REVIEW ARTICLE

URINARY TRACT INFECTIONS IN A TERTIARY HOSPITAL IN ABUJA, NIGERIA

Iregbu KC[*],Nwajiobi-Princewill PI.
Department of Medical Microbiology and Parasitology, National Hospital Abuja, P.M.B 425, Nigeria.

***Corresponding Author: Iregbu KC, Department of Medical Microbiology, National Hospital, Abuja. Nigeria.**
Email: keniregbu@yahoo.co.uk

ABSTRACT
Background: Urinary tract infections (UTIs) are among the most common bacterial infections. In uncomplicated cases the infection is easily treated with a course of antibiotic, but there is increased resistance to many of these antibiotics.
Objective: To determine the profile of UTI among patients using National Hospital Abuja and the antibiotic susceptibility profile of isolated uropathogens.
Methods: This prospective study was carried out at the department of Medical Microbiology of National Hospital, Abuja over a period of three years (January 2010 – December 2012). A total of 6763 urine samples were analyzed for age, gender, distribution, yield and antibiotics sensitivity.
Results: Of 6763 urine samples, 885 (13.1%) yielded uropathogens, with the highest percentage yield in the below one year and above 57 years age groups. The mean age was 33.9 years and modal group was 25 -32 years. The most common isolates were Escherichia coli 323 (37%) and Klebsiella spp 202 (25%). Although more infections occurred in outpatients than inpatients, the rate was more with inpatients (36% vs 11%). 97% of Klebsiella spp, 89% of E coli and 83% of P.aeruginosa were sensitive to imipenem, while their respective sensitivities to amikacin were 65%, 98% and 96% Most isolates showed high levels of resistance to many other antibiotics tested.
Conclusion: High levels of resistance exist among uropathogens in our study area. This calls for regular surveillance and improved antibiotic stewardship.
Keywords : Urinary tract infection, National Hospital Abuja, antibiotic

INTRODUCTION

Urinary tract infection or UTI is said to exist when a significant number of microorganisms, usually greater than 10^5 cells per millilitre of urine, are detected in properly collected mid-stream " clean catch"urine(1,2). The gold standard for diagnosis is the detection and identification of the causative pathogen in the urine(3).
UTI is one of the most common infections to plague man worldwide(4,5). Over 150 million people worldwide experience an episode yearly, costing the world economy over 6 billion US dollars in treatment and workloss(6). In the USA alone this result in over 8 million visits to the physician office and 1.5 million emergency room visits with about 300,000 admissions(7,8).

The common etiologic agents of UTI include enterobacteriacae like E. coli and Klebsiella spp, as well as Gram positive organisms like Staphylococci and enterococci(9-11) and Candida albicans in patients with underlying physiological debilitation(12). Studies carried out in Enugu, Yola, Zaria and Ife(13-16) show that these are the same etiological agents isolated in Nigeria.

UTI is commonly treated with oral antibiotics like amoxicillin-clavulante, nitrofurantoin, cephalosporins, fluoroquinolones and trimethropin-sulfamethoxazole(17). However, available data indicate that Nigeria has isolates with high levels of resistance(18-21), thus underscoring the need for regular institutional, regional and national surveillance in order to optimize care. The study was designed to profile UTIs as seen at

the National Hospital Abuja in order to provide guidelines for optimization of antibiotics treatment of UTIs.

METHOD

The biodata for this study namely, age, gender, ward and clinic, were extracted from the request forms of the patients sent to the laboratory for UTI investigations from January 1, 2010 to December 31, 2012. Samples with incomplete information were excluded from the study. All samples were processed in the Medical Microbiology laboratory of National Hospital, Abuja using standard procedures(22,23). Briefly, samples were examined macroscopically and microscopically, and thereafter inoculated onto CLED and blood agar media, and incubated in air at 35-36°C for 16-24 hours. Significant isolates were identified biochemically and antibiotic sensitivity performed by disc method using modified Kirby Bauer method. Data were analyzed using Microsoft excel 2007 software.

RESULTS

A total of 14700 urine samples were sent to the Medical microbiology department for urine microscopy, culture and sensitivity within the three year study period. 6763 (46%) met the inclusion criteria. 4125 (61%) were from females while 2638 (39%) were from males. There were 5380 (80%) adult samples and 1383 (20%) from children. 6215 (92%) samples were from outpatients while 548 (8%) samples were from in-patients (table 1).

TABLE 1: OUTPATIENT AND INPATIENT DISTRIBUTION OF PATIENTS

Source	Total samples	Positive samples
Outpatients	6215 (92%)	689 (11%)
Inpatients	548 (8%)	196 (36%)
Total	6763 (100%)	885 (13%)

885 (13%) specimens yielded significant growth. The yield from female samples was 14% compared to 12% from males, while it was 13.6% among adults and 11% among children. 36% and 11% of in-patient and outpatient samples respectively yielded significant growth (table 2).

TABLE 2: AGE AND GENDER DISTRIBUTION OF PATIENTS

Age Distribution	Male		Female		Total	
	Total samples	Positive samples (%)	Total samples	Positive samples (%)	Total samples	Positive samples (%)
0 – 1	40	18(45)	32	15(50)	72	33(46)
2 – 8	391	26(7)	399	41(11)	808	67(8)
9 – 16	216	20(9)	337	32(10)	553	52(9)
17 – 24	66	10(15)	402	50(12)	468	60(13)
25 – 32	930	60(7)	1997	200(10)	2927	260(9)
33 – 40	213	26(12)	438	70(16)	651	96(15)
41- 48	266	25(9)	237	50(22)	503	75(15)
49 – 56	118	21(18)	119	30(25)	237	51(22)
57 – 64	104	22(21)	86	38(44)	190	60(32)
>64	222	78(35)	182	53(29)	404	131(32)
Total	2566	306 (12)	4197	579 (14)	6763	885 (13)

The age group with the highest yield was the neonate (46%) and the above 64 year old with 32.4%, while the age group of 25-32 years had the lowest.

The most frequently isolated pathogen was E. coli 37%, followed by Klebsiella spp 25%, P. aeruginosa 8.4%, Proteus spp 7.5%, S. aureus 6.8%, Enteroccocus spp 6.2% and Candida spp at 5.3% (table 3). 50% of all isolates from ICU were Candida spp.

TABLE 3: FREQUENCY OF ISOLATES

Isolates	Number (%)
E. coli	323 (37%)
Klebsiella spp	202(25%)
P. aeruginosa	75 (8.4%)
Proteus spp	67 (7.5%)
S. aureus	60 (6.8%)
Enterococcus faecalis	55 (6.2%)
Candida spp	47 (5.3%)
Others	56 (6.3%)
Total	885 (100%)

97% of Klebsiella spp, 89% of E coli and 83% of P. aeruginosa were sensitive to imipenem, while their respective sensitivities to amikacin were 65%, 98% and 96% (table 4). Sensitivity of P aeruginosa to ceftazidime, ciprofloxacin and gentamicin were 33%, 44% and 24% respectively. 81% of S. aureus isolates were sensitive to nitofurantoin, 80% to amikacin, 73% to amoxicillin/clavulanate and 63% to ciprofloxacin. 83% of all tested isolates of E. faecalis were sensitive to amoxicillin/clavulanate, while 67% and 66% were so for cefuroxime and nitrofurantoin respectively.

TABLE 4: ANTIBIOTIC SUSCEPTIBILITY OF ISOLATES

Antibiotics	Isolates					
	E. coli	Klebsiella spp	P. aeruginosa	Proteus spp	E. faecalis	S. aureus
	T (%S)	T (%S)	T (%S)	T (%S)	T (%S)	T (%S)
Ampicillin	31(1)	-	-	3(0)	3(33)	10(40)
Amoxicillin/ Clavulante	185(27)	71(25)	-	48(19)	24(83)	26(73)
Ceftriaxone	176(67)	54(48)	-	3(0)	6(67)	15(60)
Ceftazidime	-	66(55)	48(33)	45(60)	-	-
Ciprofloxacin	103(53)	28(43)	41(44)	12(25)	6(17)	19(63)
Imipenem	45(89)	37(97)	35(83)	-	4(100)	-
Nitrofurantoin	265(79)	98(40)	-	60(45)	29(66)	43(81)
Gentamicin	143(43)	46(39	42(24	21(43)	5(40)	25(48)
Amikacin	84(98)	62(65)	25(96)	54(67)	14(21)	20(80)

T =Total tested, %S= percentage sensitive

DISCUSSION

The prevalence rate of UTI from this study was 13%, which is lower than figures from previous studies in Yola (67.2%), Enugu (77.9%), South Africa (51%) and India (27%)(14,15,24,25). It is however, higher than the figure for pregnant women in Ghana 9.5%26. The variation in rates may be partly explained by the differences in study populations and in the criteria used by centres in selecting urine samples for culture. Some centers exclude samples from patients clinically diagnosed with UTI or previous antibiotic use(27). The taking of antibiotics prior to presentation at the hospital maybe a key factor in bacterial yield(28).These factors were not considered in this study.

Most of the requests for UTI investigation came from the outpatient department, which sees most of the cases coming in directly from the community, and by extension serves as the clearing house for the specialists' clinics/units. An uncomplicated UTI is unlikely to be admitted into the wards. This finding is consistent with findings in studies from Botswana and the United States(29,30) . However, the yield from inpatient samples was more than three times that of outpatients. This may be due to primary diseases of the patients, some of which compromise the immunity of the patients and the use of invasive devices such as urinary catheters in the hospital setting(8,9,11).

The finding that UTI was more frequent in women than men is in agreement with previous studies(14,24,25,31). However, the yields from samples were not markedly different in the two groups (14% vs 12%). The higher frequency in females has been attributed to the shorter female urethra and the proximity of this to the gastrointestinal outlet, hence making it easier for enteric flora to colonize this area(32,33). Other contributory factors may include the use of contraceptives, childbirth and menopause(34,35).

The incidence of UTI was highest among infants, and thereafter dropped sharply from age two and maintained a rise until age 25-32 when it dropped slightly before maintaining the rise again. Previous studies have shown the incidence of UTI in infants to range from 0.7 – 7% with girls having lower rates than boys(4,36). The very high incidence recorded in this study likely represent contaminations and poor handling of the samples. Further study will be required to determine the true incidence of UTI in our environment. The age group with the highest sample is paradoxically among the group with least incidence. This is a very sexually active age group, and the age that most commonly abuse antibiotics(37), thus explaining the relatively low yield of samples. The high incidence in both sexes with advancing age has been attributed to the presence of a number of risk factors such as prostatic enlargement in males, diabetes mellitus, reduced ambulation, osteoporosis, interventional instrumentations like catheterization and weak bladder sphincter(12).

Gram negative Enterobacteriacae led by E coli and Klebsiella pneumoniae dominated the uropathogens seen in this study, similar to results of other studies elsewhere(14,15,38). S. aureus and enterococcus faecalis were the two Gram positive isolates and made up only 13% of all isolates. Previous studies have found Staphylococcus as an increasing cause of UTI, and attributed this to increased instrumentation like bladder catheterization(11,12,39). The rate of candiduria found in this study is of concern, considering that previous studies in Israel and Italy found rates ranging from 0.14-0.77%(40,41). Although the 5.3% rate in this study is lower than that found in a European study (9.4%)(42), we did not have data to differentiate between true infection and contamination.

The majority of isolates showed resistance to drugs commonly used to treat UTIs. Imipenem was broadly the most sensitive drug, followed by amikacin, and ceftriaxone, and these are not drugs often deployed as first line in the treatment of uncomplicated UTI. Although different studies in different parts of the world and in different parts of the same country found different resistance rates to different drugs over time(14-17,43-50) it is important that emphasis be paid to local resistance patterns as these have the greatest impact on care. These variations in susceptibility may be due to the prescription habits in different localities as inappropriate exposure to antibiotics drives development of resistance. From the results of this study it is certain that choosing drugs for empiric treatment will be challenging as no single common drug can conveniently be recommended for

that. This reinforces the need for mandatory urine culture for all suspected UTIs to properly guide therapy.

In conclusion, E. coli remains the most frequent isolate from our environment causing UTI. However this pathogen, as well as other enterobacteriaceae especially K. pneumoniae, isshowing increased resistance to beta-lactam, aminoglycoside and fluoroquinolones. Regular antibiotic surveillance and practice of antibiotic stewardship will help stem the tide of resistance and improve care.

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