ETIOLOGY AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF COMMUNITY-ACQUIRED URINARY TRACT INFECTION IN JOS METROPOLIS.

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ABSTRACT

Community-acquired urinary tract infections occur in individuals not admitted in hospital prior to development of the symptoms of the infection. It occurs mostly in women and caused by *Escherichia coli.* The aim of this study was to determine the prevalence of urinary tract infection among individuals residing within Jos metropolis. A single voided aseptically collected mid-stream urine (MSU) was obtained from 276 patients at the outpatient unit of Jos University Teaching Hospital (JUTH). These samples were processed immediately using standard wire loop method in medical microbiology laboratory in JUTH. Demographic data were collected by administering a structured questionnaire to the study participants. Data collected were analyzed by EPI info statistical package version 3.5.1. Out of the 276 individuals who participated in the study 52 (18.8%) were positive for urinary tract infection. The study revealed that female participants had the highest occurrence 40 (21.3%) of infection, while male participants had 12 (13.6%). *Escherichia coli* was the most frequently isolated uropathogen with a prevalence of 20 (38.5%). Married individuals 35 (27.3%) had a higher occurrence of infection compared to singles 17 (11.5%), there was no significant difference in occurrence of infection between married and singles p=0.101 (P>0.05) in the study. The present study revealed a prevalence of 18.8%, with female participants having the highest occurrence of infection. Streptomycin showed the highest susceptibility to bacteria isolates while the least susceptibility was observed with augmentin. Rational use of antibiotics with regular antibiotics susceptibility surveillance studies is recommended to maintain high antibiotic therapeutic profile.

Keywords: Community-acquired urinary tract infections, *Escherichia coli,* Significant isolates

INTRODUCTION

Urinary tract infection (UTI) refers to both microbial colonization of the urine and tissue invasion of any structure of the urinary tract (Fowlers, 1986). Urinary tract infections encompass a spectrum of clinical entities ranging in severity from asymptomatic infection to acute cystitis, pyelonephritis and urethritis (Fowlers, 1986). Uncomplicated UTI occurs in a normal urinary tract with no structural, functional or any underlying host illness to account for the infection, while in the complicated UTI underlying abnormality is thought to have enabled the infection to occur (Nicolle, 2005).

The spectrum of bacteria causing complicated urinary tract infection is much broader than those causing uncomplicated UTI (Prakash and Saxena, 2013). Bacteria are the most common agents for UTIs although yeast and viruses may also be involved (Turpin *et al.*, 2007). However, the most commonly isolated microorganism in bacterial UTI are the gram negative bacilli including *E. coli, Citrobacter spp., Enterobacter aerogenes, Pseudomonas aeruginosa, Proteus spp., Klebsiella spp.* and *Staphylococcus spp.* (Prakash and Saxena, 2013).

Community- acquired UTIs occur mostly in women and are mostly caused by *Escherichia coli* (Finkelstein *et al.,* 1998). For the past two decades, trimethoprim – sulphamethoxazole (septrin) have been used widely as empirical therapy for *E. coli* UTI. However, resistance of *E coli* to septrin in persons with community – acquired UTIs has increased substantially over the past decade (Finkelstein *et al.*, 1998) .

The present study had established the prevalence of community-acquired urinary tract infections in Jos metropolis. The antibiotic sensitivity profile of the isolates had also been determined. This knowledge will guide clinicians on prescription and ultimately reduce cost of health care.

MATERIALS AND METHODS

Study Area
This study was a prospective cross sectional study carried out between January to May of 2015 in Jos, North central Nigeria.

Study population
The study was carried out on 276 on apparently healthy individuals residing in Jos, North central Nigeria.

Ethical Considerations
Ethical clearance was obtained from the research and ethics review board of the Jos University Teaching Hospital (JUTH). A written consent was obtained from the participants before the commencement of sample collection.

Data collection
A structured questionnaires were used as a source of data collection and were administered to study participants prior to sample collection. Information on the age, sex and marital status were captured.

Sample Collection

A single voided aseptically collected mid-stream urine (MSU) were obtained from patients at the general outpatient unit of the Jos University Teaching Hospital (JUTH). All samples were

Sample processing

Urine culture was performed using standard wire loop method. A loop-full (0.001 ml) of mid stream urine was steak-inoculated on 5% chocolate agar and cysteine lactose electrolyte deficient (CLED) agar plates. These agar plates were incubated at 35°C for 24 hours under aerobic conditions. Isolates were considered significant if there were ≥10^5 colony forming unit/ml (CFU/ml) with 2 or less isolates (Washington, 2006). Mixed growth of more than two organisms were considered to be contaminated. Significant isolates were identified by colonial appearance, microscopy, culture and biochemical techniques (Washington, 2006).

Antibiotic susceptibility was carried out by the modified Kirby-Bauer disc diffusion method (CLSI, 2011). The following antibiotic discs (Oxoid, Basingstoke, UK) were tested on the isolates: gentamcin (10 μg), ciprofloxacin (10 μg)), augmentin (30 μg), co-trimoxazole (25 μg) nalidixic acid(30 μg) tetracycline(30 μg), streptomycin (30 μg), Ofloxacin (10 μg), amoxicillin (25 μg), levofloxacin (5 μg) and Norfloxacin (10 μg). Antibiotic selections for testing and results determination were based on the Clinical Laboratory Standards Institute (CLSI) protocols (CLSI, 2011).

Data analysis

Data obtained were analyzed by EPI info statistical package version 3.5.1. Chi-square (X^2) was used to compare association between variables and $p < 0.05$ was considered significant at 95.0% confidence level.

RESULTS

A total of 276 samples were collected and analyzed for urinary tract infection. 52 out of 276 samples were positive for UTI giving a prevalence of 18.8%. Female subjects recorded a higher prevalence compared to their male counterparts 40 (21.3%) and 12 (13.6%) respectively. There was statistical significant difference in the occurrence of infection among gender of the subjects examined (p=0.001). The highest occurrence of infection was observed within the age group interval of 21-30 18 (20.0%). Married individuals recorded a higher prevalence compared to singles, 35 (27.3%) and 17 (11.5%) respectively. There was no statistical significant difference in occurrence of infection in relation to marital status - p=0.101 (Table 1).

Table 2 showed the percentage distribution of uropathogen bacteria in relation to gender of the study participants. Female study participants had the highest occurrence of *E. coli and S. aureus* compared to their male counterparts 17 (32.7%) and 8 (15.4%) respectively. The most predominant isolate in the study was *E. coli* followed by *S. aureus* with 20 (38.5%) and 15 (28.9%) respectively. The least isolated bacteria were *Pseudomonas aeruginosa* and coagulase negative staphylococcus.

Table 3 revealed that bacterial isolates showed the highest sensitivity to Streptomycin 38 (73.1%) followed by Ofloxacin 37 (71.2%), while Augmentin had the highest resistant by bacterial isolates 3 (5.8%). *Escherichia coli* showed relative sensitivity to all antibiotic used, while coagulase negative staphylococcus was resistant to most of the antibiotics.

labelled and sent to Medical Microbiology laboratory of JUTH for culture.

Table1: Demographic characteristics of patients

Demographic characteristics	No. of sample tested	No. of Positive sample (%)	p-value
Age groups			
<10	18	3 (16.7)	0.1696
11-20	35	4 (11.3)	
21-30	90	18 (20.0)	
31-40	60	16 (26.7)	
41-50	36	5 (13.9)	
51-60	28	5 (17.9)	
>60	9	1 (11.1)	
Gender			
Female	188	40 (21.3)	0.0014
Male	88	12 (13.6)	
Marital status			
Married	128	35 (27.3)	0.1015
Single	148	17 (11.5)	

Table 2: Percentage Distribution of Uropathogens in relation to sex

Bacteria isolates	Percentage occurrence	Male	Female
Escherichia coli	20 (38.5)	3 (5.8)	17 (32.7)
Staphylococcus aureus	15 (28.9)	7(13.5)	8 (15.4)
Klebsiella pneumoniae	9 (17.3)	0 (0.0)	9 (17.3)
Proteus mirabilis	4 (7.7)	0 (0.0)	4 (7.7)
Pseudomonas aeruginosa	2 (3.9)	1 (1.9)	1 (1.9)
Coagulase negative staphylococcus	2 (3.9)	1 (1.9)	1 (1.9)
Total	52 (100.0)	12 (23.1)	40 (76.9)

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Table 3: Antibiotic sensitivity pattern of Bacterial isolates

Bacterial isolates		CPX	NB	CN	COT	S	OFX	AMX	NA	LEV	AUG	TE
E. coli	20	9(45.0)	16(80.0)	8(40.0)	2(10.0)	11(55.0)	15(75.0)	4(20.0)	10(50.0)	16(80.0)	2(10.0)	4(20.0)
K. pneumoniae	9	3(33.3)	4(44.4)	2(22.2)	0(0.0)	7(77.7)	5(55.5)	0(0.0)	5(55.5)	8(88.8)	1(11.1)	2(22.2)
P. mirabilis	4	1(25.0)	2(50.0)	1(25.0)	0(0.0)	2(50.0)	1(25.0)	0(0.0)	1(25.0)	4(100.0)	0(0.0)	0(0.0)
P. aeruginosa	2	1(50.0)	2(100.0)	0(0.0)	0(0.0)	2(100.0)	2(100.0)	0(0.0)	0(0.0)	2(100.0)	0(0.0)	0(0.0)
S. aureus	15	7(46.7)	11(73.3)	3(20.0)	2(13.3)	15(100.0)	13(86.7)	0(0.0)	5(33.3)	1(6.7)	0(0.0)	0(0.0)
CONS	2	0(0.0)	1(50.0)	0(0.0)	0(0.0)	1(50.0)	1(50.0)	0(0.0)	1(50.0)	0(0.0)	0(0.0)	0(0.0)
Total	52	21(40.4)	36(69.2)	14(26.9)	4(7.7)	38(73.1)	37(71.2)	4(7.7)	22(42.3)	31(59.6)	3(5.8)	6(11.5)

Key:
CONS - coagulase negative staphylococcus
CPX - Ciprofloxacin   AUG - Augmentin
COT - Cotrimoxazole   CN -   Gentamicin
OFX - Ofloxacin   NA -   Nalidixic acid
LEV- Levofloxacin
NB - Norfloxacin
S - Streptomycin
AMX - Amoxycilin

Conclusion

The present study had established the prevalence of 18.8% in community-acquired UTI in Jos. *Escherichia coli* was the most frequently isolated bacteria and the drug of choice for UTI Streptomycin, Ofloxacin, Norfloxacin and Levofloxacin was also determined.

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