A CLINICAL STUDY TO IDENTIFY THE PREVALENCE OF ASYMPTOMATIC BACTERIURIA IN TYPE II DIABETIC PATIENTS AT RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES, SRIKAKULAM

Bongu Srinivasa Rao¹, A. Gopal Rao², Sharath Babu Naik Z³

¹Associate Professor, Department of Medicine, RIMS, Srikakulam.

²Associate Professor, Department of Medicine, RIMS, Srikakulam.

³Assistant Professor, Department of Community Medicine, RIMS, Srikakulam.

ABSTRACT

BACKGROUND

Diabetes mellitus is one of the common diseases affecting a large number of population throughout the world.⁽¹⁾ Urinary tract infection is the most common infection in diabetic patients. Many UTIs are asymptomatic and whether symptomatic UTI are preceded by asymptomatic bacteriuria (ASB) is not known. Asymptomatic bacteriuria can lead to symptomatic urinary infection as well as increase in tendency for chronic kidney disease (CKD) and renal failure as one of the long-term adverse effects. The prevalence rate of ASB in diabetic women are 9% - 29% among females and 0.7% - 11% in males.^(2,3) The most common aetiological agents^(4,5,6) in asymptomatic bacteriuria are *Klebsiella pneumoniae*, *E. coli*, *Enterobacter* spp., *Streptococcus agalactiae*, *Enterococcus faecalis*, Coagulase Negative Staphylococci (CONS) and *Streptococcus pyogenes*. UTI is a common problem among females and non-diabetics also, hence a study was conducted to know the asymptomatic bacteriuria among type 2 diabetics and non-diabetics.

MATERIALS AND METHODS

Outpatients attending medicine OPD in Rajiv Gandhi Institute of Medical Sciences, Srikakulam, were taken into the study. A cross-sectional study was done to know the prevalence of asymptomatic bacteriuria in Type II Diabetic patients among the diabetics (Group A) and non-diabetics (Group B); 103 patients in study population (Group A) and 50 patients in control group (Group B) were taken; 50% of the sample size were taken for control group.

RESULTS

Out of 153 randomly selected patients 103 were found to be diabetic; hence, they were recruited in the study group. Out of 103 patients, 58 (56.3%) were females and 45 (77%) were males in the study population. All the patients were in the age group of 30-80 years with an age of 42 ± 10.6 years (Table 1) (Graph 1). Non-diabetic 50 patients were included in the control group, who were in the age group of 75 years with the mean age of 48 ± 8.9 years. Control group consisted of 28 (56%) males and 22 (44%) females.

CONCLUSION

The incidence and prevalence of ASB is high in diabetic population compared to non-diabetic group.⁽⁵⁾ ASB is one of the important risk factors for renal complications in Diabetic population. Diverse pathogenic microbial diaspora are 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. To prevent lifetime complications, it is recommended periodic/ regular screening for UTI as it has a symptomatic presentation.

KEYWORDS

ASB (Asymptomatic Bacteriuria), Microbiological Examination, Microscopy, Culture and Gram Stain.

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BACKGROUND

Diabetes mellitus is one of the common diseases affecting a large number of population throughout the world. It is an endocrine disorder affecting the physical, psychological and social health of an individual. Urinary tract infection is the most common infection in diabetic patients.⁽⁶⁾ Many UTIs are asymptomatic, and whether symptomatic UTIs are preceded by asymptomatic bacteriuria (ASB) is not known.⁽²⁾

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Corresponding Author:

Dr. Sharath Babu Naik Z,

Assistant Professor,

Department of Community Medicine,
RIMS, Srikakulam.

E-mail: bhavyabongu@gmail.com

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Diabetes is more common in India, China and USA. Asymptomatic bacteriuria precedes symptomatic UTI in many occasions in type 2 diabetes.⁽⁷⁾ The presence of higher glycated haemoglobin levels was the only significant risk factor for significant bacteriuria in women with type 2 diabetes.⁽⁸⁾

Aim of the Study

- To identify the prevalence of asymptomatic bacteriuria in type II diabetics and non-diabetics.
- To know the bacterial profile of ASB.

MATERIALS AND METHODS

Outpatients attending medicine OP in Rajiv Gandhi Institute of Medical Sciences Research Institute, Srikakulam, were taken for the study. It is a cross-sectional study to know the prevalence of asymptomatic bacteriuria in type 2 diabetic patients and non-diabetics.

Study Period

1 year.

For Group A (Type 2 Diabetics)**Inclusion Criteria**

1. Patients with age > 18 years or above.
2. Both sexes.
3. Newly diagnosed cases with Type 2 diabetes mellitus with fasting > 126 mg/dL.
4. Not on any anti-diabetic treatment.

Exclusion Criteria

- Pregnant women.
- Recent urethral catheterisation.
- Immunocompromised patients (HIV, Malignancy, Long-term steroid therapy).
- Recent hospitalisation or undergone surgery within past 6 months or undergone any urogenital procedures.
- Patients with fever, chills or pain in abdomen were excluded from the study.

For Group B (Non-Diabetics)**Inclusion Criteria**

- 1) Not a known diabetic.
- 2) Aged > 18 years.
- 3) Not having any three of cardinal symptoms of diabetes.
- 4) Fasting blood sugar < 100 mg/dL.
- 5) Not having any other known chronic diseases.

Exclusion Criteria

- Pregnant women.
- Recent urethral catheterisation.
- Immunocompromised patients (HIV, malignancy, long-term steroid therapy).
- Recent hospitalisation or undergone surgery within past 6 months or undergone any urogenital procedures.
- Patients with fever, chills or pain in abdomen were excluded from the study.

Collection of Urine Sample

All patients were asked to collect clean catch midstream urine sample, and presence of pus cells and pyuria were examined, and urine culture was done.

Sample Size

All the newly diagnosed diabetic patients attending the Medicine Department OPD, who were not having any other complaints requiring antibiotics were listed for the said period. Total 257 newly diagnosed Type 2 patients were listed and after exclusion criteria and convenience sampling method 150 were included and of them 120 gave consent. 17 individuals were lost to follow-up and hence 103 individuals were retained and were labelled as Group A, i.e. Type 2 diabetic patients.

For Control, a convenience sample of 50 were chosen and shortlisted based on the inclusion criteria and majority of them were patient attendants or relatives etc. who volunteered were taken for the control group and labelled as Group B, i.e. non-diabetic individuals.

103 randomly selected study group patients and 50 randomly selected control group attending outpatient were of Rajiv Gandhi Institute of Medical Sciences, Govt. General Hospital, Sriakulam who were above 18 years of age were explained about the study and they gave written consent to participate in the study.

Laboratory Methods⁽⁹⁾

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 sterile container. The urine samples were immediately transported to laboratory and were processed immediately. In case of daily, the samples were stored in 4°C in the 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 done to describe the urine colour, specific gravity, pH, glucose, protein, ketone, RBC's etc.

Biochemical Examination

24 hours urine samples were collected to find the urine albumin level, excretion of urea. Creatinine was done by Jaffe's method Analysis in Department of Biochemistry, MMCH and 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 HDL, LDL, VLDL and triglycerides level. Micro-albuminuria, macro-albuminuria and HbA1c were done using Miphlometry analysis.

Microbiological Examinations**Microscopy**

Urine samples were centrifuged at 500 rpm/ 5 mins. A wet mount and gram stain was done to detect the presence of >10 pus cells and bacteria. Presence of > 10 polymorph nuclear leucocytes/ HPF indicated inflammation of urinary culture: Significant bacteriuria was assessed using standard loop technique ($\geq 10^5$ CFU/mL).

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

Renal Complication

Ultrasound scanning was done to find any renal scars or renal damage. Two views of 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	-	UACR < 30 mg/g.
Micro albuminuria	-	UACR 30 - 299 mg/g.
Macro albuminuria	-	UACR 300 mg/g or more.

Statistical Method

Statistical analysis was performed using Microsoft (MS) Office Excel software.

RESULTS

Out of 103 patients 58 (56.3%) were females and 45 (77%) were males in the study population. All the patients were in age group of 30 - 80 years with an age of 42 ± 10.6 years (Table 1) (Graph 1).

Non-diabetic 50 patients were included in the control group who were in the age group of 75 years with mean age of 48 ± 8.9 years. Control group consists of 28 (56%) male and females 22 (44%).

Age (Years)	Study Group	
	Male (N= 45)	Female (N= 58)
35-45	9 (20%)	14 (24.1%)
45-55	21 (50%)	28 (48.3%)
55-65	4 (9.5%)	5 (8.6%)
65-75	9 (21.4)	7 (12.1%)
75-85	2 (4.8%)	4 (6.9%)

Table 1. Age and Sex-Wise distribution of Study Group of Patients

Graph 1. Age and Sex-Wise distribution of Study Group (Type 2 Diabetics)

Out of 103 diabetic patients screened, 29 (28.2%) had asymptomatic bacteriuria in study population.⁽¹⁰⁾ In control group non-diabetic patients out of 50 only 4 (8%) were asymptomatic, but 14 (28%) had symptomatic UTI (Table 3) (Graph 3). Among 29 patients with asymptomatic bacteriuria, 18 (62.06%) were female and 11 (37.94%)⁽¹¹⁾ were male patients in the age group of 42 - 60 years.

Similar screening done on 50 individuals from the study group B 4 (8%) were found to have asymptomatic bacteriuria, in which 3 (75%) were females and 1 (25%) was a male patient (Graph 2).

Distribution of Asymptomatic bacteria among Group B Non-Diabetic individuals

■ asymptomatic bacteria ■ no bacteria

The most common uropathogens isolated from the study Group A (Type 2 Diabetes Mellitus) are *E. coli* with 13 (44.8%) followed by *Pseudomonas aeruginosa* 4 (13.8%), *Proteus mirabilis* with 3 (10.3%) and *Proteus vulgaris* 3 (10.3%), *Acinetobacter* 2 (6.9%), *Enterococcus faecalis* 2 (6.9%) and *Candida albicans* 2 (6.9%)

In control group, among 50 urine sample 3 (75%) were *E. coli* and *Klebsiella* 1 (25%).

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 and serum creatinine level in ASB. There was no correlation between age, 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 glycaemic 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. Patients with significant albuminuria UACR > 30 mg/g were the main markers to diagnose glomerulopathy. Increased albumin excretions and inflammation of the kidney are the associated factors leading to chronic kidney disease 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 declines the renal function.

CONCLUSION

- Out of 103 patients in group A (Type 2 Diabetics) of studied patients, 58 (56.3%) were females and 45 (43.7%) were males in this group. They were in the age group of 30 - 80 years with mean age of 42 ± 10.6 years.
- Of the 50 individuals from the group B (non-diabetics), 28 (56%) were males and 22 (44%) were females in the age group of 25 - 70 years with mean age of 48 ± 8.9 years 29 (28.2%).

- Asymptomatic bacteriuria consisted of 3 (75%) female and 1 (25%) male patients in the age group of 42 - 60 years in non-diabetic group.
- 29 (28.1%) had asymptomatic bacteriuria that consisted of 18 (62%) males and 11 (38%) females in study population group A (Type 2 Diabetic Mellitus).
- In group B (non-diabetic individuals), only 4 (8%) were asymptomatic with 3 (75%) females and 1 (25%) male patients.
- Nephropathy was diagnosed in 11 (10.7%) in study group A type 2 diabetic mellitus population and 1 (2%) group B in non-diabetic population.
- Neuropathy was seen in 4 (3.9%) studied group A (Type 2 Diabetic Mellitus) population and 1 (2%) in group B (non-diabetes).
- The most common uropathogens isolated from study group A (Type 2 Diabetic Mellitus) are *E. coli* followed by *Pseudomonas aeruginosa* 4 (13.8%).
- In non-diabetics, the most common uropathogens isolated were *E. coli* and *Klebsiella*.

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