THE RESISTANCE PROFILE OF SOME UROPATHOGENS IN PATIENTS ATTENDING OBAFEMI AWOLOWO UNIVERSITY TEACHING HOSPITAL FOR UROLOGICAL INVESTIGATIONS

***Zailani SB**

***Gadzama GB**

+Abba AM

****Onipede AO**

****Aboderin AO.**

ABSTRACT

Background: *Urinary tract infections (UTI) are a common source of morbidity and mortality in all age groups in both sexes. Areas of concern in the treatment of UTI include the emergence of drug resistant uropathogens. Hence, the selection of drug resistant pathogens in both community acquired and nosocomial infections are of major concern world-wide.*

Objective: *This retrospective study was aimed at determining the sensitivity profile of some uropathogens to antibiotics in urological patients attending Obafemi Awolowo University Teaching Hospital located in Southwestern part of Nigeria.*

Method: *The microscopy, culture and sensitivity results of un-selected mid stream urine specimens totaling 1015 received by the medical microbiology laboratory in the year 2000 were reviewed. Of these, 666 had all the information required for the study.*

Results: *The total number of isolates in this study was 430(64.6%) out of which Gram-negative bacilli accounted for 40.5 % . The largest of this group being Klebsiella 13.7%, others were Pseudomonas 11.1% and E.coli 8.3%. Gram positive isolates represented 11.6% of organisms cultured. S. aureus 9%, being predominant. C. albicans made up 0.9%.*

Conclusion: *There was a generally high level of resistance of isolates to beta lactams, macrolides, and amino glycoside antibiotics compared to the third generation cephalosporins and quinolone antibiotics. The paper also underscores the importance of filling out request forms properly.*

Author Affiliations: *Department of Med. Microbiology and Parasitology, College of Medical Sciences, University of Maiduguri.
+Department of Surgery, University of Maiduguri Teaching Hospital,
Department of Med. Microbiology and Parasitology,
College of Health Sciences, Faculty of Science, Obafemi Awolowo University.**

Corresponding Author: Dr. SB Zailani
Department of Medical Microbiology and Parasitology College of Medical Sciences University of Maiduguri.
E-mail: zailanisb@yahoo.com

Keyword: Uropathogen, Resistance, Rapidtest.

INTRODUCTION

Urinary tract infections (UTI) are a common source of morbidity and mortality in all age groups in both sexes [1-4] .A suspicion of urinary tract infection either as a primary or secondary site of morbidity is a frequent reason for requesting a microbiological investigation of a mid stream urine specimen (msu)[5-8]. Many investigators have reported that only 50 % of patients complaining of dysuria, frequency of urination and pyrexia actually have UTI. [3,4,6,] For this reason, a definite diagnosis of UTI is based on confirmatory laboratory investigation, which depends on the demonstration of significant bacteriuria and pyuria [7]. However, opinions differ as to the number of colonies cultured per milliliter of urine, which are considered indicative of UTI [8]. Traditionally, colonies of 10^5 bacteria/ml msu are considered indicative of UTI, but more recently 10^2 *coliforms*/ml msu is advocated by some workers [8].

Areas of concern in the treatment of UTI include the emergence of drug resistant uropathogens. Hence, the selection of drug resistant pathogens in both community acquired and nosocomial infections are of major concern world wide [9-11]. More so, in a developing country where antibiotic policies are virtually non-existent.

This study was aimed at determining retrospectively the sensitivity profile of uropathogens to antibiotics in a teaching hospital located in Southwestern part of Nigeria.

Materials and Methods

The microscopy, culture and sensitivity results of un-selected mid stream urine specimens totaling 1015 received by the medical microbiology laboratory of Obafemi Awolowo University Teaching Hospital in the year 2000 were reviewed. Only 666 forms had all the information required for the study.

Demographic data obtained from the laboratory forms included age, sex, diagnosis and ward/clinic. In addition, microbial isolates and their sensitivity profile to antibiotics were also obtained.

Mid-stream samples of clean catch specimens of urine are part of routine samples obtained from patients. Urine samples were either examined immediately or refrigerated at 4°C and examined within 2-4 hours of collection.

A standard platinum loop was used to plate the uncentrifuged urine onto CLED agar (Oxoid) and or McConkey agar (Oxoid). After over night incubation at 37°C under aerobic conditions, colony counts were determined semi- quantitatively and organisms were identified by standard methods. [12] The bacteriological result was correlated with the presence of more than five pus cells per high power field/ml (i.e. degree of pyuria) of repeated msu.

Antibiotic sensitivity tests of the microbial isolates were done by employing the disc diffusion method [13]. The radii of incubation observed were measured with a calibrated ruler and sensitivity or resistance determined by comparing the size of the inhibition zones with previously determined standard. Quality control procedures and quality control zone size strains of National Committee for Clinical Laboratory Standards (NCLL)[13] were used. The total number of strains of each isolate recovered by the laboratory and the percentage of these isolates resistant to each antimicrobial agent tested were determined.

Results

Of the 1015 mid-stream urine specimens received in the year 2000, 55% were obtained from females and 45% from males. Thirty four percent of the specimens did not have the age of the patient indicated on the request forms accompanying the specimens; as such they were excluded from the study. The total number of positive isolates from 666 specimens was 430 (64.6%), out of which 285 (66.3%) were females and 145 (33.7%) were males. Table I shows age and sex distribution of specimens with complete information.

A primary diagnosis of UTI was the most frequent (7.4%) indication for requesting the investigation of urine, followed by benign prostatic hyperplasia and pyelonephritis 6.8% and 5.7% respectively. Tables II and III show the pattern of diagnoses and the distribution of wards/clinics from whence urine specimens were received. Samples were more frequently received from the female wards and clinics (e.g. antenatal clinic).

Approximately 35% of the specimens received in the laboratory were negative upon culture, while 12.5 % were either of multiple growths or contaminated. The summaries of the types of bacteria isolated and the sensitivity profile to antibiotics tested are shown in Tables IV and V, respectively. Gram-negative bacilli accounted for 40.5% of bacterial isolates. The largest of this group being *Klebsiella* 13.7% followed by *Pseudomonas* 11.1% and *E.coli* 8.3%. Gram positive isolates represented 11.6 % of organisms cultured. *S.aureus* 9% being predominant. *C.albicans* was isolated in only 0.9%.

Table 1. *Age and sex distribution of mid-stream urine specimens at Obafemi Awolowo University teaching hospital complex in the year 2000.*

Age (years)	Number of samples		Total
	Male	Female	
1- 10	34	12	46
11-20	28	24	52
21-30	75	124	199
31-40	48	89	137
41-50	36	30	66
> 50	120	46	166
Total	**341**	**325**	**666**

Table II. *Pattern of diagnoses in patients whose urine samples were received at Obafemi Awolowo university teaching hospital Ile-Ife in the year 2000.*

Diagnosis	Frequency	Percentage
Urinary tract infection	49	7.4
Benign prostatic hypertrophy	45	6.8
Pyelonephritis	38	5.7
CRF	41	6.2
Medical test.	41	6.2
Post- op	35	5.3
Cystitis	34	5.1
Diabetes mellitus.	33	4.9
PID	33	4.9
Anaemia	32	4.8
Sepsis	32	4.8
CCF	30	4.5
Nephritic syndrome	29	4.3
Cyesis	29	4.3
Hypertension	29	4.3
ARF	27	4.0
Nephritis	27	4.0
Urethritis	17	2.6
VVF	25	3.8
Malaria	20	3.0
Others	**30**	**4.5**

*The percentage is more than 100 due to more than one diagnosis in some cases.

LEGEND:
CRF =Chronic renal failure, PID =Pelvic inflammatory disease
CCF =Congestive cardiac failure, ARF= Acute renal failure
VVF =Vesico-vaginal fistula

Table III. *The distribution by ward/clinics of urine samples at Obafemi Awolowo university teaching hospital complex, Ile-Ife in the year 2000.*

Ward/Clinic	Frequency	Percentage
ANW	106	15.9
GOPD	73	11.0
SOPD	71	10.7
GYNW	67	10.1
MMW	49	7.3
Renal Ward	46	6.9
MOPD	35	5.2
PN	34	5.1
CASW	30	4.5
FMW	29	4.4
MSW	29	4.4
CEW	23	3.5
Staff	16	2.4
CW	13	1.9
Ortho. Ward	8	1.2
LW	6	0.9
COPD	6	0.9
ICU	5	0.7
Others	20	3.0
Total	**666**	**100**

LEGEND:

ANW =Antenatal ward
GOPD =General out patient department
SOPD=Surgical out patient department
GYNW=Gynaecology ward
MMW=Male medical ward
MOPD=Medical out patient department
PNW=Post-natal ward
CASW=Casualty ward
FMW=Female medical ward
MSW=Male surgical ward
CEW=Children emergency ward
CW=Children ward
LW=Labour ward
COPD=Children out patient department
ICU=Intensive care unit.

Table IV. *Distribution of bacterial isolates from mid stream urine specimens at Obafemi Awolowo University teaching hospital Ile Ife in the year 2000.*

Organism	Frequency	*Percentage*
Klebsiella spp	*91*	*13.7*
Pseudomonas Spp	*74*	*11.1*
E. coli	*55*	*8.3*
Proteus spp.	*32*	*4.8*
Coliforms	*17*	*2.6*
S. aureus	*60*	*9.0*
S. albus	*9*	*1.3*
Streptococcus Spp.	*3*	*0.4*
C. albicans	*6*	*0.9*
Mix. Growth	*83*	*12.5*

**236(35.4%) specimens did not yield any bacterial pathogen after incubation.*

Table 5. *Number and percentage susceptibility of mid steam urine isolates in Obafemi Awolowo University teaching hospital Ile-Ife in the year 2000.*

Isolate	No.	Amp	Metclx	Ery	Tet	Chlor	Sxt	Col	Gen	Ctz	Ctx
E.coli	55	5(9)	18(33)	8(4)	12(22)	17(30)	20(36)	26(47)	30(54)	46(84)	50(90)
Kleb spp.	91	4(4)	**	16(18)	12(19)	12(13)	16(18)	20(22)	34(37)	88(97)	61(67)
Proteus spp.	31	2(20)	**	12(39)	2(6)	15(48)	8(26)	12(39)	8(26)	27(87)	27(87)
Pseudo spp.	74	**	**	**	**	**	18(24)	23(31)	11(15)	55(74)	28(38)
Coliform	17	**	**	11(65)	2(18)	**	4(23)	**	10(59)	14(82)	14(82)
S. aureus	60	11(18)	11(18)	44(92)	24(40)	31(52)	16(26)	30(50)	29(48)	53(88)	47(78)
S albus	9	**	**	**	**	**	**	**	**	**	**
Strept.	3	**	**	**	**	**	**	**	**	**	**
C.albicans	6	**	**	**	**	**	**	**	**	**	**

Discussion

Urinary tract infection (UTI) is a common problem in clinical practice, and samples of urine from patients with suspected infections of urinary tract usually constitute more than 30% of different kinds of specimen received in a medical microbiology laboratory[13,14]. In our laboratory, for the year under review urine specimens constituted 45% of all specimens received.

Our observation that females are more likely to have UTI than males is consistent with what has been reported by other authors [1,4,6,11] and like wise the high prevalence of UTI in the reproductive age group. There was a significant age and sex distribution pattern with the observation that below the age of 30 more females had their urine examined for UTI, whereas above the age of 30, examination of urine specimen in men increased. This may be due to structural problems of obstructive uropathy in males with advancing age.

Of particular concern to us is the observation that 34.4% of specimens did not have adequate demographic and clinical information on the laboratory form accompanying specimens. We feel that this reflects the level of importance, which the attending physician attaches to supplying the laboratory with adequate information, which is fundamental to a successful investigation of a presumed pathogen. Therefore, we wish to point out the fact that a complete laboratory record provides an objective basis upon which further improvement in patient care can be contemplated. Hence clinicians will do better in supporting the laboratory by supplying adequate information .

Legend:
Amp = Ampicillin (10µg & 25µg), Metclx = Methicillin/Cloxacillin(5µg)
Ery = Erythromycin (10µg), Tet = Tetracyclin (10µg & 50µg)
Chlor = Chloramphenicol (10µg), Sxt = Cotrimoxazole (25µg)
Col = Colistin (10µg), Gen = Gentamicin (10µg)
Ctz = Ceftriazone (30ug), Ctx =Cefotaxime (30ug)
Caz = Ceftazidime (30ug), Nit = Nitrofurantoin (30ug)
Nal = Nalidixic acid (30ug)

Figures in brackets( ) = % susceptibility.

** =Not tested.

Thirty five percent of specimens received in the laboratory were negative upon culture. This is not surprising, as Lowe [14] has reported earlier that 70-80 % of urine specimens received in a clinical laboratory are found on full microscopic and cultural examination, to be free from evidence of infection in the urinary tract. We are convinced that this observation is also important to resource poor laboratories like ours to consider the application of a simple and rapid preliminary screening test to identify specimen showing no evidence of infection without the need for further full investigation. We believe this will save labour and resources. From a study [15] conducted on the cost effectiveness of combined rapid test (multistix) in screening for UTI , the authors concluded that 75% of urine samples can be excluded from laboratory analysis. Since there is a 20 fold difference in cost between dipstix and laboratory culture and antibiotic sensitivity testing, the potential savings from this simple screening test was said to be considerable. About 12.5% of the specimens was grossly contaminated, the gross contamination of urine reflects the problems associated with specimen collection and transportation to the laboratory. Doctors and other health personnel concerned should put more effort to explain to the patients especially females on how to obtain good quality urine specimen where applicable.

The pattern of bacterial isolates is similar to what has been observed in hospitalized patients as opposed to community acquired infection [6,10,11] with *Klebsiella spp* 13.7% and *Pseudomonas spp* 11.1% surpassing *E.coli* 8.3% in the frequency of isolates . Specimens emanated more from patients in the wards than from the clinics. This is not surprising as they are likely to require catheterization of the urethra at a stage during their admission which may require a mid stream urine investigation.

There was a generally high level of resistance of isolates to beta lactams , macrolides, and aminoglycosides compared to the third generation cephalosporins and quinolones . This portends a grave therapeutic implication for patient care, as traditional antibiotics, which are cheaper and affordable are no longer useful while the more effective and thus expensive cephalosporins and quinolones antibiotics may not be affordable for most of our patients. This high resistant profile confirms the observation of several authors [7,9,10] and underscores the importance of instituting a surveillance system to monitor the magnitude of the problem in hospitals. This will guide the establishment of local antibiotic policy.

In conclusion we would like to emphasize the importance of supplying the laboratories with adequate information by filling out the details on the request form. The introduction of a simple and rapid screening test will save the cost of processing urine specimen in resource poor laboratories. Finally, the institution of antibiotic policy will reduce the problem of drug resistance in the country.

Acknowledgment
We are indebted to Mr. SS Aribiyi and other technical staff of Medical Microbiology and Parasitology Department Obafemi Awolowo University Teaching Hospital, Ile Ife for their co-operation and assistance in record keeping.

REFERENCES

1. Kass EH. Bacteriuria and the diagnosis of infections of the urinary tract. Archiv of Inter Med. 1957; ***100***: 709-713.

2. Kunin CM, Deutscher, M R, Paquin J K.Urinary tract infection in school children : an epidemiological, clinical and laboratory study. Medicine. 1964; 43:91

3. Bello AB, Onile BA. Urinary tract infections among children. Nigerian Medical Practitioner.1988; ***15*** {30}:43-44.

4. Olusanya O, Olutiola PO. Studies on bacteriuria in patients and students in Ile-Ife. Nigerian Journal of Medicine. 1984; 177-183.

5. Maskell R. Diagnosis of urinary tract infection, its causes and consequences. In: Urinary tract infection, current topics in infection series,3 Edward Arnold, London.1982;21-41.

6. Kaitz Al, William JE. Bacteriuria and Urinary tract infections in hospital patients, New Eng J Med. 1960; 262: 425.

7. Akonai AK, Kassim OO, Adeniran MO. Taiwo OA. Study of urinary tract infections at Ile_ife, Nigeria. East African Medical Journal1993***; 70*** [1]: 10-14.

8. Nicholson GD. Urinary tract infection. Postgrad Doc. 1989; ***11*** [5]:122-125

9. Kadiri S, Ajayi SO, Toki R.A. Quinolone for short time treatment of uncomplicated urinary tract infection. East Afr Med J 1999. ***76***(10):587-589.

10. Ahmed AA, Osman H, Mansour AM, *et al*. Antimicrobial agent resistance in bacterial isolates from patients with diarrhoea and urinary tract infection in the Sudan. Am J Trop Med Hyg. 2000; ***63***(5-6):259-263

11. Larabi K. Epidemiology of urinary infections in the Menzel-Bourguiba region. Tunis Med. 2001; ***79***(4):242- 246.

12. Lennette E.H, Sprouding E.H, Trant J.P. Manual of Clinical Microbilogy. American Society for Microbiology Publications. Washington D.C., U.S.A. 1974.

13. National Committee for Clinical Laboratory Standards (Approved Standard MZ- A3). Performance Standards for Antimicrobial Disk Susceptibility Tests. National Committee for Clinical Laboratory Standards. Villanova. PA. 1984.

14. Lowe P A. Chemical Screening and Prediction of bacteriuria a new approach. Medical Laboratory Sciences. 1986; ***43***: 28-33.

15. Fowlis G A, Waters J, Williams G. The cost effectiveness of combined rapid tests (multistix) in screening for UTI. J Royal Soc Med 1995;***88***(5):303.