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Original Article

Prevalence of Urinary Tract Infection (UTI) among Diabetics patients in Vandavasi, Tamil Nadu, India.

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Abstract

The prevalence of Urinary Tract Infection (UTI) was evaluated in two hundred diabetic patients attending Vandavasi, Tamil Nadu, India. The overall prevalence of UTI was 37%, female preponderance was higher 43% and male was 30%. The urinary tract infections were found to be common in age group between 41-50 yrs. The most predominant bacterial isolates were *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus mirabilis*. *Invitro* antibiotic susceptibility tests revealed that Nalidixic acid; Ofloxacin and Ciprofloxacin were more effective against *E. coli*, *K. pneumoniae* and *P. mirabilis* respectively. Ampicillin, Carbenicillin and Gentamicin were poorly effective, with urinary isolates.

Key words: UTI, diabetes, bacteria, antibiotic susceptibility.

Introduction

Urinary tract infections are the common bacterial infections of mankind. In humans, urinary tract is the second commonest site after the respiratory tract, for bacterial infection. During the last 25 years, two discoveries in particularly, there is a high prevalence of UTI in apparently healthy populations, all over the world and the second is that the morbidity and mortality of UTI have remained static, even though there are many powerful and effective antimicrobial drugs (Delamaire *et al.*, 1997).

UTI are most common particularly in females, about 10-20% of women have UTI at sometime in their life and a significant number have recurrent infections. Although the majority of infections are acute and short lived, the contribute to a significant amount of morbidity in the populations (Patterson and Andriole, 2001). Normal urine is sterile in the urinary bladder and organs of the upper urinary tract. The urethra however, does contain normal resident flora that include *Streptococcus*, *Bacteroids*, *Mycobacterium*, *Neisseriae* and a few enteric bacteria. Urine becomes contaminated with skin flora during its passage through the urethra. The anterior urethra of both sexes contains small number of same type of organisms found on the skin and perineum. These organisms regularly appear in normal voided urine in numbers of 10^2 to $10^4/m^2$. The constant flushing of contaminated urine from the body and its dilution with newly formed uncontaminated urine eliminates bacteria or maintain their numbers at low level. Any interference with its clearing mechanism results in bacterial manipulation and a greatly increased probability of developing or sustaining an infection. Females are more likely to have UTI at a young age because of differences in anatomical structure, sexual maturation and the changes that occur during pregnancy and child birth and the presence of tumors.

Diabetes is problem of worldwide dimension. It is known to mankind from time in memorial. In diabetes mellitus, a number of factors influence the assessment of risk of infection and resulting complications. These include duration of illness, severity of non infectious complications, concurrent illness, adequacy of blood glucose control and degree of medical supervision.

Escherichia coli are the most common bacterial pathogen causing urinary infection in patients with diabetes, other organisms being *Klebsiella pneumoniae* and *proteus mirabilis*. *Pseudomonas aeroginosa* should be suspected if there is a history of resent instrumentation or hospitalization. Candiduria may signify contamination of the urine specimen, benign saprophytic colonization of the catheter and lower UTI, or may be indicative of true invasive infection of the upper and or lower urinary tract. Therefore, this study has been undertaken to

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assess the prevalence status of UTI pathogens, sugar level pyuria and susceptibility patterns of diabetic's patients.

Materials and Methods

Study population

The clinical specimen for the present study was obtained from the Asian Medical Laboratory in vandavasi. A total of 200 clinical specimens were processed for significant bacteriuria.

Specimen collection

Specimens were collected in sterile universal containers. After washing the perineum with soap and water allowed for drying, the first part of the specimen was discarded so as to avoid contaminated with normal flora. Then the clean voided mid-stream urine was collected in a wide mouthed sterile bottle.

Glucose Test (sugar)

A clean test tube was filled with 5 ml of Benedict's solution and gently heated for few minutes. 0.5ml urine was added, mixed well and boiled for 5minutes in a water bath. After 5 minutes the tube was cooled and observed for the colour reaction. The percentage of glucose concentration in the urine was indicated by the colour change.

Significant bacteriuria method

A standard loop designed to deliver 0.01 ml of sample was used for plating. The loop was immersed vertically just below the surface of the urine specimen and one loopful of specimen was taken avoiding air bubbles. The sample was inoculated in to duplicate plates of Blood and Macconkey agar. All plates were then incubated at 37ºC aerobically for 24 hrs. The plates were then examined macroscopically and microscopically for bacterial growth.

Microscopically analysis

The urine samples were centrifuged at 5000rpm for 5minutes. The deposits were examined microscopically. Samples with ≥ 10 white blood cells/mm^3 were regarded as pyuric. Smears were prepared from the urine samples, stained with gram stain and examined microscopically. Bacterial isolates were identified by Bergey's Manual of bacteriology (1990).

Antibiotic susceptibility

Antibiotic susceptibility tests for the isolates were performed individually by agar diffusion method (Bauer-Kirby *et al.*, 1996). The results were interpreted by High- media standard chart.

Results

A total of 200 urine samples were collected, out of which, females (112) and males (88) samples respectively (Table-1 and Fig.1). The overall prevalence of urinary tract infection was 37% and the prevalence rate was higher in females (43%) then males (30%). Urine sugar level also assessed by glucose test and recorded in table-2. 0.55 sugar levels was observed in 39 samples, 1% sugar in 50 samples, 1.5% sugar in 43 samples, 2.0% sugar in 26 samples and Nil sugar level in 42 samples respectively (Table-2). The higher percentage of urine sugar level has also observed in females (112) then (88).

Table-1: Prevalence of UTI over the sex distribution

S.No.	Sex	No. of cases examined	No. of cases positive	%
1	Female	112	48	43%
2	Male	088	26	30%
	Total	200	74	37%

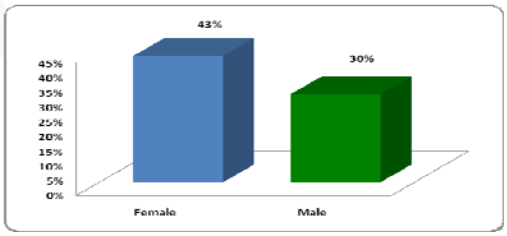

Fig.1: Prevalence of UTI over the sex distribution

Table -2:Urine sugar level of the diabetic patients

S.No	Urine sugar level	Female	Male
1	+ (0.5%)	17	22
2	++ (1.0%)	30	20
3	+++ (1.5%)	23	20
4	++++ (2.0%)	18	08
5	Nil sugar level	24	18
	Total	112	88

Microscopic examination of the urine sample revealed that 74 (37%) of the specimen showed significant pyuria while 126 (63%) showed in significant pyuria (Table-3 and Fig.2). The prevalence of UTI over the age-sex distribution was assessed. The higher percentage of prevalence was observed in females 64.9%

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(48) and 35.15 (26). In females, 31-40 age groups were more prevalent to UTI, followed by 41-50 age groups. In males, maximum number of positive cases was observed in 41-50 age groups (Table-4).

Single bacterial etiology was isolated in 74 cases out of 200 samples plated, Escherichia *coli* was found to be the predominant isolate in 42 cases, followed by *Klebsiella pneumoniae* in 26 cases and *Proteus mirabilis* was isolated in 6 cases as shown in table-5 and figure-5. Maximum numbers of isolates were recorded in females (46) isolates as compared then males (28).

Table - 3: Pyuria of UTI patients

S.No	Pyuria result	No. of cases	Percentage
1	Significant pyuria	74	37%
2	Insignificant pyuria	126	63%

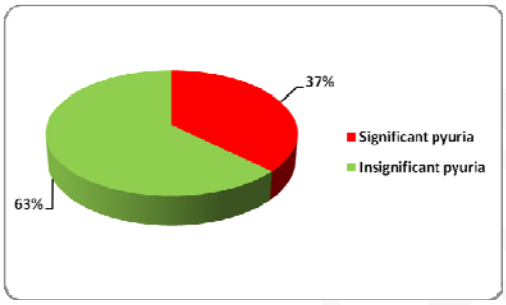

Fig. 2: Pyuria of UTI patients

Table-4: Prevalence of UTI over the age distribution and sex

S.No	Age Group	Sex		Total no. of cases
		Female	Male	
1	21-30	2	1	3
2	31-40	23	5	28
3	41-50	14	16	30
4	51-60	9	4	13
	Total	48	26	74

Table -5: Bacterial single isolates

S. No	Bacteria isolated	Sex		Total No. of isolates
		Female	Male	
1	*E. coli*	22	20	42
2	*K. pneumoniae*	20	6	26
3	*P. mirabilis*	4	2	6

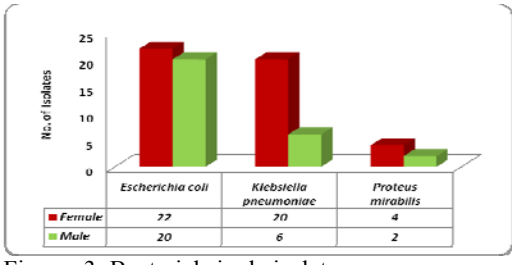

Figure -3: Bacterial single isolates

The antibiotic sensitivity/resistance patterns of the isolate to various antimicrobial agents are shown Table-6. Nalidixic acid, Ofloxacin and Ciprofloxacin were more effective against *E. coli*, *K. pneumonia* and *P. mirabilis* respectively. Antibiotics like Ampicillin, Carbenicillin and Gentamycin were poorly effective.

Discussion

The prevalence of UTI among the diabetic patients was 43%. Which was higher when compared to prevalence in male (30%). This result is higher than prevalence rate of 14% UTI in women with type 1 diabetes recorded by Suzanne *et al.,* 2000. According to them risk factors for the development of UTI in these women was oral contraceptive use. This study agrees with other reports stating high prevalence of UTI in females, during youth and adulthood age (Burbige *et al.,* 1984; Akinyemi *et al.,* 1997., Cheesbrough, 2000., Ibeawuchi and Mbata, 2002; Asinobi *et al.,* 2003; Mbata, 2007).

The most common organism isolated from theses diabetic patients was *Escherichia coli* (56%), *Klebsiella pneumoniae* (35%) and *Proteus mirabilis* (85%). This finding is similar to other finding which indicate that gram negative bacterium, particularly *E.coli* is the commonest pathogen isolated in patients with UTI (Burbige *et al.,* 1984; Akinyemi *et al.,* 1997; Okoanafua *et al.,*1989; Ebie *et al.,* 2001; Njoku *et al.,* 2001; Mbata, 2007. In another study from India, it was found that *E. coli* was the commonly grown organism (64.3%) followed by *Staphylococcus aureus* (21.4%) and *K. pneumoniae* (14.3%) (Geerlings, 2002). Nalidixic acid, Ofloxacin and Ciprofloxacin were the most useful antibiotics which are inhibited most of the isolated UTI pathogens. This is similar to other reports where quinolones are the most effective (Krumpermann, 1983; Burbige *et al.,* 1984; Ebie *et al.,* 2001; Ehinmidu, 2003; Mbata, 2007). Gram negative bacilli were found to be highly

sensitive to Ciprofloxacin (62%) than to Ofloxacin (23%). Ciprofloxacin is thus clearly useful against poly resistant species such *Pseudomonas aeruginosa* (Notowicz, 1984).

The research of this study may not be representative of the general diabetic population. Urinary tract infections are often treated empirically and susceptibility test are often carried out only when the patient has failed one or more cases of antibiotic. The susceptibility pattern may be a support before antibiotic therapy initiation; however, it should be borne in mind that *invitro* antimicrobial sensitivity that only a guide and that condition *invivo* may be quite different (Winstanley *et al.*, 1997). These data may be used to determine trends in antimicrobial susceptibilities, to formulate local antibiotic policies and to assist clinicians in the choice of antibiotic therapy to prevent misuse, or overuse, of antibiotics.

Table- 6: Antibiotic sensitivity/resistance pattern of the bacterial isolates

Bacterial isolates	No. of isolates	A		Cb		Cf		G		Na		Nx		Of	
		S	R	S	R	S	R	S	R	S	R	S	R	S	R
E. coli	42	13	29	19	23	28	14	15	27	31	11	21	21	25	17
K. pneumoniae	26	11	15	10	16	18	8	10	16	20	6	15	11	21	5
P. mirabilis	06	1	5	2	4	6	-	2	4	4	2	3	3	5	1

(Ampicillin, Cb-Carbenicillin, Cf-Ciprofloxacin, G-Gentamycin, Na-Nalidixic acid, Nx-Norfloxacin and Of-Ofloxacin)

References

Akinyemi, K.O., Alabi, S.A., Taiwo, M.A. and Omonigbehin, E.A. 1997. Antimicrobial susceptibility pattern and Plasmid profiles of pathogenic bacteria isolated from subjects with Urinary Tract Infections in Lagos, Nigeria. *Niger. Qtr. J. Hosp. Med*.,1: 7-11.

Asinobi A.O., Fatunde O.J., Brown B.J., Osinusi K. and Fasina N.A. 2003. Urinary Tract Infection in Febrile Children with Sickle Cell Anaemia in Ibadan, Nigeria. *Ann. Trop. Paediatr.,* 23(2): 129-134.

Bauer A.W., Kirby W.M., Sherris J.C. and Jurck M. 1996. Antibiotics susceptibility testing by a standard single disc method. Am. *J. Clin.Path*., 451: 493-496.

Burbige K.A., Retic A.B., Colony A, Bauer S.B. and Lebowitz, R. 1984. UTI in boys. *J. Urol.,* 132: 541-542.

Cheesbrough, M. 2000. District Laboratory Practice in Tropical Countries. *Cambridge United Press,* U.K,7: 105.

Delamaire M., Maugendre D. and Moreno M. 1997. Impaired leucocyte function in diabetic patients. *Diabetes. Med.,*14: 29-34.

Ebie M, Kandaki-Olukemi Y.T., Ayanbadejo J., and Tanyigna K.B., 2001. UTI infections in a Nigerian Military Hospital. Niger. *J. Microbiol*., 15(1) : 31-37.

Ehinmidu J.O. 2003. Antibiotics Susceptibility Pattern of urine bacterial isolates in Zaria, Nigeria. *Trop. J. Pharmaceutical Res.,*2(2): 223-228.

Geerlings S.E., Stolk R.P., Camps M.J., Netten P.M., Hoekstra J.B., Bouter K.P., Bravenboer B, Collet J.T., Jansz A.R. and Hoepelman A.I. 2000. Asymptomatic bacteriuria may be considered a complication in women with diabetes. *Diabetes Mellitus* women asymptomatic bacteriuria utrecht study group. *Diabetes Care*, 23:744-9.

Ibeawuchi R. and Mbata T.I. 2002. Rational and irrational use of antibiotics. *Afr. Health*, 24(2): 16-18.

Krumpermann, P.H. 1983. Antibiotics Resistance Index of *E. coli* to identify high risk sources of faecal contamination of foods. *Appl. Environ. Microbiol*., 46 : 165-170.

Mbata T.I., 2007. Prevalence and antibiogram of UTIs Among Prisons Inmates in Nigeria. *Int. J. Microbiol*., 3(2) press.

Njoku C.O., Ezissi N.H. and Amadi A.N. 2001. Observations on bacterial infections of Urinary tract patients. *Int. J. Environ. Health and Human Development*. 2: 57-61.

Notowicz A., Stolz E. and Van Klingeren B. 1984. A double blind study comparing two dosages of enoxacin for the treatment of uncomplicated urogenital gonorrhoea. *J. Antimicrob. Chemother*., 91-94.

Okoanafua E.E. and Okoanafua B.N.1989. Incidence and Pattern of Asymptomatic Bacteriuria of pregnancy in Nigerian women. Niger. *Med. Pract*., 17: 354-358.

Patterson J.E. and Andriole V.T. 2001. Bacterial urinary tract infections in diabetes. *Int .J. Antimicrob. Agents*,17(4): 287-292.

Winstanley T.G., Limb D.I., Eggington R. and Hancock, F.1997. A 10 year survey of the antimicrobial susceptibility of urinary tract isolates in the UK: the microbe based project. *J. Antimicrobiol. Chemother*., 40: 591-594.