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ORIGINAL RESEARCH ARTICLE

NON-LACTOSE FERMENTERS CAUSING URINARY TRACT INFECTION AMONG DIABETIC PATIENTS AND ITS ANTIBIOTIC SENSITIVITY PATTERN: A DESCRIPTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Urinary tract infection is the term that involves infection in any part of urinary tract. It is a severe public health problem and is caused by infection with wide range of pathogens. Increased range of recurrence and antimicrobial resistance among uropathogens causes economic burden of these infection. We here intended to find out non-lactose fermenters causing urinary tract infection.

Methods: The descriptive cross-sectional study was conducted at Microbiology laboratory of Kathmandu Medical College and Teaching Hospital between the month of 1st August, 2020 till 30thJanuary, 2021. Clean catch midstream urine was collected in a wide mouthed leak proof sterilized container. Culture and bacterial identification were done using standard microbiological guideline. Antibiotic sensitivity test was performed by Kirby-Bauer disc diffusion method following clinical and laboratory standards institute (CLSI) guidelines.

Results: Among 2645 samples, 418 (15.80%) were positive for bacterial infection. Out of 418 positive cases 52 (12.44%) were non-lactose fermenters. Among non-lactose fermenters causing Urinary tract infection the most common organism was Acinetobacter species 17 (32.69%) which was more sensitive to Ofloxacin 58.82% followed by Gentamycin, Amikacin and Imipenem 47.05%.

Conclusions: The most common non-lactose fermenter causing urinary tract infection among diabetic patients was Acinetobacter species which is more sensitive to Ofloxacin.

INTRODUCTION

Urinary tract infection (UTI) is a common health problem around the world.[1] UTI is the leading infectious disease that affects both male and females.[2] Community acquired UTI is the most common bacterial infection found in women. Patient having diabetes mellitus are the one with increased risk for developing UTI.[3]

Mostly UTIs are found to be asymptomatic, especially in women as compared to men.[4]Diabetes may also predispose patient to upper urinary tract infection, the upper tract is involved in upto 80% of UTI among diabetic patient.[5] Bacteria associated UTI is a common problem among patients with diabetes mellitus.[6] Bacteriuria is more common in diabetic than in non- diabetic women resulting as a combination of host and local risk factor.[6] As the concept of significant bacteriuria was introduced all the reported data on prevalence of asymptomatic bacteriuria appear to be conflicting.[4] Several studies has shown influence of diabetes mellitus on uropathogens and the antimicrobial resistance in elderly patient having UTI.[4] Antimicrobial therapy for this infection is usually began before laboratory microbiological tests. Most of the uncommon cases, such as emphysenators pylelonephritis and emphysematous pyelitis, are reported to occurs more frequently in diabetic patients.[7] Development of antimicrobial resistance among uropathogens limit the use of drug of choice for the treatment.[1] Repeated isolation of microorganism in the case of UTI among diabetics, prompt diagnosis and early therapy is required.[6]

The aim of this study was to elicit non-lactose fermenters causing UTI and their antimicrobial susceptibility among diabetic patients.

METHODS

The descriptive cross-sectional study was conducted at Microbiology laboratory of Kathmandu Medical College and Teaching Hospital between the month of 1st August, 2020 till 30th January, 2021. Ethical approval was taken from institutional review committee of Kathmandu Medical College and Teaching Hospital (Ref no:2506202004). The diagnosis of diabetes was based on WHO-2003 glucose-based criteria.[8] In order to quantify the uropathogens, Clean catched midstream urine were collected in a leak proofsterile containers after giving instruction to the patients and were processed in microbiology laboratory within two hours of sample collection. Samples were thenstreaked onto Cystine Lactose Electrolyte Deficient

(CLED) media following Clinical and laboratory standards institute (CLSI) guideline. All the positive urine cultures showing significant bacteriuria as per Kass (> 10^5 organism/mL) were further processed with biochemical tests. Antimicrobial susceptibility was performed to determine the susceptibility pattern of isolated uropathogens following CLSI guideline.[9] *Escherichia coli* ATCC 25922 and *Pseudomonas aeruginosa* ATCC 27853 were used for quality control. Statistical analysis was performed by using statistical package version 20.0.

Sample size (n) =$Z^2\alpha/2*(p)*(1-p)/d^2$=380.67 ~381

Where: Z = degree of confidence level=95%=1.96,

p = prevalence 54.76 %=0.5476[8]

d = allowable error=5%

RESULTS

In total 2645 samples were been processed, of which 418 (15.80%) cases were found to be positive. Out of total positive cases 52 (12.44%) cases of urinary tract infection were caused by non-lactose fermenters (Figure 1).

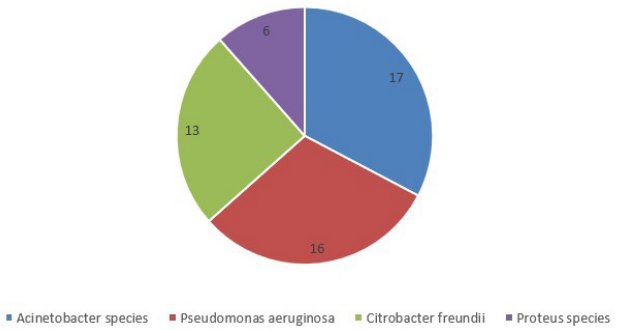

Figure 1: Distribution of Non-lactose fermenters

Of total positive cases with diabetes mellitus caused by non-lactose fermenters only 32.69% cases were presented with symptoms like dysuria, nocturia, fever and lower abdominal pain (Table 1).

Table 1: Distribution of symptomatic and asymptomatic

UTI cases	N (%)
Symptomatic	17(32.69)
Asymptomatic	35(67.30)
Total	52 (100.00)

From the total non-lactose fermenters, *Acinetobacter* species is seen in the higher number and this organism is more sensitive to Ofloxacin 58.82% followed by Amoxycillin/Clavulanic acid 52.94% (Table 2).

Table 2: Antibiotic sensitivity pattern of bacterial isolates

Organisms isolated	Antibiotics used	Susceptibility isolated n (%)
Acinetobacter species	Amikacin	8 (47.05)
	Amoxycillin/Clavulanic acid	9 (52.94)
	Ampicillin	3 (17.64)
	Azithromycin	5 (29.41)
	Cefixime	2 (11.76)
	Ceftriaxone	7 (41.17)
	Ciprofloxacin	5 29.41)
	Cotrimoxazole	7 (41.17)
	Gentamycin	8 (47.05)
	Imipenem	8 (47.05)
	Ofloxacin	10 (58.82)
	Piperacillin/Tazobactam	6 (35.29)
	Nitrofurantoin	3 (17.64)
	Amikacin	8 (50.00)
Pseudomonas aeruginosa	Amoxycillin/Clavulanic acid	4 (25.00)
	Ampicillin	2 (12.50)
	Azithromycin	7 (43.75)
	Cefixime	3 (18.75)
	Ceftriaxone	5 (31.25)
	Ciprofloxacin	4 (25.00)
	Cotrimoxazole	3 (18.75)
	Gentamycin	8 (50.00)
	Imipenem	6 (37.50)
	Ofloxacin	8 (50.00)
	Piperacillin/Tazobactam	5 (31.25)
	Nitrofurantoin	4 (25.00)
	Amikacin	10 (76.92)
Citrobacter freundii	Amoxycillin/Clavulanic acid	10 (76.92)
	Ampicillin	6 (46.15)
	Azithromycin	5 (38.46)
	Cefixime	7 (53.84)
	Ceftriaxone	4 (30.76)
	Ciprofloxacin	8 (61.53)
	Cotrimoxazole	6 (46.15)
	Gentamycin	11(84.61)
	Imipenem	11 (84.61)
	Ofloxacin	8 (61.53)
	Piperacillin/Tazobactam	7 (53.84)
	Nitrofurantoin	11 (84.61)
	Amikacin	4 (66.66)
Proteus species	Amoxycillin/Clavulanic acid	5 (83.33)
	Ampicillin	3 (50.00)
	Azithromycin	2 (33.33)
	Cefixime	2 (33.33)
	Ceftriaxone	2 (33.33)
	Ciprofloxacin	3 (50.00)
	Cotrimoxazole	1 (16.66)
	Gentamycin	4 (66.66)
	Imipenem	3 (50.00)
	Ofloxacin	4 (66.66)
	Piperacillin/Tazobactam	5 (83.33)
	Nitrofurantoin	3 (50.00)

DISCUSSION

In our study, total 2645 urine samples were been processed of which 418 (15.80%) cases were culture positive of which 51 (12.20%) of Urinary tract infection was caused by non-lactose fermenters. We tried to isolate bacteria and tried to find out whether there is any difference in bacterial isolation and its

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antibiotic sensitivity pattern among diabetic and non diabetic patients. We isolated increased number of urinary tract infection is caused by *Acinetobacter* species (32.69%) followed by *Pseudomonas aeruginosa* (30.76%), *Citrobacter freundi* and *Proteus* species (11.53%), our study was similar to another study where among non-lactose fermenters *Acinetobacter baumaunii* and *Pseudomonas aeruginosa* mostly isolated from urine sample.[10] We determined that there was no difference in bacterial growth and its antibiotic pattern. Increasing antibiotic resistance is compromising on empirical treatment of resistant bacteria. Clinically applicable phenotypic methods are required for the detection of resistance pattern. There is a continuous resistance of gram negative microorganism to antibiotics, which include Enterobacteriaceae, *Acinetobacter* species and *Pseudomonas aeruginosa* which limits the potential of adequate antibiotic treatment. Regarding the profile of uropathogens. Asymptomatic cases of UTI among diabetic patients were found in increased proportion 67.70% as compaired to symptomatic 32.29% cases. This result is similar with the results shown by Tamang et al,[11] which shows 70.6% asymptomatic UTI cases. In this study Acinetobacter species was more sensitive to drugs like Ofloxacin 58.82%, followed by Amoxycillin/Clavulanic acid 52.94%, Imipenem 47.05%, Gentamycin 47.05% and Amikacin 47.05%. Similar type of study was done in which *Acinetobacter* species was more sensitive to Imipenem 69.5%.[12] This study shows *Pseudomonas aeruginosa* more sensitive to Gentamycin 50%, Amikacin 50% and Ofloxacin 50%. In the study conducted by Dania et al,[13] it also shows Pseudomonas aeruginosa more sensitive to Amikacin. In addition, in this study, *Citrobacter freundii* was sensitive to Gentamycin 84.61% followed by Imipenem 84.61% and Nitrofurantoin 84.61%, similar type of study shows *Citrobacter* sensitivity to Gentamycin 77.4% and Nitrofurantoin 66.1%. Lastly, in our study *Proteus* was more sensitive to Amoxycillin/Clavulanic acid 83.33% followed by Piperacillin/Tazobactam 83.33%, similar type of result has been shown in the study conducted by Mirella et al,[14] which shows *Proteus* species more sensitive to Amoxycillin/Clavulanic acid 95.7%.

The limitation of our study was that we cannot collect the socioeconomic status and we could not include all the cases COVID-19 pandemic.

CONCLUSION

In this study *Acinetobacter* species is the main causative agent causing urinary tract infection among diabetic patients and the organism is more sensitive to ofloxacin.

CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

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