



Journal Homepage: - www.journalijar.com
**INTERNATIONAL JOURNAL OF
 ADVANCED RESEARCH (IJAR)**

Article DOI: 10.21474/IJAR01/1449
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/1449>



RESEARCH ARTICLE

PREVALENCE OF ASYMPTOMATIC BACTERIURIA AND ITS ANTIMICROBIAL SENSITIVITY PATTERN AMONG PATIENTS WITH DIABETES MELLITUS AT TERTIARY HOSPITAL, BHAVNAGAR, GUJARAT.

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Manuscript Info

Manuscript History

Received: 15 July 2016
 Final Accepted: 16 August 2016
 Published: September 2016

Key words:- Asymptomatic Bacteriuria, Type 2 diabetes mellitus, *E. coli* and *Enterococcus spp.*

Abstract

Diabetes mellitus and its complications impose a major health burden in developing country like India. Increased silent Infection in diabetic patient is due to altered host defense mechanism, frequent hospitalization, vascular abnormality and neuropathy. This study was conducted to identify the frequency of Asymptomatic Bacteriuria and its antibiotic sensitivity pattern in diabetes people. A comparative study was carried out in 400 diabetes patients, with a group of 400 normal healthy individuals. Age and sex were matched for both control and diabetic patient. Clean voided midstream urine samples were collected into wide mouth open sterile container. The spectrum of bacteria causing asymptomatic bacteriuria and their antibiotic susceptibility profile has been noted. Asymptomatic bacteriuria was observed more commonly in patients with diabetes mellitus 11% than in non diabetic control subjects 1%. Bacteria isolated included *Escherichia coli* with a prevalence of 44.18%, followed by *Enterococcus spp* 18.6%, *Klebsiella pneumonia* 13.95 % and *Staphylococcus aureus* 9% , two cases of *S. saprophyticus* also isolated. Asymptomatic bacteriuria was more common in diabetes patient than non diabetic patient.

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Introduction:-

Diabetes mellitus is a chronic endocrine disorder and pose a major health concern in both developed and developing nation. In India alone, the prevalence of diabetes is expected to increase from 31.7 million in 2000 to 79.4 million in 2030¹. As the prevalence of diabetes mellitus increases worldwide, complications associated with it also assume equal importance. Patients with diabetes mellitus have a higher risk of developing asymptomatic bacteriuria (ASB) and urinary tract infections (UTIs) compared with patients without diabetes mellitus^{2,3}

Asymptomatic Bacteriuria is defined as bacterial colony is $> 10^5$ cfu/ml in clean catch midstream voided urine, or $> 10^3$ cfu/ml in catheterization and supra pubic aspiration⁵. If the bacterial count is between 10^2 and 10^4 ml usually contamination is considered in spontaneous voided urine³.

Diabetes mellitus causes several abnormalities of the host defense system that might result in a higher risk of certain infections, including UTI. Possible underlying mechanisms include:

- Impaired granulocyte function.

- Increased adherence of uro-pathogens to bladder epithelial cells.
- The effects of glucosuria on the growth of uropathogens in diabetic persons (“sweet urine” theory).
- Neuropathic bladder, leading to impaired bladder emptying.

The prevalence of ASB in healthy population is less than 1% in full-term female neonates. Male neonates are more often affected than females (2%). The presence of bacteriuria in neonates is an indication for investigation to rule out congenital malformations, especially vesico-ureteral reflux^{3,4}. After infancy the prevalence of ASB decreases mainly in boys and in preschool children it occurs in approximately 1% of girls and ASB is very rare in boys. In school-age girls the prevalence of ASB increases to 2-5% and it remains in this range during adulthood in sexually active women. During pregnancy the occurrence of ASB does not change, but the consequences are more serious than in non-pregnant women. In young adult men the prevalence of ASB is below 0.01%. In the elderly, the prevalence of bacteriuria ranges from 17 to 50% in women and 6-34% in men^{4,5}.

In view of this the present study was done to find out the prevalence of Asymptomatic Bacteriuria in and around Bhavnagar City, to isolate and to find out antibiotic sensitivity pattern among type 2 diabetes patients attending to outpatient department of Medicine, in Sir Takhtsinhji general Hospital, Bhavnagar, Gujarat. Samples were processed in Bacteriology section of the Microbiology laboratory, government medical college and Sir Takhtsinhji general Hospital, Bhavnagar.

Aims and objectives:-

- To study Asymptomatic bacteriuria correlation in type 2 diabetes patient.
- To study ASB in control healthy group.
- To find out various species of Bacteriuria prevalent in & around Bhavnagar city.

Methodology

The study was conducted from November 2014 to July 2015 in Sir Takhtsinhji General Hospital, Bhavnagar, Gujarat. 400 Patient was randomly selected adult patients (20-65 years) diagnosed with diabetes mellitus type 2 and presenting to outpatient department of medicine with ailments other than urinary tract infection were included in the present study. A group of 400 normal healthy individuals, age and sex matched from the same population served as control which were not having diabetes and any sign and symptom of urinary tract infection.

Exclusion criteria for type 2 diabetes cases and control subjects was one or more combination of the following:

- Symptoms of UTI (dysuria, frequency, urgency, abdominal discomfort, fever etc.)
- Vulvovaginitis,
- Pregnancy,
- Recent hospitalisation or surgery (<4 months),
- Known urinary tract abnormalities (including cystopathy, etc.),
- Recent urinary tract instrumentation (catheterization, etc.),
- Culture positive for three or more organisms, funguria,
- Use of antibiotics, immunosuppressive drug treatment in the last 14 days,
- Past history of UTI, Hypertension.

Patient was asked to get a urine sample after cleaning the male/female external urethra with normal saline. A clean catch mid stream, voided urine samples were collected in a wide mouth sterile container. In case of male patient one sample was collected and in female patients 2 samples 15 days apart, was collected. The sample was transported to microbiology laboratory within 1 hrs and proceeded with Direct Examination by Wet mount Preparation^{6,7}.

Within 2 hrs of urine collection, culture was done by semi quantitatively method in CLED media using standard measured wire loop technique. Plates were incubated for 24 hrs under aerobic condition. After 24 hrs of incubation urine samples showing colony count more than 100,000Cfu/ml was considered to be significant for asymptomatic bacteriuria. Those colonies developed on CLED media was further preceded by gram stain, motility check by wet mount preparation and biochemical reaction and then antibiotic sensitivity test on Muller Hinton agar by Kirby-Bauer's disc diffusion method following Clinical Laboratory Standards Institute (CLSI) guidelines⁸.

All the instruments used for sample processing were checked every day for proper functioning before processing. *E.coli* ATCC 25922, *E.fecalis* 29212, and *S. aureus* ATCC 25923 were used as a reference strain and quality check⁸.

Result:-

Out of 400 patient there were 195 male and 205 female patients were followed.

Out of 400 cases, we got 43 cases were positive for Asymptomatic Bacteriuria. Positive cases were increasing with the age of the patient. 15 patients out of 116 were positive for age > 55 year, 20 cases were positive for age 46-55 year, 07 cases were positive for age 36-45 years and 1 case was positive for age 20-35 year. Overall positivity rate was 10.75 % (43) out of 400 cases. (table 1)

Table 1:- Result of Asymptomatic bacteriuria found positive in selected age group of type 2 diabetes patient

Age group(year)	No. of patient	positive result	% positive result
20-35	43	1	2.32
36-45	93	7	7.52
46-55	148	20	13.51
>55	116	15	12.93
Total	400	43	10.75

In present study *E. coli* was most common organism 19(44.18%) found. It was also most common in male 7 (39%) and female 12 (48%) patient. 2nd most common organism was enterococci, 8 cases isolated. *Klebsiella* was isolated in 6 cases followed by *Pseudomonas* and *S. aureus* in 4 case each. *S. saprophyticus* was isolated in 2 cases. higher antibiotics like Vancomycin, Cephoxitin, Meropanam, Pipracillin-tazobactam, Ceftriaxone and levofloxacin are highly (nearly 100 %) sensitive. While Amoxicillin- Clavulanic acid drugs are resistant for *Pseudomonas*, *Klebsiella* and enterococci spp, and for other organism it was found less sensitive. Nitrofurantoin sensitivity pattern varies from 50-100% in various isolated organism. (Table 2)

Table 2:- Type of Organism found positive in male and female type 2 diabetes cases.

Organism	Total
<i>Escherichia coli</i>	19
<i>Klebsiella</i> spp	6
<i>Pseudomonas</i>	4
<i>Staphylococcus aureus</i>	4
Enterococci spp	8
<i>S. saprophyticus</i>	2
Total	43

Out of total 400 healthy control subjects not having any diabetes, have taken into the study. Age and sex distribution of control subjects are same as type 2 diabetic case studies to reduce the randomization and selection bias of the study. Total 3 cases (<1%) found positive from 400 control subjects. In male 1 case are positive while in female 5 cases are positive (Table 3)

Table 3:- ASB found positive in healthy control groups.

Sex	Number of patients	Positive	Percentage
Male	195	1	0.51%
Female	205	2	0.98 %
Total	400	3	0.75%

Discussion:-

Asymptomatic bacteriuria in diabetic patient occur worldwide in developed and developing country and are a contributor to morbidity and mortality in those patients. The increase level of sugar in body can leads to many problem which has been recognized earlier.

Present study shows that out of 400 clinically diagnosed cases of type 2 diabetes 10.75 % were affected by Asymptomatic bacteriuria. Our results are comparable to studies conducted by Sashidhar et al (1988) where in isolation rate was 4%. In a study conducted by Karunajeeva et al (2005) and Neelima patil et al (2012) isolation rate

was 7.3 % and 13% respectively, Which is again comparable to results of present study. *E. coli* was most common organism in both male and female cases, in our study as well as other studies.

Several Meta-analysis and other individual studies suggested that non diabetic healthy group has much lower chance to ASB then diabetic group. Studies done by Bansal and et al⁹ 2012, Sunnesh reddy and et al¹⁰ 2013, Sahsidhar and et al¹¹ 1958, Marijo Ranko and et al¹² ,2011, Schimtt and et al¹³,1986, Vigg and et al¹⁴,1977, and Abu bakare and et al¹⁵ 1986 shows 1-5% , 5%, 0%, 0%, 0%, 2% and 2% ASB chances in healthy groups. In present study it is <1%.

Conclusion:-

In developing country like INDIA where increasing cases of diabetes and poor hygienic practices are prevalent, chances of ASB are high. The important clinical concerns of ASB in diabetic individuals are its contribution to morbidity, either risk of developing a symptomatic urinary infection or its more serious risks of developing diabetic complications. Prompt diagnosis is essential for the patient to reduce the morbidity.

ASB was found to be more positive in Female diabetic patient. Most common age group was 46-55 year in both male and female. Increase chance of ASB is correlate with increase in duration of diabetic illness.

In control healthy group of subjects ASB was found very low in prevalence and it is more common in postmenopausal non diabetic female patient.

In present study *E. coli* was isolated most commonly in both male and female. The high prevalence of ASB of 10.75 % in this study is of major public health importance. The predominant pathogen was *E. coli* and this organism is beginning to acquire resistance to some of the clinically used antibiotics. The level of resistance to antibiotics recorded in this study is of great concern.

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