International Journal of Urology and Nephrology ISSN 2091-1254 Vol. 6 (6), pp. 001-005, June, 2018. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research paper

Prevalence of urinary tract infections (UTI) among patients attending Dalhatu Araf Specialist Hospital, Lafia, Nasarawa State, Nigeria

Kolawole, A. S.[1], Kolawole, O. M.[2]*, Kandaki-Olukemi, Y. T. [1], Babatunde, S. K.[3], Durowade K. A.[4] and Kolawole, C. F.[4]

[1]Medical Laboratory Dept., School of Health Technology, Keffi, Nigeria.
[2]Department of Microbiology, Faculty of Science, University of Ilorin, P. M. B. 1515 Ilorin Kwara State, Nigeria.
[3]Department of Biological Sciences, Ajayi Crowther University, Oyo, Nigeria.
[4]Department of Epidemiology and Community Health, U. I. T. H. Ilorin, Kwara State, Nigeria.

Accepted 12 January, 2018

The prevalence of Urinary Tract Infections (UTI) was evaluated in three hundred patients attending Dalhatu Araf Specialist Hospital, Lafia Nasarawa State, Nigeria. Results showed 180 (60%) patients were positive. The most common organisms were *Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus,* and *Proteus mirabilis*. *In-vitro* antibiotic susceptibility tests revealed that the gram negatives bacteria were sensitive to quinolones (ofloxacin, ciprofloxacin, pefloxacin) and erythromycin, while the gram positive isolates were sensitive to lincomycin, erythromycin and quinolones (ofloxacin, ciprofloxacin, pefloxacin).

Key words: UTI, bacteria, antibiotic susceptibility.

INTRODUCTION

Gram negative enterics constitutes a serious problem in urinary tract infection in many parts of the world. It has been estimated that symptomatic urinary tract infections (UTI) occurs in as many as 7 million visits to emergency units and 100,000 hospitalizations annually in USA (Schappert, 1999). UTI has become the most common hospital-acquired infection, accounting for as many as 35% of nosocomial infections, and it is the second most common cause of bacteraemia in hospitalized patients (Stamm, 2002; Weinstein, 1997). UTI accounts for a significant part of the work load in clinical microbiology laboratories and enteric bacteria (in particular, *Escheri-chia coli*) remain the most frequent cause of UTI, althou-gh the distribution of pathogens that cause UTI is chang-ing (Ojiegbe and Nworie, 2000). There are several factors and abnormalities of UTI that interfere with its natural resistance to infections. These factors include sex and age (Ojiegbe and Nworie, 2000) disease, hospitalization and obstruction (Epoke et al., 2000). Females are however believed to be more affected than males except at the extremes of life (Akinkugbe et al., 1973). This is as a result of shorter and wider urethra. The anatomical relationship of the female's urethra and the vagina makes it liable to trauma during sexual intercourse as well as bacteria been massaged up the urethra into the bladder during pregnancy/ child birth (Arthur et al., 1975; Duerden et al., 1990).

UTI is challenging, not only because of the large number of infections that occur each year, but also because the diagnosis of UTI is not always straight forward. UTI has to be distinguished from other diseases that have a similar clinical presentation, some UTIs are asymptomatic or present with atypical signs and symptoms, and the diagnosis of UTI in neutropenic patients (who do not typically have pyuria) may require different diagnostic criteria than those used for the general patient population. Because of these factors, much reliance is placed on laboratory tests to augment clinical impressions; even when clinical diagnoses are unequivocal, physicians may order laboratory tests to identify the cause of the infections and/or to provide isolates for anti-microbial susceptibility. It therefore comes as no surprise that the laboratory examination of urine specimen accounts for a

*Corresponding author. E-mail: tomak74@yahoo.com. Tel: 234-8060088495.

Table 1. Prevalence of UTI in relation to sex of patients.

Sex	No Examined	No positive	Percentage
Male	150	60	33.33 %
Female	150	120	66.67 %
Total	300	180	60 %

large part of the work load in many hospital based laboratories.

The purpose of this study is to summarize the laboratory diagnoses of routine UTI and the antimicrobial susceptibility pattern of isolates, performed within a period of 6 months in 2007, since there is little or no published data on it in Dalhatu Araf Specialist Hospital, Lafia. Also, the proximity of the target location to the Federal Capital Territory, Abuja would be of interest since many who work in Abuja live in neighbouring Nassarawa State due to high standard of living in Abuja.

MATERIALS AND METHODS

Study population

The study population was drawn from patients attending Dalhatu Araf Specialist Hospital, Lafia, Nasarawa State. Three hundred (300) patients not clinically diagnosed as having UTI were involved in the study. They were made up of 150 males and 150 females and aged between 15-30 years. Those excluded form the study were patients who have been clinically diagnosed of UTI. Patients on antibiotic therapy were excluded from the study.

Collection of samples

Early morning mid-stream urine samples were collected using sterile, wide mouthed glass bottles with screw cap tops. On the urine sample bottles were indicated name, age, sex, and time of collection. The samples were analyzed bacteriologically using the methods of Stamm et al. (1982).

Sample processing

Culture

A calibrated sterile platinum wire loop for the semi-quantitative method was used for the plating and it has a 4.0 mm diameter designed to deliver 0.01 ml. A loopful of the well mixed urine sample was inoculated into duplicate plates of Blood and Mac-Conkey agar. All plates were then incubated at 37^{o}C aerobically for 24 h. The plates were then examined macroscopically and microscopically for bacterial growth. The bacterial colonies were counted and multiplied by 100 to give an estimate of the number of bacteria present per milliliter of urine. A significant bacterial count was taken as any count equal to or in excess of 10,000 cfu /ml (Stamm et al., 1982; Stark and Maki, 1984).

Microscopy

The urine samples were mixed and aliquots centrifuged at 5000 rpm for 5 min. The deposits were examined using both x10 and x40 objectives. Samples with 10 white blood cells/mm^3 were regarded as pyuric (Smith et al., 2003).

A volume of the urine samples were applied to a glass microscope slide, allowed to air dry, stained with gram stain, and examined microscopically. Bacterial isolates were identified generally using a battery of tests (Cheesbrough, 2000; Prescott et al., 1999).

Antibiotic susceptibility testing

The method used with standardization of the inoculum size was agar diffusion method described by Baur et al. (1996). Interpretation of results was done using the zone sizes. Zones of inhibition of 18 mm was considered sensitive, 13-17 mm intermediate and < 13 mm resistant. The standardized single-disc diffusion method was employed as described by Vandepitte et al. (1991).

Statistical analysis

The data obtained were subjected to chi-square test at 5% ($p<0.05$) confidence interval.

RESULTS

Of the 300 specimens examined in this study, 180 (60%) showed significant bacteriuria; 120 (66.67%) were females while 60 (33.33%) were males (Table 1).

Microscopic examination of the centrifuged urine revealed that 130 (43.33%) of the specimen showed significant pyuria (pus cells of 5 cell/ hpf) while 170 (56.67%) showed insignificant pyuria (pus cells of 1-2 cells/ hpf). Of the 130 significant pyuric samples, 125 (96.15%) yielded significant bacterial growth, 3 (2.31%) insignificant bacterial growth while 2 (1.54%) yielded no bacterial growth (Table 2).

Table 3 shows the prevalence of UTI in relation to age and sex of patients. Results indicate that a high percentage of organisms were isolated from both males and females within the age brackets of 21-25 years and 26-30. Comparatively, however, there were more cases in females than males.

Of the 180 isolates obtained, gram negative bacteria had a higher frequency of occurrence than gram positive constituting 140 (77.7%) of the total isolates. These included: *E. coli* 55 (30.56%); *Pseudomonas aeruginosa* 42 (23.33%); *Proteus mirabilis* 29 (16.11%) and *Klebsiella aerogenes* 14 (7.78%). Gram positive bacteria accounted for 40 (22.22%) of the isolates. They include *Staphylococcus aureus* 27 (15%); *Staphylococcus saprophyticus* 13 (7.22%). It was also found that the rate of isolates of *E. coli* and *P. aeruginosa* were higher in isolates exclusively from females (Table 4).

The *in-vitro* antibiotic sensitivity pattern of the isolates to common anti-microbial agents is shown in Table 5.

Results indicated that quinolones were the most potent of all the antibiotics. Nitrofurantoin, Ampicillin and Cotrimoxazole were poorly effective.

DISCUSSION

The prevalence of UTI in the population was 60%. This

Table 2. Relationship between significant bacteriuria and pyuria in urine samples of patients.

Pyuria Result	No	Percentage (%)
Significant Pyuria	130	43.33
Insignificant Pyuria	170	56.67
Significant Pyuria with growth	125*	96.15
Significant Pyuria without growth	2*	1.54
Significant Pyuria with insignificant growth	3*	2.31

*n = 130

Table 3. Prevalence of urinary tract infection in relation to age and sex of patients.

Age group (years)	Males examined	Males positive (%)	Females examined	Females positive (%)	Total No. positive (%)
15-20	40	12 (30%)	30	5(16.67%)	17(24.29%)
21-25	60	23(38.3%)	40	37(92.5%)	60(60%)
26-30	50	25(50%)	80	78(97.5%)	103(79.23%)
Total	150	60 (40 %)	150	120 (80 %)	180 (60%)

Table 4. Frequency of isolation of organism in relation to sex of patients.

Organism	Isolates from Males	Isolates from Females	Total (%)
Escherichia coli	20	35	55 (30.56%)
Pseudomonas aeruginosa	15	27	42 (23.33%)
Proteus mirabilis	11	18	29 (16.11%)
Klebsiella aerogenes	4	10	14 (7.78%)
Staphylococcus aureus	10	17	27 (15%)
Staphylococcus saprophyticus	0	13	13 (7.22%)
Total	60	120	180 (100 %)

figure is higher than prevalence rate of 25.6% significant bacteriuria recorded by Nedolisa (1998) at the Jos University Teaching Hospital (JUTH), Nigeria and 22% by Ekweozor and Onyemenen (1996) in Ibadan. It is also higher than the 38.6% rate recorded by Akinyemi et al. (1997) in Lagos, Nigeria, and 35.5% rate recorded by Ebie et al. (2001) in Rukuba Military Cantoment, Jos, Plateau State, but agrees with Mbata (2007) who recorded 77.9% among Prison inmates in Nigeria. The proximity of the target location to FCT, Abuja could be adduced for the high prevalence since many people who work in Abuja live in the neighbouring Nassarawa State due to high standard of living and high beehive of activities in FCT. The high prevalence may be due to genuine population susceptibility because factors like sexual intercourse, peer group influence, pregnancy, low socio-economic status, are common among Nigerian men and female (Andriole, 1985; Akinyemi et al., 1997).

The most common organism isolated in these patients was *E. coli* (30.56%), *P. aeruginosa* (22.33%), *P. mirabilis* (16.11%), *and S. aureus* (15%). This finding is similar to other reports which indicate that a gram negative bacterium, particularly *E. coli,* is the commonest pathogen isolated in patients with UTI (Burbige et al., 1984; Akinyemi et al., 1997; Okonafua et al., 1989; Ebie et al., 2001; Njoku et al., 2001; Mbata, 2007). As expected, females recorded 7.22% prevalence of *S. saprophyticus* since it is believed to cause cystitis mainly in sexually active females (Murry et al., 1998) and none was recorded in males.

In this study, the prevalence of UTI in females is more than in males. Of the 180 isolates obtained, 120 were from female patients while 60 were from males. This is in agreement with other reports which stress that UTI is more frequent in females than in males, during youth and adulthood (Burbige et al., 1984; Akinyemi et al., 1997, Cheesbrough, 2000; Ibeawuchi and Mbata, 2002; Asinobi et al., 2003; Mbata, 2007).

The most useful antibiotics in this study were quinolones (ofloxacin, ciprofloxacin, and pefloxacin), erythromycin, and lincomycin (in gram positives) because they inhibit most commonly isolated UTI pathogens. These drugs are relatively expensive when compared to most antibiotics frequently used. This probably had

Table 5. Antimicrobial susceptibility pattern of isolated organism.

Organism	No Tested	Cot	Cpx	Gen	Pfx	Ofx	Ery	Tet	Nit	Aug	Amx	Lin (%)
E. coli	55	1.8	96.4	5.5	96.4	94.6	81.8	18.2	9.1	R	-	-
P. aeruginosa	42	R	95.2	R	100	95.2	71.4	11.9	R	R	-	-
P. mirabilis	29	R	100	10.4	89.7	96.6	69	41.4	6.9	R	-	35.7
K. aerogenes	14	85.7	14.3	92.9	92.9	71.4	50	14.3	50	-	-	-
S. aureus	27	37	96.3	22.2	92.6	85.2	100	48.2	7.4	3.7	7.4	100
S. saprophyticus	13	61.5	100	23.1	100	92.3	100	46.2	7.7	15.4	15.4	100

COT, Co-Trimoxazole; OFX, Ofloxacin; CEF, Ceftriazone; CPX, Ciprofloxacin; ERY, Erythromycin; AUG,Augmentin; GEN, Gentamycin; TETRA, Tetramycin; AMX, Amoxycillin; PFX, Pefloxacin; NIT, Nitrofurantoin; LIN, Lincomycin.

restricted their procurement and indiscriminate use, therefore making the organisms susceptible to it. This is similar to other reports where quinolones are the most effective (susceptible) (Krumpermann, 1983; Burbige et al*.,* 1984; Ebie et al*.,* 2001; Ehinmidu, 2003; Mbata, 2007). Nitrofurantoin, ampicillin and Co-trimoxazole (septrin) which are commonly used antibiotics were poorly effective against majority of the organisms isolated in this study. This differ from the studies and findings in Caucasian women where ampicillin and septrin remain the most useful antimicrobial agents (Ronald, 1987) and the findings by Ebie et al. (2001) among patients in Military Hospital, Jos, Nigeria where the isolates were highly susceptible to nitrofurantoin and that of Olaitan (2006) which has septrin (co-trimoxazole) as very effect-tive. The difference may be due to the practices of self medication and indiscriminate use of these antibiotics in this part of Nigeria and the acquiring of plasmid-encoded resistance gene (Akinyemi et al., 1997).

The results of this study and those of others may not be representative of the general population; urinary tract infections are often treated empirically and susceptibility tests are often carried out only when the patient has failed one or more courses of antibiotics. Even though the susceptibility pattern shown by this study buttressed the need for *in-vitro* sensitivity reports before antibiotics therapy initiation, however, it should be borne in mind that *in-vitro* antimicrobial sensitivity is only a guide and that conditions *in-vivo* may be quite different (Winstanley et al., 1997).

The findings have no doubt highlighted the need for constant monitoring of susceptibility of specific pathogens in different populations to commonly used anti-microbial agents. These data may be used to determine trends in antimicrobial susceptibilities, to formulate local antibiotic policies, to compare local with national data and overall to assist clinicians in the rational choice of antibiotic therapy to prevent misuse, or overuse, of antibiotics. Also, the results from this study revealed that the impor-tant infecting organisms were found to be the commen-sals of perianal and vaginal regions. This calls for inc-rease in personal hygiene.

Finally, since the hospital environment is a sort of collection agency for many pathogenic microorganisms by virtue of the many seriously ill patients who passes through it, therefore, it is extremely important for the hospital managements to do everything possible to mini-mize the spread of these organisms to other patients.

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