (1%). Loss of detrusor and external sphincter coordination was found in 31.7% of diabetics [5].

DISCUSSION

Of the 50 known cases of diabetes chosen for the study, with clinical or microbiological evidence of urinary tract infection, there were 57 (57%) patients who had no evidence of bacteruria, and 43 (43%) patients had bacteruria (positive urine culture from mid-stream urine). In the present study out of 50 diabetic patients’ 28 cases found to be suffering from urinary tract infection. In this study totally 17 diabetic patients was found to be suffering from urinary tract infection. So bacteruria is more common in female than male diabetics. In the present study, the symptoms like fever, dysuria, urgency, frequency, and hematuria, were statistically significant in bacteruric patients when compared between non-bacteruric patients. Predominant bacteria isolated were E.Coli (18) and the next common being Klebsiella (7). Other organisms isolated included were Enterococci (1), and Pseudomonas (1). Candida was isolated along with klesiella in three of the patients. Gender based evaluation of the causative organism also showed E.Coli as the most common cause organism in females.

Acute pyelonephritis is a common presentation of UTI in diabetes. In one study by Nicolle *et al.* diabetes increased the probability of acute pyelonephritis requiring hospital admission by 20–30-fold in those less than 44 years of age and by three to five-fold in men and women aged 45 years and over. Not only do patients with diabetes have an increased incidence of acute pyelonephritis compared with non-diabetic controls, but bilateral pyelonephritis is also commoner and predisposes to more severe infection of the upper urinary tract with substantially greater complications. Uncomplicated UTIs in diabetics are usually due to the same pathogens as in non-diabetic adults with UTIs. However, Klebsiella pneumoniae, group B streptococci, and C. albicans, are more likely to be pathogens in diabetic patients with UTIs [6,7].

UTIs in patients with diabetes are due to the same urinary pathogens as those found in the general

population, with the majority of ascending infections being caused by E.coli. Other uropathogens found in patients with diabetes include *Proteus* spp., *Enterobacter* spp. and *Klebsiella pneumoniae* and group B streptococci are also more common in patients with diabetes. *Staphylococcus aureus* accounts for infections caused by haematogenous spread. About 50–75% of emphysematous pyelonephritis cases are caused by E.coli and most of the rest are caused by other Gram-negative organisms [8, 9].

CONCLUSION

The study results indicate that bacteriuria and UTI occur more commonly in women with diabetes than in women without disease. The most significant conclusion the study highlighted was that majority of the diabetic patients (60%) suffering from symptomatic UTI were having bacteriuria. The study revealed that the duration of type 2 diabetes patients of more than 10yrs had high predilection for development of UTI's. Another important conclusion that can be inferred from the study is that elevated glycosylated Hb values are associated with diabetics suffering from UTI's. The study also highlights the fact that urine culture analysis of diabetic patients with UTI revealed that E.coli was the commonest organism isolated followed by klebsiella organism.

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