Original Article

Clinical Cross-sectional Study to Identify the Prevalence of Asymptomatic Bacteriuria in Type II Diabetic Patients at Rajiv Gandhi Institute of Medical Sciences Srikakulam

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Abstract

Background: Diabetes mellitus is one of the common diseases affecting a large of population throughout the world. It is an endocrine disorder affecting the physical, psychological, and social health of an individual, WHO has defined diabetes as not merely but affecting a "state of complete physical, mental, and the social well-being.

Materials and Methods: Outpatients attending medicine Outpatient Department in Rajiv Gandhi Institute of Medical Science Srikakulam, were taken into this study to know the prevalence of asymptomatic bacteria (ASB) in Type II Diabetic patients and non-diabetic patients, i.e., taken 2 Groups (a). Group A: Positive for diabetic. (b) Group B: Negative for diabetic. 103 patients in the study population (Group A), 50 patients in control group (Group B), 50% of the sample size were taken for the control group.

Results: Out of 153 randomly selected patients 103 was found to be diabetic hence they recruited in the study group. Out of 103 patients, 58 (56.3%) were females, and 45 (43.7%) were males in the study population. All the patients were in age 30–80 years with an age of 42 ± 10.6 years. Non-diabetic 50 patients were included in the control group who were in the age 75 years with mean age of 48 ± 8.9 years. Control group consist of 28 (56%) male and 22(44%) females.

Conclusion: The incidence and prevalence of ASB are high in diabetic population compared to non-diabetic group. ASB is one of the important risk factors for renal complications in diabetic population. Diverse pathogenic microbial diaspora is responsible for ASB. Close monitoring of antibiotic sensitivity shall improve the control of ASB and thereby score over the risk reduction of renal complications in diabetic patients.

Key words: Culture, Gram stain, Microbiological, Microscopy

INTRODUCTION

Diabetes mellitus is one of the common diseases affecting a large of population throughout the world. It is an endocrine disorder affecting the physical, psychological, and social health of an individual.

Urinary tract infection (UTI) is the most common infection in diabetic patients. Many UTI is asymptomatic and whether symptomatic UTI is preceded by asymptomatic bacteriuria (ASB) is not known. In diabetic women, there is a four-fold propensity of UTI. ASB precedes symptomatic UTI in many occasions in Type 2 diabetes.

ASB is characterizes by the presence of significant amount >10^5 CFU/ml of bacteria in urine.

Asymptomatic bacteria can lead to symptomatic urinary infection, as well as an increase in tendency for chronic kidney disease (CKD) and renal failure as one of the long-term adverse effect. Serious complications such as emphysematous pyelonephritis, renal papillary necrosis, and perinephric abscess. Diabetes with ASB is at risk for albuminuria.

The prevalence rate of ASB in diabetic women is 9–29% among females and 0.7–11% in males. The most common

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etiological agents in ASB are *Klebsiella pneumonia*, *Escherichia coli*, *Enterobacter* Spp., *Streptococcus agalactiae*, *Enterococcus faecalis*, and coagulase-negative Staphylococci (CONS). *Streptococcus pyogenes E. coli* is the most common uropathogens among them.[1-10]

Aim of the Study
- To identify the prevalence of ASB in Type II diabetics and non-diabetics.
- To know the bacterial profile of ASB.

MATERIALS AND METHODS

Design
Type II diabetic patients are attending at medicine OP in Rajiv Gandhi Institute of Medical Science Research Institute, Srikakulam, were randomly selected for the study based on the exclusion/inclusion criteria. It is a cross-sectional case-controlled study to know the prevalence of ASB in Type 2 patients, taken into two groups, namely, (1) positive for diabetic and (2) negative for diabetic.

Study Period
The study period was 1 year.

Inclusion Criteria
1. Patients with age >18 years or above.
2. Both sexes.
3. From random selection patients with type 2 diabetes mellitus with fasting > 126mg/dl included in a study group for sample size 103.
4. Similarly, from random selection patients with fasting blood sugar < 100mg/dl were included in the control group for sample size of 50.

Exclusion Criteria
1. Pregnant women.
2. Recent catheterization.
3. Immunocompromised patients (HIV, malignancy, and long-term steroid therapy).
4. Recent hospitalization or undergone surgery within past 6 months or undergone any urogenital procedures.
5. Patients with fever, chills, and pain in abdomen were excluded from the study.

All type 2 diabetic patients with fasting blood sugar level >100 mg/dl but < 126 mg/dl all the non-diabetic patients were asked to collect clean-catch midstream urine sample and presence of pus cells, and pyuria was examined, and urine culture was done.

103 randomly selected study group patients and 50 randomly selected control group attending outpatients were of Rajiv Gandhi Institute of Medical Science Government General Hospital Srikakulam, who are above 18 years of age were explained about the study and gave written consent to participate in the study.

Laboratory Methods
The patients were instructed to clean their genital area with soap and water and to leave the first part of the urine and collect 10 ml of the clean catch midstream urine in smile container. The urine samples were immediately transported to the laboratory and were processed immediately. In case of daily, the samples were stored in 4°C in refrigerator or preservative like boric acid were added. In addition to culturing; quantitative bacterial count, microscopic examination, and routine biochemical analysis for diabetic patients were done. Macroscopic analysis of urine samples was performed to describe the urine color, specific gravity, Ph. Glucose, protein, Ketone, red blood cells, etc.

Biochemical Examination
24 h urine samples were collected to find the urine albumin level, excretion of urea, creatinine was done by Jaffe's method analysis in the Department of Biochemistry, MMCH & RI.5 ml of blood was collected to test for the fasting, post-prandial glucose level, serum creatinine level, and blood lipid profiles such as high-dose cyclophosphamide, low-density lipoprotein (LDL), very LDL, and triglycerides level. Microalbuminuria, macroalbuminuria, and hemoglobin Alc were done using nephelometry analysis was done.

Microbiological Examinations
Microscopy
Urine samples were centrifuged at 500 rpm/5 min. A wet mount and gram stain were done to detect the presence of >10 pus cells and bacteria. Presence of >10 polymorph nuclear leukocytes/HPF indicated inflammation of urinary Culture: Significant bacteriuria as assessed using standard loop technique ($\geq 10^5$ CFU/ml).

The samples were streaked on varius media such as nutrient agar, blood agar, MacConkey agar, and incubated at 37°C for 24.48 h and presence of visible colony formation was noted.

Renal Complication
Ultrasound scanning was done to find any renal scars or renal damage. Two views anterior and posterior scan views were taken for finding the presence of cortical indentation, and focal or multiple defects either unilaterally or bilaterally was recorded as abnormal.

Normal albuminuria - urinary albumin to creatinine ratio (UACR) <30 mg/g.

Microalbuminuria - UACR 30–299 mg/g.

Macroalbuminuria - UACR 300 mg/g or more.

RESULTS

Of the 103 type 2 diabetes patients 50 non diabetics subjects 58(56.3%) were females and 45 (43.7%) were males with age range between 30 and 80 years and in the between age of 42+/-10.6 years. Of the 50 non diabetics subjects 28(56%) were females and 22(44%) were males and with age range between 30 years to 80 years and were in the ages between 48+/- 8.9 years.

Out of 103 diabetic patients 42 (40.8%) were having asymptomatic bateriuria and 4 of 5o non diabetic individuals were found to have asymptomatic bateriuria ie 8%.

Of the 42 asymptomatic bateriuria 27 (64.3%) were females and 15 (35.7%) were males. Of the 4 asymptomatic bateriuria among non diabetic cases 3 (75%) were females and 1 (25%) were females).

The most common uropathogens isolated from the diabetic patients 16(38%) were having *E.coli*, 6(14.3%) *P.aeruginosa*, 4(9.5%) were *Acinetobacter*, 4(9.5%) were having *Proteus mirabilis*, 4(9.5%) were *P. vulgaris*, 3(7.1%) were *Citrobacter* spp. 3(7.1%) were *S. aureus* and 2(4.8%) were Klebsiella spp.Among the non diabetic individuals 2 (50%) were having *E.coli*, 1 (25%) *Klebsiella* spp. and *P. vulgaris* 1(25%) [Tables 1-3 and Graphs 1-3].

Table 1: Age and gender wise distribution of studied subjects

Age	Females(%)	Males(%)
31 to 40 years	14 (24.1)	9 (20)
41 to 50	28 (48.3)	21 (50)
51to 60	5 (8.6)	4 (9.5)
61 to 70	7 (12.1)	9 (21.4)
71 to 80	4 (6.9)	2 (4.8)
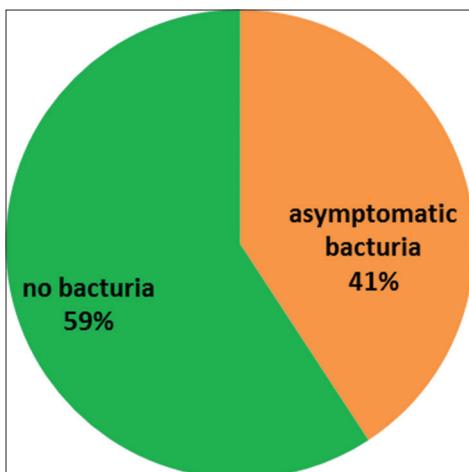
Graph 1: Distribution of studied population according to presence of ASB among type 2 diabetics (*n*=103)

DISCUSSION

The association of ASB with albuminuria and creatinine level has a significant correlation, which is concordant with our study, which also shows significant association of albuminuria ($P < 0.001$) and serum creatinine ($P < 0.001$) level in ASB. There was no correlation between age, body mass index (BMI) and ASB among the diabetic patients, which is similar to a study who also reported that there is no correlation between ASB with age and BMI of the patients.

The mean glycemic level of diabetic patients at the time of inclusion into the study was $>7.2 \pm 1.8$.

It is suggested that ASB leads to increase in frequency of complications such as pyelonephritis, emphysematous cystitis, emphysematous pyelonephritis, perinephric abscess, renal papillary necrosis, and renal failure.

The rate of diabetic glomerulopathy prevalence was 10.7% and 4%, which need a renal biopsy to be performed.
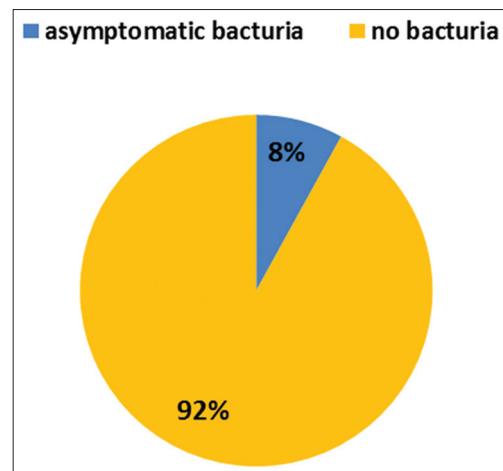
Graph 2: Distribution of studied population according to presence of ASB among non diabetics(*n*=50)
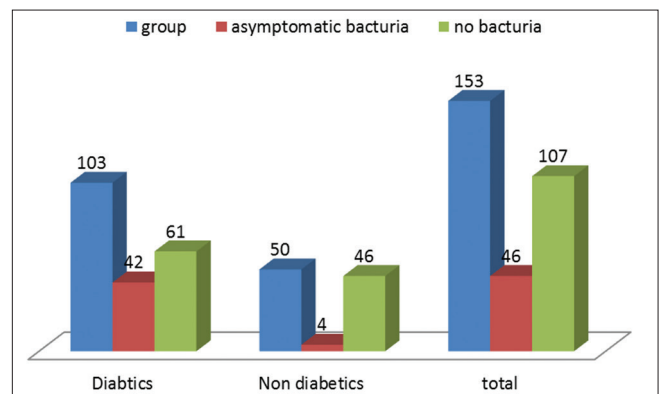
Graph 3: Distribution ASB among of studied subjects

Table 2: Various predisposing risk factors among studied individuals

Factor	Type 2 diabetic group	Non diabetic individuals	Remarks
Age (years)	42±10.6	48± 8.9	
Glycemic control(%)	9.2±2.3	12.4±1.2	P = 0.56
BMI (kg/m^2)	31±22.6	28.3±4.4	P = 0.27
S.creatinine (ia mol/lit)	85.4±22.6	79±19	P < 0.001
Urine Microalbumin	14	9	0.37
H/o UTI in previous years*	yes	yes	P = 0.37
H/o Smoking consumption as a habit*	yes	yes	P = 0.01
H/o Alcohol consumption as a habit*	yes	yes	P = 0.21

*H/o (history of) particular indicator present in some but not all individuals of the studied population)

Table 3: Prevalence of uropathogens among studied subjects

Organism	Study group (n = 42) (%)	Control group (n = 4) (%)
E coli	16 (38)	2 (50)
P.aeruginosa	6 (14.3)	-
Acinobacter species	4 (9.5)	-
P.mirabilis	4 (9.5)	-
P.vulgaris	4 (9.5)	1 (25)
Citrobacter species	3 (3.7)	-
S.aureus	3 (3.7)	-
Klebsiella species	2 (4.8)	1 (25)

Patients with significant albuminuria UACR > 30 mg/g were main markers to diagnose glomerulopathy. Increased albumin excretions, inflammation of the Kidney are the associated factors leading to CKD in Type 2 diabetic patients. These results imply that damage to the kidney may be due to high incidence of recurrent ASB, which makes kidney vulnerable for bacterial infections which in turn decline the renal function.

CONCLUSION

Out of 103 patients in the study group (Type 2 DM), 58 (56.3%) were females, and 45 (43.7%) were males in the study population in age 30–80 years with mean age of 42 ± 10.6 years. 50 control group patients 28 (56%) female and 22 (44%) males in the age 30–80 years with mean age of 48 ± 8.9 years.
- 42 (40.8%) had symptomatic bacteriuria consists of 26 (61.91%) male and 16 (38.09%) female in study population.
- In control group non-diabetic patients only 4 (8%) has asymptomatic with 3 (75%) were females and 1 (25%) were male patients.

- Nephropathy was diagnosed in 11 (10.7%) study population and 2 (4%) control patients. Neuropathy was seen in 4 (3.9%) study population and 1 (2%) in control group patients.

Most common uropathogen in study group (38%) and control group (50%)is *E coli.*

Significant difference in serum creatinine values were found between control and study group.

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