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Senthamarai S
Professor, Meenakshi Medical
College & Research Institute,
Kanchipuram, India

Sivasankari S
Associate professor, Meenakshi
Medical College & Research
Institute, Kanchipuram, India

Anitha C
Assistant professor, Meenakshi
Medical College & Research
Institute, Kanchipuram, India

Vasumathi A
Assistant professor
Stanley medical college
Chennai, India

Venugopal V
Director of PG studies, Meenakshi
Medical College & Research
Institute, Kanchipuram, India

Thenmozhivalli PR
Dean, Meenakshi Medical
College & Research Institute,
Kanchipuram, India

Amsavathani SK
Former HOD, Meenakshi
Medical College & Research
Institute, Kanchipuram, India

Correspondence
Senthamarai S
Professor, Meenakshi Medical
College & Research Institute,
Kanchipuram, India

A study on clinical presentation, bacterial profile and its antibiotic sensitivity pattern in urinary tract infections among diabetic patients attending tertiary care hospital, Tamilnadu

Senthamarai S, Sivasankari S, Anitha C, Vasumathi A, Venugopal V, Thenmozhivalli PR, Amsavathani SK

Abstract

Urinary tract infections are common with diabetes patients. Asymptomatic presentation may lead to life threatening complications. This study was done to determine the prevalence of urinary pathogens and its susceptibility pattern in diabetic patients at Meenakshi medical college & research institute, Kanchipuram. A total of 189 urine samples were collected and among them 23 (12.16%) showed significant growth ($\geq 10^5$ CFU/ml). Among the 23 UTI patients, 5 were IGT, 1 GDM and 17 were type 2 diabetes mellitus. None were type 1 diabetes during our study. Female (73.91%) were commonly affected than males (26.08%). More number of cases has been noted in the age group 61-80 (56.52%) which is followed by 41-60 (39.13 %). 35% had asymptomatic UTI. E.coli was the common GNB isolated in this study which is followed by Klebsiella. All the isolates in our study showed major resistance to ampicillin and cotrimoxazole. Amikacin, gentamicin and 3rd generation cephalosporin showed moderate resistance and these drugs should be used with great care. Moderate resistance to quinolones are alarming. Amoxycylav, nalidixic acid and nitrofurantoin showed minimal resistance. Imipenem is the promising drug in this study but should keep this as reserve.

Keywords: Urinary tract infections, Diabetes mellitus, *E. coli*.

Introduction

Diabetes mellitus (DM) is a worldwide health problem, with an expected prevalence of 593 million by 2035 [1].

Urinary tract infection (UTI) is an infection of the lower (urethra, bladder) or upper (ureter, kidney) urinary tract, which has long been recognised as a significant problem in patients with diabetes may be due to the change in the immunity, high glucose concentration in urine and the presence of micro vascular disease favours the seeding of bacteria and genesis of infection [2, 3,4].

The UTI can present clinically as symptomatic or asymptomatic. Asymptomatic bacteriuria (ASB) is defined as "the presence of at least 10^5 colony forming units (CFU) / ml of one or two bacterial species in clean – voided midstream urine sample from an individual without any symptoms of urinary tract infection" [5]. If unnoticed patient may go for serious complications, such as emphysematous cystitis, pyelonephritis, renal or perinephric abscess, bacteremia and renal papillary necrosis occur more commonly in diabetic patients and acute renal failure is double the chance to develop in bacteraemic patients [6].

Hence this study was taken to determine the prevalence of UTI, uropathogens profile and their antimicrobial pattern in diabetic patients.

Materials and method:

This study was conducted with the patients attending department of diabetes and microbiology at Meenakshi Medical College & Research Institute, Kanchipuram. Demographic details, diabetic details and informed consent were obtained from the patients. Blood and urine glucose values were tested. From all the confirmed diabetic cases, regardless of the symptoms, after giving proper instruction, a clean catch mid stream urine samples were collected with aseptic precautions in a sterile wide mouthed container and transported

immediately to the microbiology laboratory and processed as per the standard protocol. After identification all the isolates were subjected for the Kirby Bauer disc diffusion method and the results were interpreted according to CLSI guidelines [7,8]

Results

A total of 189 urine samples were collected and among them 23 (12.16%) showed significant growth ($\geq 10^5$ CFU/ml). Among the 23 UTI patients, 5 were IGT, 1 GDM and 17 were type 2 diabetes mellitus. None were type 1 diabetes during our study. Female (73.91%) were commonly affected than males (26.08%). More number of cases has been noted in the age group 61-80 (56.52%) which is followed by 41-60 (39.13%). 35% had asymptomatic UTI.

Table 1: Distribution of uropathogens.

Isolates	Number (n=23)	Percentage
Escherichia coli	16	69.4
Klebsiella pneumoniae	4	17.4
Proteus mirabilis	1	4.4
Pseudomonas aeruginosa	1	4.4
Staphylococcus aureus	1	4.4

Table 2: Antibiotic resistance pattern of uropathogens

Antibiotics	Number (n=23)	Percentage
Ampicillin	21	91.3
Co-trimoxazole	18	78.26
Amikacin	14	60.86
Gentamycin	12	52.17
Cefotaxime	12	52.17
Ceftriaxone	11	47.82
Norfloxacin	10	43.47
Ciprofloxacin	9	39.13
Ceftazidime	8	34.82
Chloramphenicol	6	26.08
Amoxyclav	4	17.39
Nalidixic acid	3	13.04
Nitrofurantoin	2	8.69
Imipenem	0	0

Discussion

Urinary tract infection is one of the most common type of infection encountered in the practice of medicine today. The risk of developing infection in diabetes is higher due to abnormalities in the host defence and high glucose in urine. In this study, 23 (12.16%) showed significant growth in culture. 17.8% showed culture positivity in the report of Gizachew *et al.* [9]

Among the study population, female (73.91%) were commonly affected than males (26.08%). This is substantiated with the studies of Ruhi Khan *et al* & Sood *et al.* [10, 11]

The predominance of female could be explained by its low pH, short urethra, close proximity of the urethra to anus, teeming of Perianal flora and sexual intercourse, favours the infection. (Aiyegoro *et al.*) [12]

Diabetes mellitus has been considered as a predisposing factor for UTI, especially in women, in whom the prevalence of asymptomatic bacteriuria is four fold higher when compared to women without diabetes whereas it is not true for men with diabetes, in whom the prevalence of UTI is similar to that in the general population.

In our study, 35% had asymptomatic presentation in UTI. Similar observations has been made by Ruhi Khan *et al*, Marie *et al* & Sharma *et al.* [10,14,15].

Slightly lower rate of 14.7% had asymptomatic UTI in the study of Gizachew Yismaw *et al.* [9]

Prevalence of ASB is usually about 3 times higher in diabetic population compared to non diabetic population, due to the fact that, there is metabolic derangement, impaired granulocyte function, neuropathic bladder, increased adherence of bacterial organism to bladder epithelial cells and increased glucose content of urine (Geerlings *et al.*) [13]

Different studies in the general population showed that the etiologic agents of UTIs belonged mainly to gram negative enteric bacteria (Tessema *et al.*) [16]

E. coli was the predominant isolate in significant bacteriuria. This finding was supported by Ruhi Khan *et al*, & Gizachew *et al.*, *E. coli* was followed by Klebsiella, as a common isolate in our study. The same has been noted by Jyothsna *et al.* [17]

Whereas CONs were the majority isolate, reported in the study of Marie E. A *et al.* The high isolation rate of CONs in the present study could be explained as contamination during specimen collection or processing and/or could be change in pattern of infection in diabetic patients.

Antimicrobial pattern of isolates are very important as it guides the treatment for the clinicians. All the isolates in our study showed major resistance to ampicillin and cotrimoxazole.

Amikacin, gentamicin and 3rd generation cephalosporin showed moderate resistance and these drugs should be used with great care.

Resistance to quinolones are alarming. Amoxyclav, nalidixic acid and nitrofurantoin showed minimal resistance. Imipenem is the promising drug in this study but should keep this as reserve.

In diabetes, Urinary tract infection appears to be multifactorial. The duration of diabetes, glycosuria, female gender, glycemic control are some of the factors. In some reports the presence of UTI during past year, has also been postulated as important risk factor for ASB in diabetics, could be due to the colonization of uropathogens in urinary tract of diabetics after episodes of UTI, decrease local secretion of cytokines and increased adherence of bacteria to uroepithelial cells can accelerate the prolonged release of bacteria from urinary tract resulting in bacteriuria. (Hoepelman *et al*, Meiland *et al.*) [18,19]

Conclusion

UTI is one of the common infection in diabetes and females are commonly affected. It may be preventable with better glycemic control and appropriate use of antimicrobials. Gram-negative organisms were the commonest organisms isolated and *E. coli* was the major urinary pathogen. Most of the isolates showed intermediate to low level of resistance to one or more antimicrobials tested which denotes that regular monitoring is very essential to establish reliable information about resistance pattern of urinary pathogens for optimal empirical therapy of diabetic patients with UTI.

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