Research Article

Clinical profile of urinary tract infections in diabetes

Eshan Sharma[1], Rakesh Thakuriya[2*], Shwata Acharya[3]

[1,2]Assistant Professor, [3]Jr. Resident, Department of Medicine, N.I.M.S Medical College and Hospital, Jaipur, Rajasthan, INDIA.
Email: jaindrkamalkumar@gmail.com

Abstract

Background: Urinary tract infection (UTI) is the most common infection among patients with Diabetes Mellitus and is found to be responsible for considerable morbidity, especially if it is not recognized or left untreated. **Objective:** Present study was done to describe the clinical profile of urinary tract infections in diabetes at our hospital. **Methods:** This is a cross-sectional study of 150 diabetic patients who have visited the hospital for treatment during the study period. Demographic and clinical data were obtained from each participant using questionnaires. Clean-catch, midstream urine samples were collected and cultured for UTI diagnosis and antibiotic susceptibility. Symptomatic bacteriuria was considered as a positive urine culture (≥105 colony-forming units [CFU]/mL of a single bacterial species) from the patients with the symptoms associated with UTI; asymptomatic bacteriuria was defined as positive urine culture from the patients without symptoms associated with UTI. **Results and Conclusion:** Out of 150 patients, 92 were males and 58 were females. 142 patients had type 2 diabetes mellitus. The prevalence of Urinary tract infections was found to be 22% with 33 cases of UTI among study population. The predominant forms of isolates were Escherichia coli found in 20 cases (60.6%) and Klebsiella pneumoniae in 6 cases (18.2%). E. faecalis isolates were seen in 4 cases and P mirabilis isolates were seen in 3 cases. Five, three, three and two of 20 E. coli isolates showed resistance to ampicillin, nitrofurantoin, co-trimoxazole and amoxicillin-clavulanic acid, respectively. All the E. coli isolates were susceptible to gentamicin and cephalexin. Two, one and one of nine K. pneumoniae isolates were resistant to ampicillin, co-trimoxazole and amoxicillin-clavulanic acid. All the nine K. pneumoniae isolates found to be sensitive to gentamicin (100%)
Keywords: Urinary tract infections, type 2 diabetes, Escherichia coli.

[*]**Address for Correspondence:**
Dr. Rakesh Thakuriya, Assistant Professor, Department of Medicine, N.I.M.S Medical College and Hospital, Jaipur, Rajasthan, INDIA.
Email: jaindrkamalkumar@gmail.com
Received Date: 30/06/2015 Accepted Date: 30/06/2015

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 01 July 2015

INTRODUCTION

Urinary tract infections have been reported to be more common, more severe, and also carry worse outcomes in the patients with type 2 diabetes mellitus. They are also reported to be often caused by resistant pathogens. The impairments in the immune system, poor metabolic control as well as incomplete bladder emptying due to the autonomic neuropathy may all contribute to the increased risk of urinary tract infections in diabetic patients[1]. With the emergence of multidrug resistant uropathogenic strains of organisms, the choice of antimicrobial agent has also been restricted[2]. Present study was done to describe the clinical profile of urinary tract infections in diabetes at our hospital.

METHODS

This was a cross-sectional and descriptive study done at our hospital over a study period of 2 months. Male and female patients with type I or type II DM who attended the hospital and were willing to participate were included in the study, irrespective of the presence or absence of urinary tract infections (UTI) symptoms. Exclusion criteria were pregnancy, chronic renal disease or use of antibiotic therapy during the previous one month. Demographic and clinical data were obtained from each participant using questionnaires. Every patient was asked about symptoms suggestive of UTI (e.g., urgency, dysuria, loin pain, urinary frequency and nausea) and also regarding history of other medical disorders, such as hypertension and, for males, prostate enlargement. Clean-catch, midstream urine samples were collected and cultured for UTI diagnosis and antibiotic susceptibility. Symptomatic bacteriuria was considered as a positive urine culture (≥105 colony-forming units [CFU]/mL of a single bacterial species) from the patients with the

How to site this article: Eshan Sharma, Rakesh Thakuriya, Shwata Acharya. Clinical profile of urinary tract infections in diabetes. *International Journal of Recent Trends in Science and Technology.* July 2015; 15(3): 448-450 http://www.statperson.com (accessed 02 July 2015).

symptoms associated with UTI; asymptomatic bacteriuria was defined as positive urine culture from the patients without symptoms associated with UTI. Chromogenic culture plates were used for growth morphology, then isolates were Gram-stained and species confirmed by in-house biochemical testing[3]. Gram-negative organisms, e.g. E. coli, Klebsiella pneumonia, and Proteus mirabilis, were distinguished by microscopy. E. coli was identified as medium, pink-to-red colonies and confirmed by positive indole test, whereas K. pneumonia were large, pink-to-mauve colonies, which were confirmed by negative oxidase and indole tests. P. mirabilis was assessed as small pale-to-colourless colonies testing positive to indole and urease but negative to oxidase. Enterococcus faecalis was the only Gram-positive microorganism that was isolated and was identified by the presence of small, turquoise colonies with coccoid morphology, which tested negative for catalase and positive for bile esculin. The disc diffusion method was used to determine the antimicrobial susceptibility of isolates. Colonies were suspended in normal saline to 0.5 McFarland standard, and using disposable sterile swabs, the suspensions were inoculated on Muller-Hinton agar and incubated for 18–24 hours, according to Clinical and Laboratory Standards Institute (CLSI) guidelines[4]. Antimicrobial susceptibility and resistance was determined by isolate growth zone diameter according to CLSI guidelines. Gram-negative bacteria (E. coli, K. pneumoniae and P. mirabilis) were tested against six antimicrobial agents: ampicillin, gentamicin, amoxicillin-clavulanic acid, cephalexin, co-trimoxazole, and nitrofurantoin. Gram-positive bacteria isolated were assessed against four antimicrobial agents, ampicillin, amoxicillin-clavulanic acid, nitrofurantoin, and ciprofloxacin. Amoxicillin-clavulanic acid was prescribed for the symptomatic patients of UTI as the empirical treatment before the culture results were available. All patients were asked to return for the urine culture results after 2 days and their treatment was then evaluated.

RESULTS

Total of 150 diabetic patients who have visited the hospital for treatment during the study period were included**.** Out of 150 patients, 92 were males and 58 were females. 142 patients had type 2 diabetes mellitus while 8 patients had type 1 diabetes mellitus. Among the 150 diabetic patients, 60 patients (40%) had symptoms suggestive of UTI. The prevalence of Urinary tract infections was found to be 22% with 33 cases of UTI among study population. The prevalence of bacteriuria among symptomatic and asymptomatic diabetic patients was 14 out of 60 (23.3%) and 20 out of 90 (22.2%) respectively. The predominant forms of isolates were Escherichia coli found in 20 cases (60.6%) and Klebsiella pneumoniae in 6 cases (18.2%). E. faecalis isolates were seen in 4 cases and P mirabilis isolates were seen in 3 cases. Five, three, three and two of 20 E. coli isolates showed resistance to ampicillin, nitrofurantoin, co-trimoxazole and amoxicillin-clavulanic acid, respectively. All the E. coli isolates were susceptible to gentamicin and cephalexin. Two, one and one of nine K. pneumoniae isolates were resistant to ampicillin, co-trimoxazole and amoxicillin-clavulanic acid. All the nine K. pneumoniae isolates were found to be sensitive to gentamicin (100%). E. faecalis isolates were 100% susceptible to amoxicillin-clavulanic acid and nitrofurantoin. Only 25% of the E. faecalis isolates were resistant to ampicillin and ciprofloxacin. P. mirabilis were 100% susceptible to gentamicin, amoxicillin-clavulanic acid and cephalexin. One out of 3 (33.33%) P. mirabilis showed resistance to ampicillin, co-trimoxazole and nitrofurantoin. Multi-drug-resistance was observed in 8 (24.2%) of the total 33 isolates. Three out of 20 (15%) of the E. coli isolates showed multi-drug-resistance against two to four antimicrobial agents. One out of four (25%) of the E. faecalis isolates showed multi-drug-resistance against two antimicrobial agents.

DISCUSSION

The prevalence of Urinary tract infections was found to be 22%. The prevalence of bacteriuria among symptomatic and asymptomatic diabetic patients was 23.3% and 22.2% respectively. Study by Hamdan *et al*[2] have also reported similar results with the prevalence of symptomatic, asymptomatic, and overall bacteriuria among diabetic patients as 17.1%, 20.9%, and 19.5%, respectively. However, Yeshitela *et al*[5] have reported prevalence of symptomatic and asymptomatic bacteriuria in diabetic patients as 13.6% and 10.4% which is lower than that of our study. The patients with diabetes have an increased risk of infection in general and, especially Urinary tract infections[6]. This susceptibility to Urinary tract infections could be explained by a diminished neutrophil response, lower levels of urinary cytokines, and leukocyte concentrations, which may facilitate the adhesion of microorganisms to the uroepithelial cells[7,8]. Our study found that E. coli was the most common organism to be isolated from both symptomatic as well as asymptomatic patients, and it was found to be resistant mainly to ampicillin, nitrofurantoin, co-trimoxazole and amoxicillin-clavulanic acid. These findings are in accordance with reports from other studies[5,9]. Similarly, Escherichia coli was isolated from 71% of the subjects and Klebsiella from 13.5% patients in an Indian study by Janifer J *et al*[10] done in South India.

CONCLUSION

The prevalence of Urinary tract infections was found to be 22% with among the diabetics in our study population. The predominant forms of isolates were Escherichia coli followed by Klebsiella. Gram negative organisms were more frequently involved in causing UTI among the study subjects. Antibiotic resistance is becoming a cause of great concern. Further studies need to be done to understand the epidemiology and clinical profile of UTI in diabetes which will help in better prevention and management of this problem.

REFERENCES

1. Nitzan O, Elias M, Chazan B, Saliba W. Urinary tract infections in patients with type 2 diabetes mellitus: review of prevalence, diagnosis, and management. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy. 2015; 8:129-136. doi:10.2147/DMSO.S51792.
2. Hamdan HZ, Kubbara E, Adam AM, Hassan OS, Suliman SO, Adam I. Urinary tract infections and antimicrobial sensitivity among diabetic patients at Khartoum, Sudan. Annals of Clinical Microbiology and Antimicrobials. 2015; 14:26. Doi: 10.1186/s12941-015-0082-4.
3. Murray PR, Baron EJ, Pfaller MA, Tenover FC, Yolken RH. Manual of Clinical Microbiology. 6. Washington DC: American Society of Microbiology Press; 1995. p. 1482.
4. CLSI. Performance standards for antimicrobial susceptibility testing. Wayne, PA: Clinical and Laboratory Standards Institute; 2007.
5. Yeshitela B, Gebre-Selassie S, Feleke Y. Asymptomatic bacteriuria and symptomatic urinary tract infections (UTI) in patients with diabetes mellitus in Tikur Anbessa Specialized University Hospital, Addis Ababa, Ethiopia. Ethiop Med J. 2012 Jul; 50(3):239-49.
6. Muller LM, Gorter KJ, Hak E, Goudzwaard WL, Schellevis FG, Hoepelman AI, Rutten GE. Increased risk of common infections in patients with type 1 and type 2 diabetes mellitus. Clin Infect Dis. 2005 Aug 1; 41(3):281-8.
7. Valerius NH, Eff C, Hansen NE, Karle H, Nerup J, Søeberg B, Sørensen SF. Neutrophil and lymphocyte function in patients with diabetes mellitus. Acta Med Scand. 1982; 211(6):463-7.
8. Hoepelman AI, Meiland R, Geerlings SE. Pathogenesis and management of bacterial urinary tract infections in adult patients with diabetes mellitus. Int J Antimicrob Agents. 2003 Oct; 22 Suppl 2():35-43.
9. Ghenghesh KS, Elkateb E, Berbash N, Abdel Nada R, Ahmed SF, Rahouma A, Seif-Enasser N, Elkhabroun MA, Belresh T, Klena JD. Uropathogens from diabetic patients in Libya: virulence factors and phylogenetic groups of Escherichia coli isolates. J Med Microbiol. 2009 Aug; 58(Pt 8):1006-14.
10. Janifer J, Geethalakshmi S, Satyavani K, Viswanathan V. Prevalence of lower urinary tract infection in South Indian type 2 diabetic subjects. Indian Journal of Nephrology. 2009; 19(3):107-111. doi:10.4103/0971-4065.57107.

Source of Support: None Declared
Conflict of Interest: None Declared