



Full Length Research Paper

**PREVALENCE AND ANTIBIOTIC SUSCEPTIBILITY PATTERNS OF URINARY TRACT
INFECTION ETIOLOGIC AGENTS AMONG PATIENTS ATTENDING GENERAL
HOSPITAL, OFFA, NIGERIA**

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ABSTRACT

Urinary tract infections (UTIs) are regarded as one of the most common infections experienced by humans affecting over 150 million people annually worldwide. This study was aimed at determining the prevalence, risk factors and the susceptibility patterns of urinary tract infection etiologic agents among patients in a public hospital for a 10 months period. Five hundred patients attending Offa General Hospital were drafted for this study. Organisms were identified by comparing their characteristics to that of known taxa while antibiotic susceptibility test was carried out using disk diffusion methods as described by the National Committee for Clinical Laboratory Standards. Interviewer- administered questionnaire and clinical report form were also used to collect data, and data was analyzed using SPSS version 17. Results revealed that 230 (46%) of the subjects were positive for UTI which was found to be more prevalent in female subjects than male ones. Other factors which contributed to the prevalence of UTI included; age, marital status and residential location with p values of 0.002, 0.018, 0.000 respectively. Results further revealed that etiologic agents isolated included *E. coli*, *Pseudomonas aeruginosa*, *Proteus mirabilis* and *Klebsiella aerogenes* with 98 (42.61%), 55 (23.91%), 40(17.39%), 11(4.78%) isolates respectively. The antimicrobial activities of selected antibiotics on UTI isolates indicated that the highest sensitivity and resistance was recorded for ofloxacin and amoxillin respectively. A need exist for sensitization of the Nigerian public on the proper usage of antibiotics, as the incidence of UTI and antibiotic resistance ability of its etiologic agent is on the increase.

Keywords: Urinary Tract Infection, Antibiotic, Susceptibility Pattern, Prevalence, Resistance

INTRODUCTION

Urinary tract infections (UTIs) are regarded as one of the most common infections experienced by humans (Otajevwo and Amedu, 2015). They are infections caused by the incidence and growth of microorganisms in the urinary tract (Akobi *et al.*, 2014). UTIs can be asymptomatic or symptomatic described by an extensive range of symptoms from mild voiding irritation to bacteremia (Otajevwo and Amedu, 2015). The infections generally are named after the part of the tract they affect. Bladder infections are regarded as cystitis while kidney infections are referred to as pyelonephritis (Vasudevan, 2014).

UTIs are known to be widespread. They affect about 150 million people worldwide annually (Stamm, 1999). Various prevalence rates have been recorded in different parts of Nigeria. A prevalence rate of 57.5% was recorded by Adeyeba and Ojeaga (2002) in Ibadan, 48% in Rivers state by Agbagwa and Ifeanacho (2015), 46.1% in Niger state by Akobi *et al.* (2014) and 59.2% in Edo state by Otajevwo and Amedu (2015). Other prevalence rate recorded in different countries include 8.9% in Iran, 10.4 % in Ethiopia, 29.8% in Panama by Enayat *et al.* (2008), Alemu *et al.* (2012) and August and DeRosa, (2012) respectively.

UTIs are mostly caused by rearward ascension of bacteria from the urethra to the bladder and kidney particularly in the females due to the shortness and width of the urethra to the vagina thus transfer of organisms to the target sites is more permissible (Jones *et al.*, 2006; Ebie *et al.*, 2001). The structure of the females urethra and vagina make it susceptible to trauma during sexual intercourse as well as bacteria been massaged up the urethra and into the bladder during pregnancy and or child birth (Ei-Sweih *et al.*, 2008; Kolawole *et al.*, 2009). *Escherichia coli* and *Klebsiella* spp are most associated with UTIs, though other bacteria such as *S. aureus*, *S. epidermidis* and *Enterococcus* spp formerly called *Streptococcus faecalis* have been frequently isolated from patients presenting with UTIs (Omonigho *et al.*, 2001; Akobi *et al.*, 2014). Other organisms implicated in UTIs include; *Pseudomonas aeruginosa*, *Proteus* species, and *Enterobacter* species (Akobi *et al.*, 2014)

The first choice agents for treating enteroaggregative *E. coli* (EAEC) infections are quinolones, rifaximin, azithromycin, and cephalosporin. However, the number of pathogenic *E. coli* has increased and resistance to third-generation cephalosporin (e.g. ceftazidime, ceftriaxone, or cefotaxime) associated with production of extended spectrum β -lactamases (ESBLs) limits therapeutic options (Zahar *et al.*, 2009).

MATERIALS AND METHOD

Study site

This study was conducted at Offa General Hospital, located in Offa local Government area in Kwara State, Nigeria. Offa is one of the major cities of Kwara State situated in the North Central geographical zone of Nigeria and it is situated between latitude 8° 10' 33" N, 238 Km North of Lagos at longitude 4° 43' 02" E and 530 Km southwest of Abuja, The Federal Capital of Nigeria.

Population of the study

Five hundred (500) patients (both inpatients and out patients) attending Offa Specialist Hospital's Medical Laboratory for urinalysis (not clinically diagnosed as having UTI) for a 10 month period formed the population of this study.

Ethical Approval

Ethical clearance for this study was obtained from the Ethical Review Committee (ERC) of Offa General Hospital, Offa, Kwara State, after it had met all the necessary requirements of the committee. In addition, informed consent was obtained from individual patient/parent/guardian after a clear explanation of the objectives and logistics of the study had been given.

Sampling technique

Questionnaire based technique was used on the five hundred (500) patients attending Offa Specialist Hospital for urinalysis to evaluate the Prevalence and risk factors of Urinary Tract Infections (UTIs) in Offa metropolis and patients who did not give consent were excluded.

Data analysis

Descriptive statistics such as mean, frequency, standard deviation, percentage and graphs were used in the discussion of the results, in order to give a lucid representation of the data analyzed, statistical package for social science version 17.0 for windows (SPSS), was used to test for the level of significance of the result obtained. Both continuous and discrete variables were generated. The relationship between discrete variable and outcome of interest was tested using Chi-squared test at 5% ($p < 0.05$) confidence interval.

SAMPLES PROCESSING

Collection of sample

Wide mounted plastic containers with screw cap tops (universal containers) were used to collect the mid-stream urine samples, containers were labeled with name, age, sex and time of collection. The samples were analyzed and identified by conventional bacteriological tests (Podschn and Ullmann, 1998; Stamm *et al.*, 1982).

Confirmation and Identification of bacterial isolates

The bacterial isolates were cultured on nutrient agar and incubated at 37°C for 24 hours and subsequently characterized by examination of colonial morphology by sub-culturing on to differential selective media (Eosin Methylene blue agar). The colonies from various media were gram stained and further characterized by some biochemical tests which include catalase, coagulase, indole, oxidase and citrate utilizations tests. The organisms were finally identified by comparing their characteristics to that of known taxa using scheme of Cheesbrough (2004).

Antibiotic Susceptibility Testing

The antibiotic susceptibility of the bacterial species isolated was performed on Mueller-Hinton agar (MHA) (Merck) plates by disk diffusion method as described by the National Committee for Clinical Laboratory Standards (NCCLS, 1999). 0.1 ml of each bacterial isolate was seeded into each of the Petri dishes containing Mueller-Hinton agar and allowed to stand for 30 minutes to enable the inoculated organisms to pre-diffuse. The commercially available discs containing the following antibiotics: Augmentin (AUG, 30µg), Ofloxacin (OFL, 5µg), Gentamicin (GEN, 10µg), Nalidixic Acid (NAL, 30µg), Nitrofurantoin, (NIT, 200µg), Cotrimoxazole (COT, 25µg), Amoxyline, (AMX, 25µg), Tetracycline (TET, 25µg), (Liverpool L9 7AR, UK) were aseptically placed on the surfaces of the sensitivity agar plates with a sterile forceps and incubated at 37°C overnight. Zones of inhibition after incubation were observed and the diameters of inhibition zones were measured in millimeters. Zone of inhibition of ≥ 18 mm was considered sensitive, 13-17 mm intermediate and <13 mm resistant. The percentage resistance was calculated using the formula $PR = a/b \times 100$, where 'PR' is percentage resistance, 'a' is the number of resistant isolates and 'b' is the number of isolates tested with the antibiotic. The percentage sensitivity was calculated using the formula $PS = c/d \times 100$, where 'PS' is percentage sensitivity, 'c' is the number of sensitive isolates and 'd' is the number of isolates tested with the antibiotic.

RESULTS

Results revealed that out of the 500 samples examined, 230 (46%) showed significant bacteriuria while 270 (54%) no bacteriuria. The demographic characteristics of the subjects with respect to the prevalence of UTI are shown in Table 1. Female subjects had a higher prevalence rate compared to the male subjects with a significant association ($p=0.000$) existing between the sex of the subjects and prevalence of UTI. Results from Table 1 showed that other socio-demographic factors which constituted a statistical significance to the acquisition of UTI are age, marital status and residential location having p values of 0.002, 0.018, 0.000 respectively. Table 2 describes the sexual and health characters of the subjects with respect to UTI prevalence. Results here showed that the various sexual and health factors under consideration apart from subjects who had a history of catheter usage ($p=0.581$) constituted considerable risk factor in the prevalence of UTI. These factor included pregnancy, menopause, and anal intercourse amongst others.

Table 1: Demographic characteristics of subjects with respect to UTI prevalence

	<i>No. Positive (%)</i>	<i>No. Negative (%)</i>	<i>No. Tested(%)</i>	χ^2 (p value)
<i>Sex</i>				95.660 (0.000)
Female	170 (34)	80 (16)	250 (50)	
Male	60 (12)	190 (38)	250 (50)	
Total	230 (46)	270 (54)	500 (100)	
<i>Age</i>				12.777 (0.002)
20-40	151 (30.2)	210 (42)	361 (72.2)	
41-60	64 (12.8)	40 (8)	104 (20.8)	
61-80	15 (3)	20 (4)	35 (7)	
Total	230 (46)	270 (54)	500 (100)	
<i>Marital status</i>				5.640 (0.018)
Single	75 (15)	116 (23.2)	191 (38.2)	
Married	155 (31)	154 (30.8)	309 (61.8)	
Total	230 (46)	270 (54)	500 (100)	
<i>Educational level</i>				0.051 (0.975)
Primary level	18 (3.6)	22 (4.4)	40 (8)	
Secondary level	130 (26)	150 (30)	280 (56)	
Tertiary level	82 (16.4)	98 (19.6)	180 (36)	
Total	230 (46)	270 (54)	500 (100)	
<i>Residential location</i>				22.142 (0.000)
Urban	208 (41.6)	200 (40)	408 (81.6)	
Rural	22 (4.4)	70 (14)	92 (18.4)	
Total	230 (46)	270 (54)	500 (100)	

P< 0.05 is statistically significant

Table 2: Sexual and health characteristics of subjects with respect to UTI prevalence

	No. Positive (%)	No. Negative (%)	No. Tested (%)	χ^2 (p value)
<i>Menopause</i>				9.160 (0.002)
Yes	12 (4.8)	16 (6.4)	28 (11.2)	
No	158 (63.2)	64 (25.6)	222 (88.8)	
Total	170 (68)	80 (32)	250 (100)	
<i>Pregnancy</i>				9.953 (0.002)
Yes	78 (31.2)	20 (8)	98 (39.2)	
No	92 (36.8)	60 (24)	152 (60.8)	
Total	170 (68)	80 (32)	250 (100)	
<i>Catheter</i>				0.305 (0.581)
Yes	40 (8)	42 (8.4)	82 (16.4)	
No	190 (38)	228 (45.6)	418 (83.6)	
Total	230 (46)	270 (54)	500 (100)	
<i>Anal intercourse</i>				6.384 (0.012)
Yes	2 (0.8)	0 (0)	2 (0.8)	
No	58 (23.2)	190 (76)	248 (99.2)	
Total	60 (24)	190 (76)	250 (100)	
<i>Antibiotic usage</i>				22.029 (0.000)
Yes	98 (19.6)	62 (12.4)	160 (32)	
No	132 (26.4)	208 (41.6)	340 (68)	
Total	230 (46)	270 (54)	500(100)	
<i>STD Family</i>				199.578 (0.000)
Yes	190 (37.8)	52 (10.4)	242 (48.2)	
No	40 (8.2)	218 (43.6)	258 (51.6)	
Total	230 (46)	270 (54)	500(100)	
<i>Circumcised</i>				6.384 (0.012)
Yes	58 (23.2)	190 (76)	248 (99.2)	
No	2 (0.8)	0 (0)	2 (0.8)	
Total	60 (24)	190 (76)	250 (100)	
<i>Self-medication</i>				3.543 (0.060)
Yes	3 (0.6)	0 (0)	3 (0.6)	
No	227 45.4)	270 (54)	497 (99.4)	
Total	230 (46)	270 (54)	500 (100)	

P< 0.05 is statistically significant

Results revealed that of the 230 isolates obtained, gram negative bacteria had a higher frequency of occurrence than gram positive constituting 204 (88.7%) of the total isolates. These included: *E. coli* 98 (42.61%), *Pseudomonas aeruginosa* 55 (23.91%) *Proteus mirabilis* 40(17.39%) and *Klebsiella aerogenes* 11(4.78%). Gram positive bacteria accounted for 26(11.3%) of the isolates, which was *Staphylococcus aureus* 26 (11.3%). It was also found that the rate of isolates of *E. coli* and *P. aeruginosa* were higher (Table 3).

The in-vitro antibiotic susceptibility pattern on the isolates to common anti- microbial agents is shown in Table 4. Result indicated that ofloxacin had the highest potency while amoxicillin had the least potency among the selected antibiotics. The results revealed that OFL (ofloxacin) demonstrated highest antimicrobial activities against the test isolates, followed by GEN (gentamicin), TET (tetracycline), NIT (nitrofurantoin), COT (cotrimoxazole), NAL (nalidixic acid), AUG (augmentin), and AMX (amoxycillin) with percentage sensitivities raging between 100 - 9.1% and percentage resistance of 0- 90.9%. Tables 4 and 5 showed the antimicrobial susceptibility of *E. coli*, *P. aeruginosa*, *P. mirabilis*, *K. aerogenes*, *S. aureus*, susceptibility patterns of the isolates from the subjects and percentage susceptibility pattern of isolates to antibiotics. The antimicrobial activities of selected antibiotics on UTI isolates indicated that the highest sensitivity was recorded for OFL (ofloxacin) and highest resistance was recorded for AMX (amoxillin).

Table 3: Percentage of Urinary Tract Infection's Isolates

<i>Isolates</i>	<i>No of isolates</i>	<i>Percentage (%)</i>
<i>Escherichia coli</i>	98	42.61
<i>Pseudomonas aeruginosa</i>	55	23.91
<i>Proteus mirabilis</i>	40	17.39
<i>Staphylococcus aureus</i>	26	11.3
<i>Klebsiella aerogenes</i>	11	4.78
Total	230	100

Table 4: Percentage Susceptibility pattern of Antibiotics on UTI isolates from patients

<i>S/N</i>	<i>Antibiotics</i>	<i>No of tested isolates</i>	<i>No of sensitive isolates</i>	<i>No of resistant isolates</i>	<i>% Sensitivity</i>	<i>% Resistance</i>
1	Amoxycillin	230	23	207	10	90.
2	Augmentin	230	39	191	17	83.
3	Cotrimoxazole	230	126	104	54.8	45.2
4	Gentamicin	230	199	31	86.5	13.5
5	Nalidixic acid	230	104	126	45.2	54.8
6	Nitrofurantoin	230	128	102	55.7	44.3
7	Ofloxacin	230	230	0	100	0.0
8	Tetracycline	230	115	115	50.0	50.0

Table 6: Antimicrobial Susceptibility patterns of the UTI isolates from patients

Isolates	Antimicrobial agents							
	AMX	AUG	COT	GEN	NAL	NIT	OFL	TET
Ec ₍₉₈₎	R ₍₈₈₎	R ₍₈₃₎	R ₍₅₀₎	R ₍₁₀₎	R ₍₆₂₎	R ₍₅₀₎	R ₍₀₎	R ₍₅₉₎
	S ₍₁₀₎	S ₍₁₅₎	S ₍₄₈₎	S ₍₈₈₎	S ₍₃₆₎	S ₍₄₈₎	S ₍₉₈₎	S ₍₃₉₎
Ps ₍₅₅₎	R ₍₅₂₎	R ₍₄₆₎	R ₍₂₂₎	R ₍₈₎	R ₍₃₂₎	R ₍₂₀₎	R ₍₀₎	R ₍₂₁₎
	S ₍₃₎	S ₍₉₎	S ₍₃₃₎	S ₍₄₇₎	S ₍₂₃₎	S ₍₃₅₎	S ₍₅₅₎	S ₍₃₄₎
Pr ₍₄₀₎	R ₍₃₅₎	R ₍₃₂₎	R ₍₁₈₎	R ₍₂₎	R ₍₁₈₎	R ₍₁₈₎	R ₍₀₎	R ₍₁₉₎
	S ₍₅₎	S ₍₈₎	S ₍₂₂₎	S ₍₃₈₎	S ₍₂₂₎	S ₍₂₂₎	S ₍₄₀₎	S ₍₂₁₎
Kl ₍₁₁₎	R ₍₁₀₎	R ₍₈₎	R ₍₆₎	R ₍₆₎	R ₍₆₎	R ₍₆₎	R ₍₀₎	R ₍₆₎
	S ₍₁₎	S ₍₃₎	S ₍₅₎	S ₍₅₎	S ₍₅₎	S ₍₅₎	S ₍₁₁₎	S ₍₅₎
Sa ₍₂₆₎	R ₍₂₂₎	R ₍₂₂₎	R ₍₈₎	R ₍₅₎	R ₍₈₎	R ₍₈₎	R ₍₀₎	R ₍₁₀₎
	S ₍₄₎	S ₍₄₎	S ₍₁₈₎	S ₍₂₁₎	S ₍₁₈₎	S ₍₁₈₎	S ₍₂₆₎	S ₍₁₆₎

Key: AMX= Amoxicillin, AUG=Augmentin, COT= Cotrimoxazole, GEN=Gentamicin, NAL= Nalidixic acid, NIT= Nitrofurantoin, OFL= Ofloxacin TET= Tetracycline R = Resistance S= Sensitive Ec= *Escherichia coli* Ps= *Pseudomonas aeruginosa* Pr = *Proteus mirabilis* Kl= *Klebsiella aerogenes*

Table 7: Percentage (%) Resistance and Susceptibility pattern of UTI Isolates to Antibiotics

Isolates	Antibiotics							
	AMX	AUG	COT	GEN	NAL	NIT	OFL	TET
Ec ₍₉₈₎	R _(89.8)	R _(84.7)	R ₍₅₁₎	R _(10.2)	R _(63.3)	R ₍₅₁₎	R ₍₀₎	R _(60.2)
	S _(10.2)	S _(15.3)	S ₍₄₉₎	S _(89.8)	S _(36.7)	S ₍₄₉₎	S ₍₁₀₀₎	S _(39.8)
Ps ₍₅₅₎	R _(94.6)	R _(83.6)	R ₍₄₀₎	R _(14.6)	R _(58.2)	R _(36.4)	R ₍₀₎	R _(38.2)
	S _(5.4)	S _(16.4)	S ₍₆₀₎	S _(85.4)	S _(41.8)	S _(63.6)	S ₍₁₀₀₎	S _(61.8)
Pr ₍₄₀₎	R _(87.5)	R ₍₈₀₎	R ₍₄₅₎	R ₍₅₎	R ₍₄₅₎	R ₍₄₅₎	R ₍₀₎	R _(47.5)
	S _(12.5)	S ₍₂₀₎	S ₍₅₅₎	S ₍₉₅₎	S ₍₅₅₎	S ₍₅₅₎	S ₍₁₀₀₎	S _(52.5)
Kl ₍₁₁₎	R _(90.9)	R _(72.7)	R _(54.5)	R _(54.5)	R _(54.5)	R _(54.5)	R ₍₀₎	R _(54.5)
	S _(9.1)	S _(27.3)	S _(45.5)	S _(45.5)	S _(45.5)	S _(45.5)	S ₍₁₀₀₎	S _(45.5)
Sa ₍₂₆₎	R _(84.6)	R _(84.6)	R _(30.8)	R _(19.2)	R _(30.8)	R _(30.8)	R ₍₀₎	R _(38.5)
	S _(15.4)	S _(15.4)	S _(69.2)	S _(80.8)	S _(69.2)	S _(69.2)	S ₍₁₀₀₎	S _(61.5)

Key: AMX= Amoxicillin, AUG=Augmentin, COT = Cotrimoxazole, GEN=Gentamicin, NAL= Nalidixic acid, NIT= Nitrofurantoin, OFL= Ofloxacin and TET= Tetracycline R= resistant strains S= sensitive strains Ec= *Escherichia coli* Ps= *Pseudomonas aeruginosa* Pr = *Proteus mirabilis* Kl= *Klebsiella aerogenes* Sa = *Staphylococcus aureus*

DISCUSSION

A prevalence rate of 46% for UTI was found among the study population. The value is higher than 13.2% significant recorded by Farajnia *et al.* (2009) at Northwest of Iran and 22% reported by Ekweozor and Onyemenen (1996) in Ibadan, Nigeria. However, it compares favourably with 35.5% rate recorded by Ebie *et al.* (2001) in Rukuba Military Cantonment, Jos Plateau State and 38.6% rate recorded by Akinyemi *et al.* (1997) in Lagos, Nigeria. Result also showed that it was considerably lower than 60% recorded by Kolawole *et al.* (2009) at Dalhatu Araf Specialist Hospital Lafia, Nasarawa State, Nigeria and 77.9% recorded by Mbata (2007) among prisons' inmates in Nigeria. The higher recorded in this study could be due to average standard of living and exposure of people living in Offa metropolis. Since low socio economic status, peer group influence, sexual intercourse and pregnancy are among other factors than increase the susceptibility of individuals to urinary tract infections (Andriole, 1985; Akinyemi *et al.*, 1997).

Age of the subjects was a factor influencing the prevalence of UTI ($p=0.002$). This may be due to the fact that individuals within this age bracket are sexually active and may be fond of habit of not using protective contraceptives which may increase the risk of UTIs (Nicolle, 2008). UTI was also found to be more common among the married individuals which was statistically significant ($p=0.018$), this may also be attributed to sexual frequency among married individuals as supported by Nicolle (2008). Although education did not play a significant role ($p=0.975$) in the acquisition of UTI among the subjects, the location of the subject's residence was a contributing factor to their exposure to UTI.

Sex of the subjects was a contributing factor to the prevalence of UTI ($p=0.000$). 73.91% of the subjects with UTI were females. This is in agreement with other reports that confirm the frequency of urinary tract infection in females than males during youth and adulthood, due to their anatomy, (Dielubanza and Schaeffer, 2011; Ibeawuchi and Mbata 2002; Mbata, 2007). Distribution of UTI among patients who had reached menopause and those that had not reached menopause was significant ($p=0.002$). Highest prevalence rate of 158(63.2%) was recorded for patients who have not reached menopause, while those that have reached menopause had lower prevalence rate of 12(4.8%). This finding was contrasted by the report of Dielubanza, and Schaeffer (2011) which revealed that a woman's estrogen levels decrease with menopause her risk of urinary tract infections increases due to the loss of protective vagina flora.

A high prevalence rate was also found among non-pregnant subjects (63.2%), those with a history drug (36.8%), subjects with STD diagnosed among family member (37.8%), with low prevalence rate of UTI found among subjects who use catheter (8%), subjects who engage in anal intercourse (0.8%), and uncircumcised subjects (0.8%). This may be traced to level of awareness of people in Offa metropolis and category of subjects involved in the study.

The microorganisms isolated in this study were *E. coli*, 98 (42.61%), *P. aeruginosa* 55(23.91%), *P. mirabilis* 40 (17.39%), *K. aerogenes* 11 (4.78%) and *S. aureus* 26 (11.3%). This etiological finding is in agreement with the reports of other researchers which indicated that a gram negative

bacterium, particularly *E. coli* is the commonest pathogen isolated in patients with UTI (Nicolle, 2008; Mbata, 2007). The percentage susceptibility of UTI isolates to commonly used antibiotics revealed ofloxacin (100%), gentamicin (86.4%), tetracycline (59.1%), nitrofurantoin (54.5%), cotrimoxazole (50%), nalidixic acid (45.4%), augmentin (18.2%) and amoxicillin (9.1%). The effectiveness of ofloxacin over other challenged antibiotics may be due relative scarcity and higher cost of the drug when compared to other antibiotics that are more readily available, affordable and frequently used. Consequently misuse and overuse of other antibiotics make the organisms develop resistance to them and susceptible to uncommon antibiotic (ofloxacin) (WHO, 2002; Manikandan *et al.*, 2011). The efficacy of gentamicin as second drug of choice next to ofloxacin is similar to the report of Manikandan *et al.* (2011) at Tamilnadu, India; the efficacy of gentamicin may be related to its multiple mechanisms of action. The findings of this study compared favourably to Shittu and Mandere (1999) who found that *S. aureus* strains were highly sensitive to gentamicin. Multi drug resistance profile of various isolates to the routinely used antibiotics was examined. Virtually all the tested UTI isolates have higher percentage susceptibility to ofloxacin and most strains were highly resistant to amoxicillin and augmentin.

Also the susceptibility patterns of this study have further stressed the need for constant monitoring of the susceptibility pattern of specific pathogens in different populations to commonly used antimicrobial agents. These data may be used to determine trends in antimicrobial susceptibilities to formulate local policies on antibiotics usage, to compare local with national data and overall to assist clinicians in the rational choice of antibiotics therapy in preventing misuse, or overuse of antibiotics

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