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Study on the Antimicrobial Sensitivity of Urinary Micro-Organisms in Diabetics with Urinary Tract Infection"

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Abstract:
OBJECTIVE: *To study the frequency of urinary culture isolatesin diabetics with urinary tract infection and to compare the spectrum ofin - vitrosensitivity to commonly used anti-microbial agents.*
RESEARCH DESIGN AND METHODS: *This was a retrospective study done over a year, by procuring data from the patient records of diabetics admitted with urinary tract infection. The clinical settings including history, examination and the urine cultures with anti-microbial sensitivity of 40 patients were included in the study. The procured data were further analyzed using ratios and percentages.*
RESULTS:*In this study, 37 patients had isolates of a single organism and 3 had multiple isolates. Escherichia coli was the most common among all isolates (67.5%). Among other isolated organisms were Enterococcus-12.5%, Klebsiella - 10%, Acinitobacter - 5 %, Candida - 5%, Pseudomonas - 5% and Proteus - 2.5%.Similar pattern was observed among patients with chronic kidney disease.IncidenceofE coli isolates in recurrent UTI was much lower (13.33%) as compared to Enterococcus (20%). When analyzed based on prior antimicrobial exposure, 80% of isolates were Enterococcus and 20% were Acinitobacter. We observed 70% resistant organisms to common antibiotics such as Ampicillin, Nitrofurantoin, Ceftriaxone, Ciprofloxacin and Levofloxacin. However, most were sensitive to Carbepenems and Piperacillin plus Tazobactam. The resistant strains were often isolated in patients with higher glycosylated Hb indicating poorlycontrolled diabetes mellitus.*
CONCLUSIONS: *The current study found E. Coli to be the most common urinary isolate. It showed resistance to commonly prescribed oral antibiotics.The practice of developing an anti-microbial policy in individual hospitals based on their antibiograms could prevent the emergence of multi- drug resistant micro-organisms.*

I. Introduction:

Globally 347 million suffer from diabetes. More than 80% of them are from the developing countries.It has been estimated that India is home to around 40 million diabetics[1,2] .

Urinary tract infection is the pathological invasion of micro-organisms into the urinary tract and their colonisation in the urine. Diabetics are a subset of the population who stand at higher risk of contracting it. Owing to the deranged immunological response to fight back organisms and poor contraction of bladder as a consequence of neuropathy provides a good culture media for the florid colonisation of uropathogens. Sluggish blood flow further adds to the problem. UTI is of special concern in these due to higher risk of complications like pyelonephritis, renal abscess, urosepsisetc[4].WHO projects that deaths from complication of diabetes will double between 2005 to 2030.Hence early institution of appropriate antibiotic is essential.

The spectrum of organisms causing UTI and their sensitivity patterns have changed over a period of time due to indiscriminate use of broad spectrum antibiotics[5].The present study. A sound knowledge of the current trend helps initiate an appropriate antibiotic while awaiting culture reports. The practice of developing an anti-microbial policy in individual hospitals based on their antibiograms could not only prevent the emergence of multi- drug resistant micro-organisms, but also provide a regional database for family physicians.

OBJECTIVE:

To study the frequency of urinary culture isolatesin diabetics with urinary tract infection and to compare the spectrum ofin - vitro sensitivity to commonly used anti-microbial agents.

II. Material And Methods:

Source of data:

Data from the patient records of diabetics admitted with urinary tract infection over the past one year from 1st of November 2012, in a tertiary health care centre in Southern India.

Method of collection of data:

A retrospective cross sectional descriptive study was done over 1 year by collecting records of patients admitted between the 1st of November 2012 and 1st November 2013 at Father Muller Medical College Hospital,

Mangalore. A minimum of 40 patients diagnosed as UTI by urine culture showing significant growth of $>10^5$ CFU/ml, will be included in the study[(5)]. Detailed history and examination findings, laboratory investigations, the species of microorganisms and sensitivity to antibiotics used in the hospital were documented on a preformatted data sheet.

Sample and sampling technique:

A sample size of 40 was selected using purposive sampling technique based on inclusion and exclusion criteria.

Inclusion criteria:

- Known diabetics.
- Urine culture urine culture showing significant growth of $>10^5$ CFU/ml.

Exclusion criteria:

- Age <40 years
- Asymptomatic patients
- Urinary instrumentation
- History of receiving antibiotics within two weeks prior to culture.
- Menstruating women

Data analysis:

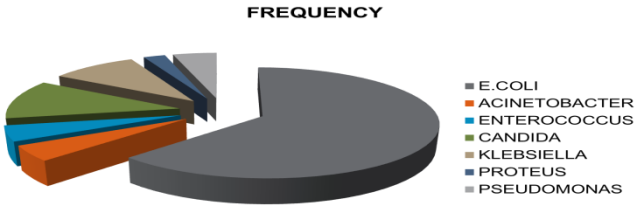
Collected data were analyzed by ratios and percentages.

RESULTS: In this study, 37 patients had isolates of a single organism and 3 had multiple isolates. *Escherichia coli* was the most common among all isolates (67.5%). Among other isolated organisms were *Enterococcus*-12.5%,*Klebsiella*- 10%, *Acinitobacter* - 5 %,*Candida*- 5%,*Pseudomonas* - 5% and *Proteus*- 2.5%.

TABLE:1 FREQUENCY OF URINARY ISOLATES.

MICROBE	N	PERCENTAGE
E.COLI	27	67.5
ACINETOBACTER	2	5
ENTEROCOCCUS	2	5
CANDIDA	5	12.5
KLEBSIELLA	4	10
PROTEUS	1	2.5
PSEUDOMONAS	2	5

CHART 1: FREQUENCY OF URINARY ISOLATES.



Similar pattern was observed among patients with chronic kidney disease.Incidenceof*Ecoli*isolatesin recurrent UTI was much lower(13.33%) as compared to *Enterococcus*(20%).

TABLE 2: FREQUENCY OF URINARY ISOLATES IN RECURRENT UTI.

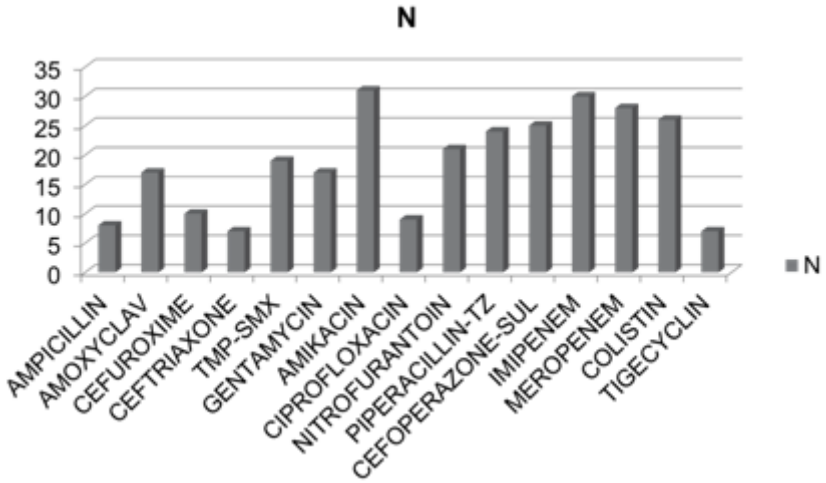
MICROBE	N	PERCENTAGE
E.COLI	2	13.33
ACINETOBACTER	2	13.33
ENTEROCOCCUS	3	20
CANDIDA	0	0
KLEBSIELLA	2	13.33
PROTEUS	0	0
PSEUDOMONAS	2	13.33

Women were more commonly suffering from UTI as compared to males.E.coli remained the most common urinary isolate in CKD patients.

TABLE4: URINARY ISOLATE PATTERN IN PATIENTS WITH UNDERLYING KIDNEY DISEASES.

	CKD	AKI
CASES	18	12
ORGANISMS:		
E. COLI	8 (50%)	5 (41.66%)
ACINETOBACTER	1 (5.55%)	0 (0%)
ENTEROCOCCUS	3 (16.66%)	2 (16.66%)
CANDIDA	1 (5.55%)	1 (8.3%)
KLEBSIELLA	2 (11.11%)	2 (16.66%)
PSEUDOMONAS	2 (11.11%)	2 (16.66%)

When analyzed based on prior antimicrobial exposure, 80% of isolates were *Enterococcus* and 20% were *Acinitobacter*. We observed 70% resistant organisms to commonantibiotics such as Ampicillin, Nitrofurantoin, Ceftriaxone, Ciprofloxacin and Levofloxacin. However, most were sensitive to CarbepenemsandPiperacillinplusTazobactam.



The resistant strains were often isolated in patients with higher glyHb indicating poorlycontrolled diabetes mellitus.

III. Discussion:

Urinary tract infection is commonly encountered in diabetics. In the present study, *Escherichia coli* was the most common among all isolates (67.5%).There was a consensus among most studies that E.Coli was the commonest isolate in diabetics as well as non-diabetics[3-7]. However the frequency of other organisms varied between studies. Pseudomonas was more commonly isolated than E.coli in subset of diabetic women as per a study in New Delhi[6]. Three older studies had similar results with the present study, enumerating E. coli as the commonest organism, however they found Klebsiella was the second common organism isolated[9-11]. In contrast, Proteus was the second common organism in some studies[4,12]

Many studies have shown an increased prevalence of bacteruria in diabetics whereas almost equal number of studies failed to show a significant association. A few older studies found no relation between control of diabetes and association of bacteruria[9-11].However,Szucs et al[13]andVaishnav et al [14] had found a higher incidence of bacteruria in uncontrolled diabetics.

An in vitro analysis of sensitivity to commonly used antibiotics has revealed an alarming rise in resistance due to indiscriminate use of broad spectrum antimicrobials. We observed 70% resistant organisms to commonly prescribed antibiotics such as Ampicillin, Nitrofurantoin, Ceftriaxone, Ciprofloxacin and Levofloxacin. However, most were sensitive to Carbepenems and Piperacillin plus Tazobactam. The resistant strains were often isolated in patients with higher glycosylated Hb indicating poorlycontrolled diabetes mellitus.

Studies in Bengaluru have shown similar patterns[7,8]. They found trimethoprim alone to be effective in covering most organisms, contrary to other studies in Taiwan and Delhi[8].

In most of the studies, organisms were susceptible to antimicrobials like ampicillin and fluroquinilones. E.coli isolates in majority of the patients were sensitive to both ampicillin and fluroquinilones. This was in contrast to the present study and the studies done by A. Altunsoy[15]where E.coli was shown to have resistance to fluroquinilones. Sensitivity patterns of other studies did not correlate with the present study[9,10,12].

This variation in sensitivity patternobserved among these studies is based on the current resistant strains prevailing in the geographic area, the pattern of antibiotic prescription over the past few years in that

area and the development of resistance to these antibiotics among the common urinary isolates.

Most studies have shown that women suffer from UTI more commonly due to the anatomic proximity of urethra to anus and its short length compared to men. Asymptomatic bacteruria is a common entity in diabetics and may precede dysuria, making it an important risk factor.Presence of urinary tract infection is defined by the Kass concept of significant bacteruria[(5)]. A study devoted to investigate these risk factors compared type1 and type2 diabetes mellitus. Type 1 diabetics who had sexual intercourse 1 week prior to the study, and those using contraception were more prone to UTI whereas asymptomatic bacteruria remained the major risk factor in type 2 diabetics.

The spectrum of organisms causing UTI and their sensitivity patterns have changed over a period of time due to indiscriminate use of broad spectrum antibiotics[(5)]. A sound knowledge of the current trend helps initiate an appropriate antibiotic while awaiting culture reports. The practice of developing an anti-microbial policy in individual hospitals based on their antibiograms could not only prevent the emergence of multi- drug resistant micro-organisms, but also provide a regional database for family physicians.

IV. Conclusions:

The urinary isolates in diabetics showed anti-microbial resistance to common oral antibiotics in this study, the commonest being E. Coli.Adequately controlled diabetes, proper hydration and personal hygiene are the key factors to prevent urinary tract infections in diabetic patients.The practice of developing an anti-microbial policy in individual hospitals based ontheirantibiograms could prevent the emergence of multi- drug resistant micro-organisms.

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