World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org

ISOLATION AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF BACTERIAL SPECIES ASSOCIATED WITH URINARY TRACT INFECTION IN ONDO STATE, NIGERIA

***Olajide Adedayo Ajayi and Felix Ijikuotu**

Env. Microbiology, Phytobacteriology and Biotechnology, Department of Microbiology, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria.

Article Received on 20/07/2015 **Article Revised on 12/08/2015** **Article Accepted on 05/09/2015**

***Correspondence for Author**
Dr. Olajide Adedayo Ajayi
Env. Microbiology, Phytobacteriology and Biotechnology, Department of Microbiology, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria.

ABSTRACT

Mid-stream urine samples were collected from adults and children of both sexes including pregnant women within Akoko Local Government area and Ondo town of Ondo State, Nigeria for microbiological analysis. 23(54.8)% of the isolates were identified as *Escherichia coli*, 10(23.8) % - *Klebsiella*, 4(9.5)% - *Staphylococcus aureus*, 3 (7.1)% - *Proteus* species and 2(4.8)% - *Pseudomonas* species in selected Akoko communities, Nigeria. With specificity to pregnant women in Ondo community, Nigeria, forty (40) bacterial species isolated and diagnosed include, *Escherichia coli*, 11 (26.49 %) *Pseudomonas aeruginosa* 10 (24.50 %), *Staphylococcus aureus*, 6 (15.00%), *Proteus vulgaris*, 2 (5.00%), *Proteus mirabilis*, 5 (12.50%), *Klebsiella pneumonia*, 2 (5.00%), Coagulase negative *Staphylococci*, 2 (5.00%), *Klebsiella oxytoca*, 1 (2.50%), *Enterococcus cloacae*, 1 (2.50 %). While twenty (20) isolates, *Escherichia coli*, 8 (37.5 %), *Pseudomonas aeruginosia*, 5 (25%), *Staphylococcus aureus*, 4 (18.75 %), *Proteus vulgaris*, 2(12.5 %), Coagulase negative *Staphylococci*, 1 (6.25%) respectively were isolated from non pregnant women. Urinary Tract Infection occur more in female than male, and it is also rampant in pregnant women. The antibiotic susceptibility pattern shows that Ofloxacin and Nitrofuratoin are the best antimicrobial agent used in treating bacteriuria in this study. The antibiotic susceptibility pattern on *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus and Proteus* spp shows that quinolone with percentage susceptibility responses of 89.23%,

84.54%, 90.57% and 88.12% were most effective antibiotics while *Pseudomonas aeruginosa* and *Staphylococcus aureus* shows very high resistant responses (100 %) to Ampicillin and Amoxicillin in some instances.

KEYWORDS: Antibiotic, Bacteria, Infection, Pregnant, Urine.

INTRODUCTION

Urinary tract infections (UTIs) are the frequent infections observed in clinical practice and results in a significant morbidity and high medical costs (Strom *et al.*, 1987). Urinary tract infections are “uncomplicated” when they occur in a normal urinary tract with no structural, functional or underlying host illness to account for the infection, or “complicated” when an underlying abnormality is thought to have enabled the infection to occur (Krieger, 2002). Urinary tract infections (UTI) is one of the most common infections occurring in all the age groups and genders from neonates to old age, but women particularly pregnant women are more vulnerable than men. This is because it has an important relationship with the reproductive based on its proximity, with reference to their anatomy and reproductive physiology including short urethra, pregnancy, easy contamination of urinary tract with faecal flora and various other reasons (Enayat, *et al*., 2008; Vasudevan, 2014).

This bacterial infection can affect the different parts of urinary tract of both males and females. Similarly, females between the age 15 years to 50 years often have the prevalence of the infection. This is due to anatomical predisposition, close approximation of urethra and vagina and sexually active life during these years (Tambekar, 2006). The presence of bacteria in the urine is called bacteriuria (Ramzan *et al*., 2004). Bacteriuria may be asymptomatic or show apparent symptoms of urinary tract infection. (Khattak *et al.*, 2006). Asymptomatic bacteriuria (ASB) is defined as the "presence of actively multiplying bacteria within the urinary tract excluding the distal urethra", at a time when the patient has no urinary symptoms (Jayalakshmi and Jayaram, 2008). Asymptomatic Bacteriuria is a microbiological diagnosis based on the isolation of a specified quantitative count of bacteria in a properly collected specimen of urine from persons without signs or symptoms, who are referable for urinary tract infection (Schaeffer, 2014). Asymptomatic bacteriuria has been associated with low birth weight and preterm birth (Jain *et al.*, 2013). It occurs in 2% to 10% of all pregnancies. If untreated, up to 30% of mother may develop acute cystis and up to 50% acute pyelonephritis (Vazquez and Villar, 2005; McCormick *et al.*, 2008).

Symptomatic Bacteriuria is divided into lower tract (acute cystitis) or upper tract (pyelonephritis) infection. Acute cystitis is defined as significant bacteriuria with associated bladder mucosal invasion and is distinquished from asymptomatic bacteriuria by the presence symptom such as Dysuria, Nocturia, Haematuria and Suprapubic discomfort in febrile women with no evidence of systemic illness (McCormick *et al.*, 2008).

Escherichia coli is most common pathogen associated with asymptomatic bacterial (>80% of isolates). *Staphylococcus saprophyticus* is the second most frequently cultured uropathogen while other Gram - positive Cocci such as; group B *Streptococci*, are less common. Other organism include; Gram – negative bacteria such as *Klebsiella, Proteus or Enterobacteriacea* (McCormick *et al.*, 2008; Jain *et al.*, 2013). However, many other bacterial can occasionally cause an infection (*Pseudomonas, Enterobacter, Mycoplasma, Chlamydia, Serrati*a and *Neisseria* species.) but are for less frequent cause than *E. coli*, in addition, fungi(*Candida* and *Cryptococcus* species) and some parasites *(Trichomonas* and *Schistosima*). For the past two decades, Trimethoprim-sulfametroxazole (TSM) or Trimethoprim alone have been used widely as empirical therapy for *E. coli* UTI. However, in the United States, resistance to SXT among *E. coli* isolates from persons with community-acquired UTIs has increased substantially over the past decade, with a prevalence exceeding 20% in many parts of the country (Cheesbrough, 2000).

Urinary tract infections (UTIs) are a common hospital-acquired infection, accounting for high rate of Nosocomial infections, and a common cause of bacteraemia in hospitalized patients. There are several factors and abnormalities of UTI that interfere with its natural resistance to infections and these factors include sex, age and disease, hospitalization and obstruction of the urine flow (Epoke *et al*.; 2000).

The most common cause of UTIs is bacteria from the bowel live in the skin near the rectum or vagina, which can spread and enter the urinary tract through the urethra. Sexual intercourse is a common cause of urinary tract infection because the female anatomy can make women more prone to urinary tract infection. During sexual activity, bacteria in vagina area are sometimes massages into the urethra. Another cause of bladder infections or UTIs is waiting too long to urinate, the bladder is a muscle that stretches to hold urine and contracts when the urine is release. Other factors to be considered under this context include low socio – economic status, sickle cell trait, diabetes mellitus, neurogenic bladder retention, history of previous urinary tract infection, structural abnormality of urinary tract and presence of renal

stones. Quantitative MSSU culture is only good standard for diagnosis of all suspected urinary tract infections.

Treatment of UTI can be intensified by Intravenous antibiotic treatment which should be guided by urine culture and sensitivity report, Increase fluid intake (may require intravenous fluid, if clinical dehydration is experienced) and Monitoring of urine output to assess complete emptying of the bladder. In this study we determine the incidence of UTI in clinical microbiology laboratories and hospitals in selected zones of Ondo state, Nigeria. This also includes the determination of the prevalence of asymptomatic UTI among pregnant and non-pregnant women in Ondo town, Ondo state, Nigeria, isolation and identification of the bacterial agent associated with this condition. Similarly, the antibiotic sensitivity profile of some of the urinary isolates was also determined. This study therefore helps to determine the implications experienced on the proliferation of this urinary tract aetiologic agents and possibility of bringing about some epidemiological control measures.

MATERIALS AND METHODS

Study area

The study area communities were Akoko south west, south east and north east local government area. The majority of the residents of Akoko area are farmers, civil servants, lectures, market people and student making less than 30% of the local government area. The study was carried out in schools, hospital and laboratory across Akoko area. Other areas covered include the state specialist hospital Ondo, Ondo state, Nigeria. This town shares boundaries with neighbouring town as Ore and Akure. It also has boundary with neighbouring State on east – Edo and Delta, on the west – Ogun and Osun, on the north – Ekiti and Kogi and south – the bright the Atlantic Ocean. Ondo State is located at latitude 5º 45º and 7º 52º and longitude 4º 20º and 6º 05º E.

Materials used

The culture mediums routinely used for the study include Nutrient agar and MacConkey agar, Eosine methylene-blue agar, Nutrient broth and Cysteine Lactose Electrolyte Deficient agar (CLED)**.** The glass wares used for this work were thoroughly washed with detergent, rinsed in several changes of water. Air dried, and sterilized in the oven at 160ºC for two hours. All liquid media for this study was prepared according to the manufacturer specifications and then homogenized, sterilized in an autoclave at the temperature of 121ºC and pressure at 1.1kg/cm^2 for 15minutes. In addition, the distilled water that was used for serial dilution was

sterilized for 15minutes at temperature of 121ºC and pressure of 1.1kg/cm^2 to ensure full sterility. The work bench was also disinfected with 70% alcohol.

Collection and transportation of urine samples

Mid stream urine (MSU) samples were collected from subject after having been instructed on how to collect the urine samples. Sterile, dry, wide-necked leak proof container was used to collect the urine samples. The samples were transported within 30 minutes of collection to the laboratory for analyses. Samples were inoculated aseptically, on CLED medium, MacConkey agar, Nutrient agar respectively. A loopful (0.001ml) of well mixed uncentrifuged urine was streaked on the surface of nutrient agar and cysterine lactose electrolyte deficient (CLED) medium. The inoculated plates were incubated for 24hrs at 37^{0}C and counts were expressed as colony forming units (CFU) per milliliter (ML). A count of ≥ 10 ^{5} CFU/ ML was considered significant to identify UTI (Barrow *et al*., 2003). 10 ml of each well mixed urine sample was centrifuged at 200gram for 5 minutes. The supernatant was discarded and a drop of the deposit was examined microscopically at high magnification for pus cell red blood cell, epithelia cells, cast, crystal, and yeast like cells and *Trichonomas vaginalis*. Pulse cell≥5 per high power field were considered significant to indicate infection (Anochie *et al*., 2001). Urinary tract infection was diagnosed if the bacteria or pus cell count or both were significant in an individual. The isolates were identified by standard microbiological method and disc susceptibility test by British society of antimicrobial chemotherapy (BSAC) method for antimicrobial susceptibility testing version 2009. Identification procedures were then initiated with well separated colonies having significant bacteria growth of single bacteria specie. Clean voided midstream urine samples were collected in aseptically with the assistance of laboratory staff at different hospitals and management of the school in Akoko area which comprise of the Akoko south west, east and north, where samples were collected. Urine samples were processed in the laboratory within 2hours of collection. Patients living in slums were educated about the collection of urine sample to avoid contamination.

Isolation and Identification Procedure

Separated colonies from the plates were streaked on fresh MacConkey agar and Cled agar, they were incubated at 37ºC for 18 to 24 hours. The pure cultures were kept in slant bottles for further biochemical test for identification purposes. Different biochemical test carried out include catalase test, TSI test, coagulase test, Urease utilization, Citrate utilization, Indole

test, Oxidase test, Gram's stain test, motility test, ornithine test and sugar Fermentations. Methyl red test was also performed. This test which was performed mainly to differentiate enterobacteria from other organisms which when cultured on buffered glucose peptone water produces sufficient acid from the fermented glucose to give a red colour with the indicator methyl red. This test was performed by inoculating a colony of the test organisms in 0.5ml of sterile glucose phosphate broth, a drop or methyl red solution was added after overnight incubation. A positive methyl red test was shown by the appearance of a bright red colour, indicating acidity. A yellow or orange colour was a negative test. Organisms such as *Klebsella* specie, *Pseudomonas* specie, *E. coli*, *Enterococci* species were suspected.

Antimicrobial susceptibility testing of the isolates was determined during the study. The antibiotic susceptibility test was performed using the agar-disc diffusion method as described by Bauer *et al.* (2002). The inoculated plates containing the antibiotics were incubated at 37ºC for 24 hours, after which the diameter of zone of inhibition around each antibiotic disc were then measured to the nearest millimeter and interpreted according to the current CLSI standard (2008 and 2012).

RESULT

This study shows various forms of microorganisms including pathogens that were obtained from urine sources sampled in Ondo State, Nigeria. Preliminary study on samples obtained and analyzed in some Akoko communities of the study area exemplified the characteristics of isolates encountered (Table 1). 4(9.5%) were identified as staphylococcus specie, 23(54.8%) were identified as *Escherichia coli*, 2(4.8%) were identified as *Pseudomonas* specie while 10(23.8%) were identified as *Klebsiella* specie and 3(7.1%) were identified as *Proteus* spp. as shown in Table 2.

Clean voided mid stream urine sample of pregnant and non-pregnant women were collected a sterile universal bottle from patient of anta natal unit of State specialist hospital Ondo and from volunteer that reside in Ondo town. Subjected age between 20 -50 years of age, the sum of 90 sample were examined 60 (66.67%) shows a significant growth and 17(18.89%) had insignificant growth, of which 8(8.89%). Identification of the isolates were based on their cultural, morphological and biochemical characteristics. A total number of 60 isolated, 46 were Gram-negative bacteria while 14 were Gram- positive bacteria. The morphological characteristic observed from these isolated varies and include: cream, pink, yellowish, brown, whitish, blue, malt, green, mucoid, non-mucoid, pin point, circular, swarm.

The Gram staining reaction of the isolates indicated that 76.6% of the isolated were Gram negative while 23.4% were Gram positive. Table 4 shows that the number of positive individual test range from age variance from 20 -25, 15 (75.00). 26 – 30, 13 (65.00%).36-40, 12(80.00%). 45-50, 14(93.33%) from total isolate of 90, 65 of (72.22%) tested positive to urinary tract infection of pregnant women and non - pregnant women. In Table 5, 40(61.53%) out of 65 screened pregnant women tested positive while 20 (80.00%) out of 25 of screened non- pregnant women tested positive which is averagely above total number tested. Table 6 shows the total viable bacteria load of the urine sample of pregnant and non-pregnant women. This range from $120x10^3$ cfu/ml to 100 x 10^6 cfu/ml. The isolates obtained from both pregnant and non-pregnant women urine samples during the study were tested for their Morphological and Biochemical characteristics (Tables 7 and 8).

Table 9 shows the frequency of Bacteria isolated and from diagnosed urine samples of pregnant women and non pregnant women infected by urinary tract infection. Out of the sixty (60) bacterial isolates used for this purpose, *Escherichia coli* (11) comes in the first place among other bacterial causes of diseases in pregnant women, percentage (% 26.49), it also occupied the same location in non-pregnant women it was isolated (8) isolates with percentage (% 37.5) *Pseudomonas areugionas* with (10) percentage (25.00%) for pregnant women and 5 (25.00%) for non pregnant women, *Staphylococcus aureus* with 6 (15.00%) for pregnant women and non pregnant women 4(18.70%), *Coagulase negative Staphylococcus* with for pregnant women 2 (5.00%) and for nonpregnant women 1 (6.25%).

Table1: Morphological and Biochemical Properties of Suspected Isolates (Akoko, Ondo St.)

S/n	Samples	Age	Gender	Gram stain	Fermentation	Catalase	Coagulase	Citrate	Motility	Ornithine	Indole	Fructose	Mannitol	Endospore	Hydrogen sulphide	Methyl red	Identification
1	A1	5	M	+	Glucose gas produce H_2S	+	+	–	–	–	–	AG	Acid	–	+	–	*Staphylococcus aureus*
2	A2	9	F	–	Lactose, Glucose, Sucrose	+	–	–	+	+	+	AG	Acid	–	–	+	*E. coli*
3	A3	10	M	–	Lactose, Glucose, Sucrose	+	–	–	+	+	+	A	G	–	–	+	*E. coli*

4	A4	4	F	_	Lactose, Fructose, Glucose	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
5	A5	14	F	+	Glucose, Sucrose	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
6	A6	6	M	+	Glucose,H_2S gas produced,	+	+	_	_	_	_	AG	Acid	_	+	_	*Staphylococcus aureus*
7	A7	Adult	M	_	Glucose, Sucrose fermented	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
8	A8	Adult	F	_	Lactose, Sucrose, Gas precipitate	+	_	_	+	+	+	AG	Acid	_	_	+	*E. coli*
9	A9	Adult	M	_	Glucose, Sucrose produced H_2S	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
10	A10	Adult	M	_	Glucose, Gas produced H_2S	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
11	A11	Adult	F	_	Glucose, Sucrose, Lactose	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
12	A12	Adult	M	_	Glucose produced H_2S	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
13	A13	Adult	F	_	Glucose, peptone catabolised	+	_	_	+	+	+	Acid	Acid	_	_	+	*E. coli*
14	A14	Adult	M	_	Glucose, Sucrose, Lactose produced	+	+	+	_	_	_	_	_		_		*Pseudomonas species*
15	A15	Adult	M	_	Glucose, Lactose, Sucrose fermented	+	+	+	_	_	_	_	_		_		*Pseudomonas species*
16	A16	Adult	F	_	Glucose produced, peptone catabolised	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*

Table 1 contd:

S/n	Samples	Age	Gender	Gram stain	Fermentation	Catalase	Coagulase	Citrate	Motility	Ornithine	Indole	Fructose	Manitol	Endospore	Hydrogen sulphide	Methyl red	Identification
17	A17	Adult	M	_	Glucose, Lactose, Sucrose fermented	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
18	B1	10	F	_	Glucose, Lactose, Sucrose	+	+	+	_	+	_		AG	_	_	_	*Klebsiella species*
19	B2	16	F	+	Glucose, Lactose, Sucrose	+	+	_	_	_	_	AG	Acid	_	+	_	*Staphylococcus. aureus*
20	B3	7	M	_	Glucose, peptone catabolised	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
21	B4	10	M	_	Glucose, Lactose, Sucrose fermented	+	+	+	_	_	_	AG	AG	_	_	_	*Klebsiella species*
22	B5	13	F	_	Glucose, peptone catabolised	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
23	B6	12	M	_	Glucose, Sucrose, Lactose fermented	+	_	+	_	+	_	AG	AG	_	_	_	*Klebsiella species*
24	B7	15	F	_	Glucose, Sucrose, Lactose	+	_	_	+	+	+	AG	_	_	_	+	*E. coli*
25	B8	9	M	_	Glucose, Sucrose, Lactose fermented	+	+	+	+	+	_	AG	AG	_	_	+	*Proteus species*
26	C1	14	F	_	Glucose, Sucrose, Gas produced	+	+	+	+	+	_	AG	AG	_	_	+	*E. coli*
27	C2	12	F	+	Glucose, lactose, sucrose	+	+	_	_	_	_	_	AG	_	_	_	*Staphylococcus aureus*
28	C3	14	F	_	Glucose fermented, gas produce	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
29	C4	10	F	_	Glucose, sucrose, lactose fermented	+	+	+	+	+	_	AG	AG	_	_	+	*Proteus species*

30	C5	Adult	F	_	Glucose, fructose, lactose	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
31	C6	Adult	F	_	Glucose, lactose, sucrose fermented	+	_	+	_	+	_	AG	AG	_	_	_	*Klebsiella species*

Table 1 contd:

S/n	Samples	Age	Gender	Gram stain	Fermentation	Catalase	Coagulase	Citrate	Motility	Ornithine	Indole	Fructose	Manitol	Endospore	Hydrogen sulphide	Methyl red	Identification
32	C7	12	F	_	Glucose, Lactose, Sucrose	+	+	+	+	+	_	AG	AG	_	_	+	*Proteus species*
33	C8	10	M	_	Glucose, Sucrose, Lactose	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
34	C9	13	M	+	Glucose fermented Gas produced	+	+	+	_	_	_	AG	AG	_	_	_	*Klebsiella species*
35	C10	12	M	+	Glucose fermented Gas produced	+	+	+	_	+	_	AG	AG	_	_	_	*Klebsiella species*
36	C11	5	M	+	Glucose, Sucrose, Lactose	+	+	+	+	+	_	AG	AG	_		_	*Klebsiella species*
37	C12	Adult	F	_	Glucose, Sucrose, Lactose	+	+	+	+	+	_	AG	AG	_	_	_	*Klebsiella species*
38	C13	Adult	M	_	Glucose, peptone catabolised	+	_	_	+	+	+	AG	AG	_	_	+	*E. coli*
39	C14	Adult	F	_	Glucose, peptone catabolised	+	+	+	_	+	_	AG	AG	_	_	_	*Klebsiella species*
40	C15	Adult	F	_	Glucose, peptone catabolised	+	_	_	_	+	_	AG	AG	_	_	+	*E. coli*
41	C16	Adult	F	_	Glucose, peptone catabolised	+	+	+	+	+	_	AG	AG	_	_	_	*Klebsiella species*
42	C17	Adult	M	_	Glucose fermented, Gas produce	+	_	_	_	+	+	AG	AG	_	_	+	*E. coli*

Table 2: Incidence of occurrence among subject studied in some Akoko communities

Sex	Numbers and prevailing rate of the suspected organism(N=42)
Male	9 (21.4%)
Female	10 (23.8%)
Children	23 (54.8%)
Total	42 (100%)

Table 3: Frequency occurrence of the isolate

ISOLATES	FREQUENCY	PERCENTAGE (%)
Staphylococcus aureus	4	9.5
Escherichia coli	23	54.8
Pseudomonas spp	2	4.8
Klebsiella spp	10	23.8
Proteus spp	3	7.1
Total	42	100

Table 4: Prevalence of urinary tract infection in relation to age group in the 90 subject

Age group	Total number of screened	No positive and percentage (%)
20 -25	20	15 (75.00)
26 – 30	20	13 (65.00)
31 – 35	20	11 (55.00)
36 – 40	15	12 (80.00)
45 – 50	15	14 (93.33)
Total	90	65(72.22)

Table 5: Prevalence of urinary tract infection in relation to pregnant and non-pregnant women

Urine sample (women)	No. screened	No. positive
Pregnant women	65	40
Non pregnant women	25	20
Total	90	65

Table 6: Determine the total viable bacteria load count of the urine sample of pregnant and non-pregnant women.

	Pregnant Women		Non-Pregnant Women	
S/N	10^3 cfu/ml	10^6 cfu/ml	10^3 cfu/ml	10^6 cfu/m
1	185	105	186	122
2	165	124	186	114
3	194	103	204	128
4	174	124	198	118
5	184	128	186	124
6	-	-	194	106
7	86	32	204	108

8	176	122	100	54
9	202	124	78	34
10	128	104	176	126
11	TNC	134	168	106
12	142	104	18	-
13	-	-	-	-
14	186	124	68	24
15	-	-	-	-
16	74	34	176	118
17	186	118	198	124
18	198	124	186	124
19	54	23	198	134
20	TNC	168	146	114
21	126	8O	168	102
22	84	26	176	124
23	124	98	164	`112
24	174	106	186	120
25	186	128	184	124
26	-	-		
27	196	124		
28	186	128		

Table 6 contd:

	Pregnant women		**Non- Pregnant Women**	
S/N	**10^3 cfu/ml**	**10^6 cfu/ml**	**10^3 cfu/ml**	**10^6 cfu/m**
29	64	34		
30	246	146		
31	184	124		
32	86	42		
33	174	106		
34	184	132		
35	174	104		
36	188	104		
37	90	46		
38	74	34		
39	154	106		
40	184	124		
41	198	128		
42	144	94		
43	-	-		
44	186	102		
45	124	86		
46	186	126		
47	184	1O6		
48	204	134		
49	186	104		
50	86	24		
51	98	44		

52	184	126		
53	174	108		
54	14	8		
55	182	124		
56	186	126		
57	-	-		

Table 6 contd:

	Pregnant Women		**Non- Pregnant Women**	
S/N	**10^3 cfu/ml**	**10^6 cfu/ml**	**S/N**	**10^3 cfu/ml**
58	208	144		
59	84	22		
60	168	126		
61	174	118		
62	88	34		
63	202	104		
64	198	108		
65	186	104		

Table 7: Morphology and Biochemical characteristic of isolates obtained from pregnant women urine sample

s/n	CLED agar (cultural morphology)	Mac Conkey agar (cultural morphology)	Gram stain reaction	Mo	In	ur	Ox	cit	Cat	coa	Sur	fru	Lac	Man	Mal	Gram	Identified organism
1	Smooth circular colonies		Positive Cocci in cluster	-	-	-	-	-	-	+	+		+	-	-	+	*Staphylococcus aureus*
2	Pinkish flat circular colonies	Pinkish, circular colonies	Negative Long Rod in cluster	-	-	+	+	-	+	-	-	+	-	+	-	-	*Escherichia coli*
3	malt, flat circular, Non mucoid colonies	green, non Mucoid, circular colonies	Negative Thin Rod in scattered	+	-	+	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
4	Pinkish, raised Mucoid, circular colonies	Pinkish, mucoid, Irregular colonies	Negative Long Rod in shatter	-	-	+	-	+	-	-	+	+	+	+	-	-	*Klebsiella pneumonia*
5	Whitish, irregular mucoid colonies	Pinkish, Mucoid, irregular colonies	Negative Short Rod in cluster	-	-	+	-	+	-	-	+	+	+	+	-	-	*Klebsiella pneumonia*
6	Whitish, circular Colonies	Malt green circular colonies	Negative, Thin long Rod in cluster	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
7	Yellowish, non mucoid, circular colonies	Whitish non mucoid circular colonies	Positive Cocci in cluster	-	-	-	-	-	-	+	+		+	-	-	+	*Staphylococcus aureus*
8	Pinkish non mucoid, flat, circular	Pinkish, non mucoid, circular colonies	Negative Thin long Rod in cluster	+	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*

	colonies																
9	Green Mucoid, swarm rough colonies	malt , non mucoid irregular colonies	Negative Short Rod in cluster	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
10	Malt non mucoid Circular smooth Colonies	Malt, non mucoid, rough, irregular colonies	Negative Short Rod in cluster	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
11	Smooth, pinkish, non mucoid, circular colonies	Smooth, Pinkish, non mucoid circular colonies	Negative Thin rod in scattered	-	-	+	+	-	+	-	-	+	-	+	-	-	*Escherichia coli*
12	Blue non mucoid swarming colonies	Translucent blue, non mucoid, swarming colonies	Negative Short Rod in cluster	+	+	+	-	+	-	-	-	-	-	-	+	-	*Proteus vulgaris*

Table 7 contd.

s/n	CLED agar (cultural morphology)	Mac Conkey agar (cultural morphology)	Gram stain reaction	Mo	In	ur	Ox	cit	Cat	coa	Sur	fru	Lac	Man	Mal	Gram	Identified organism
13	Whitish, non mucoid, smooth, circular colonies		Positive Cocci in cluster	-	-	-	-	-	+					-	-	+	*Coagulase negative staphylococcus*
14	Yellowish mucoid, Smooth, Circular colonies	Pinkish, non mucoid, Circular Colonies	Negative Thin Rod in cluster	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*

15	Blue non mucoid point pin colonies	Blue non mucoid colonies	Negative Thin Rod in scattered	+	-	+	+	+	-	-	-	-	-	-	+	-	*Proteus mirabilis*
16	Whitish non mucoid, circular colonies		Negative Cocci in cluster	-	-	-	-	-	-	+	+		+	-	-	+	*Staphylococcus aureus*
17	brownish, non mucoid, circular colonies	Dry brown, non mucoid circular colonies	Positive Cocci in cluster	+	-	-	-	-	-	-	-	-	+	+	+	+	*Enterococcus cloacae*
18	Mucoid, Swarming, Yellowish colony	Pinkish, mucoid, Warming colonies	Negative Short Rod in scattered	-	+	+	-	+	-	-	+	-	+	+	+	-	*Klebsiella oxytoca*
19	malt, mucoid, Circular colonies	Green, non mucoid, circular colonies	Negative Long Rod in cluster	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*
20	Creamy Non mucoid Circular colonies	Malt non mucoid irregular	Negative Thin rod in shatter	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
21	Whitish non mucoid, raised, circular		Positive Cocci in shatter	-	-	-	-	-	-	+	+		+	-	-	+	*Staphylococcus aureus*
22	Yellowish, Non mucoid, Smooth, circular colonies	Pinkish, non Mucoid, Smooth circular colonies	Negative, Flat long Rod in cluster	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*
23	Malt non mucoid, Irregular, raised colonies	Green, non mucoid, raised, circular colonies	Negative Thin Rod in cluster	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
24	Blue, Non mucoid	Blue Non	Negative	+	+	+	-	-	-	-	-	--	-	-	+	-	*Proteus vulgaris*

	Flat, circular colonies	mucoid, flat Circular colonies	Flat short Rod in scattered														
25	Green, non Mucoid circular colonies	Brown non Mucoid Circular colonies	Negative Short Rod in cluster	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*

Table 7 contd.

s/n	CLED agar (cultural morphology)	Mac Conkey agar (cultural morphology)	Gram stain reaction	Mo	In	ur	Ox	cit	Cat	coa	Sur	fru	Lac	Man	Mal	Gram	Identified organism
26	Pinkish non Mucoid, circular smooth colonies	Pink non mucoid, circular colonies	Negative Thin long Rod in scattered	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*
27	Whitish smooth circular colonies		Positive Cocci in cluster	-	-	-	-	-	-	+	+		-	+	-	-	*Staphylococcus aureus*
28	Yellowish, non mucoid, irregular colonies	Pink non mucoid irregular colonies	Negative Short Rod in cluster	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*
29	Blue, pin point, smooth, colonies	Blue smooth, colonies	Negative long Rod in cluster	+	-	+	+	-	-	-	-	-	-	-	+	-	*Proteus mirabilis*
30	Pinkish non mucoid smooth, circular, colonies	Pinkish non mucoid, smooth, circular colonies	Negative Thin short Rod in scattered	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*
31	Pinkish non mucoid, smooth circular colonies	Pinkish, non mucoid circular Colonies	Negative long thin Rod in scattered	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*
32	Yellowish, non mucoid smooth, circular colonies	pinkish, non mucoid, smooth, circular colonies	Negative Thin long Rod in scattered	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*

33	Yellowish, non mucoid, irregular Colonies		Positive Cocci In scattered	-	-	-	-	-	+	-	-	-	-	-	-	+	*Coagulase negative staphylococcus*
34	blue, Non mucoid, smooth, circular colonies	blue, non mucoid, circular Colonies	Negative Flat Rod in cluster	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
35	Whitish non mucoid, smooth Circular colonies		Positive Cocci in scattered	-	-	-	-	-	-	+	+		+	-	-	+	*Staphylococcus aureus*
36	blue, non mucoid, smooth, circular colonies	Blue, smooth, non mucoid, circular colonies	Negative Short rod in cluster	+	+	+	-	-	-	-	-	-	-	-	+	-	*Proteus vulgaris*
37	Blue translucent Circular smooth Colonies	Blue, non mucoid, smooth Circular colonies	Negative Long Rod in scattered	+	+	+	-	-	-	-	-	-	-	-	+	-	*Proteus vulgaris*

Table 7 contd.

s/n	CLED agar (cultural morphology)	Mac Conkey agar (cultural morphology)	Gram stain reaction	Mo	In	ur	Ox	cit	Cat	coa	Sur	fru	Lac	Man	Mal	Gram	Identified organism
38	Green, non mucoid, irregular, colonies	Malt, non mucoid, irregular colonies	Negative Long Rod in scattered	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
39	white, rough, raised irregular non mucoid colonies	green, irregular, non mucoid, circular colonies	Negative Rod In scattered	+	-	-	+	+	+	-	-	+	-	+	-	-	*Pseudomonas aeruginosa*
40	Pinkish, smooth, Flat, circular colonies	Pinkish, smooth, non mucoid, circular colonies	Negative Rod In scattered	-	-	+	+	+	+	-	-	+	-	+	-	-	*Escherichia coli*

Legend: ox : Oxidase, ure: urease, mal: maltose, fru: fructose, cit: citrate, ind: indole, mo: motility, LA: lactose, man: mannitol, coa: coagulase, cat: catalase, + : positive, -: negative

Table 8: Biochemical characteristic and identification of the isolates from non - pregnant women urine sample

s/n	CLED agar (cultural morphology)	MacConkey (cultural morphology)	Gram stain reaction	Mo	ind	ure	Cit	cat	coa	suc	flu	lact	man	mal	ox	Gram	Probable organism
1	Pinkish Smooth circular raised colonies	Pinkish Smooth circular raised colonies	Negative Thin long Rod in cluster	+	+	-	-	+	-	-	-	+	+	+	-	-	*Escherichia coli*
2	Pinkish smooth, Non mucoid circular colonies	Pinkish smooth non mucoid circular colonies	Negative Thin long Rod in scattered	+	+	-	-	+	-	-	-	+	+	+	-	-	*Escherichia coli*
3	Green non mucoid irregular colonies	Malt non mucoid irregular Rough colonies	Negative Short thin Rod in scattered	+	-	-	+	+	-	-	+	-	-	-	+	-	*Pseudomonas aeruginosa*
4	Yellowish Non mucoid Circular colonies		Positive Cocci in cluster	-	-	-	-	+	+	-	-	-	+	-	-	+	*Staphylococcus aureus*
5	Whitish, Non mucoid, circular colonies		Positive Cocci in cluster	-	-	-	-	+	+	-	-	-	+	-	-	+	*Staphylococcus aureus*
6	Pinkish Non mucoid Circular	Pinkish non mucoid circular	Negative Long Rod in cluster	+	+	-	-	+	-	-	-	+	+	+	-	-	*Escherichia coli*
7	Blue translucent Smooth circular colonies	Blue smooth circular colonies	Negative Short flat Rod in cluster	+	-	+	+	-	-	+	-	-	-	+	–	-	*Proteus vulgaris*
8	Blue smooth Circular colonies	Blue pin point smooth, Circular colonies	Negative Long Rod in cluster	+	-	+	+	-	-	+	-	-	-	+	-	-	*Proteus vulgaris*

9	Creamy irregular Rough colonies	Malt, Irregular Rough colonies	Negative Thin long Rod in cluster	+	-	+	+	+	-	-	+	-	-	-	+	-	*Pseudomonas aeruginosa*
10	Pinkish, Smooth Non Mucoid Circular colonies	Pinkish, Smooth Non Mucoid Circular colonies	Negative Short Rod in cluster	+	+	-	-	+	+	-	-	+	+	+	-	-	*Escherichia coli*

Table 8 contd.

s/n	CLED agar (cultural morphology)	MacConkey (cultural morphology)	Gram stain reaction	Mo	ind	ure	Cit	cat	coa	suc	flu	lact	man	mal	ox	Gram	
11	Pinkish, Smooth Non Mucoid Circular colonies	Pinkish, Smooth Non Mucoid Circular colonies	Negative Short Rod in cluster	+	+	-	-	+	+	-	-	+	+	+	-	-	*Escherichia coli*
12	Yellowish Non mucoid Circular colonies		Positive Cocci in cluster	-	-	-	-	+	+	-	-	-	+	-	-	+	*Staphylococcus aureus*
13	Pinkish Non mucoid Circular colonies	Pinkish, Non Mucoid, Circular colonies	Negative Long thin Rod in cluster	+	+	-	-	+	+	-	-	+	+	+	-	-	*Escherichia coli*
14	Yellowish Non mucoid Circular colonies		Positive Cocci in cluster	-	-	-	-	-	+	-	-	-	+	-	-	+	*Coagulase negative staphylococcus*
15	Creamy irregular Rough colonies	Malt, Irregular Rough, Colonies	Negative Long Rod in cluster	+	-	-	+	+	-	-	+	-	-	-	+	-	*Pseudomonas aeruginosa*
16	Creamy irregular Rough colonies	Creamy irregular Rough colonies	Negative Long Rod in cluster	+	-	-	+	+	-	-	+	-	-	-	+	-	*Pseudomonas aeruginosa*

17	Yellowish Non mucoid Circular colonies		Positive Cocci in scattered	-	-	-	-	+	+	-	-	-	+	-	-	+	*Staphylococcus aureus*
18	Pinkish, Smooth, Non Mucoid Circular colonies	Pinkish, Smooth, Non Mucoid Circular colonies	Negative Short Rod in cluster	+	+	-	-	+	+	-	-	+	+	+	-	-	*Escherichia coli*
19	Malt, Irregular Rough, Colonies	Malt, Irregular Rough, Colonies	Negative, Long Rod in cluster	+	-	-	+	+	-	-	+	-	-	-	+	-	*Pseudomonas aeruginosa*
20	Pinkish, Smooth Non Mucoid Circular colonies	Pinkish, Smooth Non Mucoid Circular colonies	Negative, Long Rod in cluster	+	+	-	-	+	+	-	-	+	+	+	-	-	*Escherichia coli*

Legend: ox : Oxidase, ure: urease, mal: maltose, fru: fructose, cit: citrate, ind: indole, mo: motility, LA: lactose, man: mannitol, coa: coagulase, cat: catalase, + : positive, -: negative

Table 9: Frequency of Bacteria isolated from diagnosed urine samples of pregnant women and non pregnant women infected by urinary tract infection.

Type of sample (bacteria)	Pregnant Women No of isolate (frequency)	Pregnant women (percentage)	Non pregnant women No of 1solate (frequency)	Non pregnant women (percentage)
Escherichia coli	11	27.50	8	37.5
Pseudomonas aeruginosa	10	25.00	5	25
Staphylococcus aureus	6	15.00	4	18.7
Coagulase negative staphylococcus	2	5.00	1	6.25
Proteus vulgaris	5	12.5	2	12.5
Proteus mirabilis	2	5.00		
Klebsiella pneumonise	2	5.00		
Klebsiella oxytoca	1	2.50		
Enterococcus cloacae	1	2.50		
Total	40	100%	20	100%

Table 10: Antibiotic susceptibility test of isolated organism

ISOLATES	ER	AM	TE	CLO	GEN	COT	CHL	NAL	NIT	OFA	AUG	PEF
Escherichia coli	ND	8 (r)	12 (i)	ND	14 (i)	R	ND	15(s)	22(s)	17(s)	16(s)	24(s)
Pseudomonas	ND	R	8	ND	14	5	ND	14	20	24	4	23
Staphylococcus aureus	12	R	18	21	16	18	19	ND	ND	ND	24	ND
Coagulase negative staphylococcus	15(s)	R	17(s)	23(s)	16(s)	19(s)	17(s)	ND	ND	ND	18(s)	ND
Proteus vulgaris	ND	8 (r)	14(i)	ND	17 (s)	18(s)	ND	12(i)	22(s)	16(s)	15(s)	26(s)
Proteus mirabilis	ND	R	17(s)	ND	11 (i)	12(i)	ND	12(i)	15(s)	16(s)	13(i)	27(s)
Klebsiella oxytoca	ND	R	14 (i)	ND	13 (i)	8(r)	ND	11(i)	16(s)	10(i)	`14(i)	24(s)
Klebsiella pneumonia	ND	R	23(S)	ND	14(i)	9(r)	ND	15(s)	17(s)	11(i)	18(s)	21(s)
Enterococcus Cloacae	ND		25(s)	R	23(s)	R	16(s)	ND	ND	ND	R	ND

ND: Not Determine, S: Sensitive, R: Resistance, GEN: Gentamicin, NIT: Nitrofuratoin, NAL: Nalidixic acid, OFL: Ofloxacin, TE: Tetracycline, COT: Cotrimoxazole, AMX: Amoxycillin, AUG: Augmentin, CHL: Chloramphenicol, PEN: Penicillin, CXC: Cloxacillin, AM: Ampicillin, ER: Erythromycin STR: Streptomycin, CPX: Ciprofloxacin

From the table, various antibiotics used shows that some of the isolates were highly sensitive to some antibiotics with > 15mm, < 14 for intermediated, less than 10 has resistance. *Escherichia coli* is highly sensitive to Quinolones group while Gram positive bacteria shows resistance to Amoxycillin and Ampicillin.

DISCUSSION AND CONCLUSION

Urinary tract infections are common conditions worldwide and the pattern of antimicrobial resistance varies in different regions. We describe the relationships between sex, isolated bacterial agents and antibiotic resistance of UTIs. The study was confined to UTIs in adults and children of both sexes. The result of the study revealed that 23(54.8%) of the total 42 isolates obtained during the course of this study were found to be *Escherichia coli*, 10(23.8%) were identified as *Klebsiella* spp, 4(9.5%) were also identified as *Staphyloccocus aureus* while 3(7.1%) were *Proteus* spp and 2(4.8%) were also identified as *Pseudomonas* spp. These result showed that *Escherichia coli* was the most predominant Gram negative bacilli associated with bacteriuria. This findings is in agreement with Foxman et al., (2003). Approximately 1 in 3 women will require antimicrobial treatment for a UTI before age 24, and 40% to 50% of women will have a UTI during their lifetime (Foxman, 2003).

The sex distribution of patients in this study is consistent with those of other reported studies, showing a statistically predominance of females with UTI. The elevated incidence of infection among females is related to differences between the male and female genitourinary systems in anatomy and microflora (Strom *et al.*, 1987). The similarities and differences in the type and distribution of uropathogens may result from different environmental conditions and host factors, and practices such as healthcare and education programmers, socioeconomic standards and hygiene practices in each Area of Akoko Local Government. The prevalence of Gram-positive cocci was not high in this study and this is consistent with the report of Kothari and Sagar (2008). The Enterobacteriaceae family were the most common microorganism isolated of Urinary tract infection in present study accounting 94.4% of total isolated bacteria and amongst them *E. coli* was the most predominant bacteria. This corroborates with past findings by Vasudevan (2014) who recorded the occurrence of 80 to 85 % *E. coli,* followed by *Staphylococcus* infection that constitutes 10 to 15 % of the study group whereby women were predominantly affected. Similar studies in the United States by Sahm *et al*., (2001) had relative trend.

The high prevalence of resistance to the commonly used antibiotics such as Ampicilllin, Cephalothin and Tetracycline has caused considerable alarm (Nurullaev, 2004) for Gram negative bacilli (Orrett *et al.*, 2003). This study is comparable with other results reported *(*Astal and Sharif, 2002 and McIsaac *et al.*, 2004). Based on the results of this study, it was revealed that the susceptibility of bacteria to other antibiotics was similar to many studies (Gupta *et al.*, 2001). According to our results, the efficacy of Nitrofuratoin and Ofloxacin was comparable to other reports (Kothari and Sagar, 2008).

This study shows variation in urinary tract infection among pregnant women in selected areas in Ondo State. In Table 4, the prevalence of significant bacteriurea/UTI among the women aged between 20 years or more attending State Specialist Hospital Ondo was determined. 72.2% of cases were test positive while 28.8% were test negative to urinary tract infection. This corroborates with work of Famurewa *et al.*, (1992) which is based on a similar epidemiologic study conveyed in western part of Nigeria.

The variance of bacterial population shown to be higher at dilution 10^{-3} on Nutrient agar than the 10^{-6} dilution in Table 6 on the same media for pregnant and non– pregnant women analyzed collaborate with the work of Ojegde and Nworie, (2000). This is however a logical scientific approach for determination of microbial population. The study further shows that forty (40), (86.6%) of the total sixty five (65) sample of pregnant women and twenty (20), (82%) for non-pregnant women infected with urinary tract infection.

In Table 7 and 8, the morphology and biochemical characteristic of isolates obtained from pregnant women and non-pregnant urine samples were determined for identification purposes. This includes Gram positive coagulase negative *Staphylococcus aureus*. The Gram negative bacteria included *Escherichia coli*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Proteus mirabilis*, *Klebsiella pneumoniae*, *Klebsiella oxytoca* and *Enterococcus* spp.

Table 9 shows the frequency of Bacteria isolated from diagnosed urine samples of pregnant and non pregnant women infected by urinary tract infection. *Escherichia coli,* eleven (11), constituting 27.49 % of the total bacterial isolates that causes infection in pregnant women, is predominant. It also occupied the similar range in non-pregnant women with eight (8) isolates constituting 37.5 % of the sampled isolates. The result correlates with the study of Vasudevan (2014).

It is believed that the rule of *Escherichia coli* infection in the urinary stream was resulting of their presence in large numbers in faeces making it a source of autoinfection. This organism is native to the natural bowel and easily transmitted to the urinary tract causing infection cases (Roberts, 2000). It also owns a number of factors pathogenicity that the most important of which fimbria to help them adhesion to specific receptors molecules in epithelial cells of the urinary tract (Collee, *et al.,* 1996).

Pseudomonas aeruginosa which is the second predominant organism causing the urinary tract infection isolated during the study. This constitutes 10 isolates (25.00 %) of pregnant women and 5 isolates (25%) from non-pregnant women. The result here correlates to the findings of Vasudevan (2014) who detected the presence of relative *Pseudomonas* spp., implicated in urinary tract infection.

These bacteria from opportunistic and systemic pathogen they cause a number of injuries including urinary tract infection, it is also resistant to most antibiotics used and that are difficult to treat (Pollack, 1995). Six (6) isolates of *Staphylococcus aureus* obtained during the study constituting 15% of the total isolates was the third prevalent organism isolated from pregnant women. Four (4) isolates (% 18.75) in non-pregnant women was also obtained. *Proteus vulgaris* and *Proteus mirabilis* constitutes 12.50% and 5.00% of isolates from pregnant women respectively. Other pathogenic organisms such as *Staphylococci*, *Klebsiella spp.,* and Enterococcus *cloacae* were also encountered in the previous study. This kind of variation in the bacterial aetiologic causation of urinary tract infection was observed by Vasudevan (2014).

Twenty five (25) samples used for this study, constituting 38.50 %, did not show bacterial growth was due to the possibility the presence of other causing of infection such as anaerobic bacteria, certain parasites, fungal and viral causes of the urinary tract infection (Vasudevan, 2014), or patient using antibiotics as treatment thus discouraging the growth of bacteria during sampling similar to urinary tract infection. This study shows that *E. coli* was highly susceptible to the quinolone groups of antibiotics (Table 7). This includes Pefloxacin, Nitrofurantoin, Ofloxacin, and ciprofloxacin the organism is intermediate sensitive to Streptomycin and Gentamycin but resistant to Augmentin, Septrin and Ampicillin. This has some relevance to the study of McCormick *et al.,* (2008), who described the resistant nature of some urinary tract infection.

The most effective antibiotics in this study were the Quinolones (Ofloxacin, Ciprofloxacin, and Pefloxacin), these antibiotics are relatively expensive compared to the common antibiotics frequently used and this might have restricted their procurement and indiscriminate use by the populace, thereby making it effective against the organisms. Ampicillin and Co-trimoxazole (Septrin) which are commonly used antibiotics were not effective against majority of the organisms isolated in this study.

CONCLUSION

This study shows that Gram-negative bacilli (Enterobacteracea) were responsible for the prevalence of urinary tract infections. The most common isolated bacteria from urinary tract infections were *E. coli* in urine sample among people living in Akoko Local Government Area, Ondo State. Urinary tract infection is predominantly a female disease.

Individual especially female should be educated on how to maintain personal hygiene and good toilet habits. Unprotected sexual intercourse and sharing of underwears should be discouraged. Nevertheless, bacterial infection is preventable by having good toilet habit, making use of medicated soap and the most effective antimicrobial agents such as Ofloxacin, Gentamycin, Amoxicillin and Nitrofuratoin against Gram-negative bacilli and also the most effective antibiotics against Gram-positive cocci like tetracycline, Nalixidic and Cotrimaxol.
Special attention to the pregnant women is one of the most important point's health care systems. Pregnancy enhances the progression from asymptomatic to symptomatic bacteriuria, which could lead to hypertension, preeclampsia, septicemia, maternal death pyelonephritis and adverse obstetric outcomes such as prematurity, low birth weight, and higher fetal mortality rates. The adverse effects of undiagnosed asymptomatic bacteriuria on mother and child have made us to suggest routine urine culture screening for all pregnant women attending antenatal clinic in order to prevent mother and child from any form of complication that may arise due to infection.

Asymptomatic bacteriuria can be ascertained based on microscopy and microbial culture. Thus, urine culture is the gold standard screening technique for asymptomatic bacteriuria during pregnancy. Gram-negative organisms were the commonest organisms isolated; among which *Escherichia coli* was the principal urinary pathogen. The isolates were most sensitive to Qunolone (Ofloxacin, Ciprofloxacin, and Pefloxacin) followed by, Nitrofurantion, in all the isolates Ampicillin was found to be least sensitive antibiotic. *Escherichia coli* and *Klebsiella pneumoniae* have the ability to produce Extended-Spectrum β-Lactamases (ESBL)

in large quantities (Paterson and Bonomo, 2005) resulting in limitation of therapeutic option. It is hereby recommended that antibiotic therapy should be used only after a thorough culture and antibiotic sensitivity tests have been carried out to avoid the emergence of drug resistance among bacteria.

REFERENCES

1. Astal Z.Y, Sharif F.A. Relationship between demographic characteristics and community-acquired urinary tract infection. *EMHJ.*, 2002; 8(1): 164-171.
2. Cheesbrough, M. District Laboratory Practice in Tropical Countries. Examination of urine and antimicrobial sensitivity testing; 2000; pp. 105–143.
3. CLSI, 2012. Update on the 2012-2013. CLSI Standards for Antimicrobial Susceptibility Testing: Edition -Susan Sharp. http://www.swacm.org/annualmeeting/2012/stlouisworkshops/WS4GPCLSI Update2012.pdf. Accessed 1st July, 2013.
4. CLSI. 2008. Performance Standards for Antimicrobial Susceptibility Testing: Eighteenth Informational Supplement. 18th Edn., Clinical and Laboratory Standard Institute, USA., ISBN-13: 9781562386535, Pages, 181.
5. Collee J.G., Fraser A.G., Marmion B.P. and Simmons A.S. (1996). Practical Medical Microbiology. 14th. ed . Churchill Livingstone.
6. Enayat K, Fariba F, Bahram N. Asymptomatic bacteriuria among pregnant women referred to outpatient clinics in Sanandaj, Iran. *Int Braz J Urol*., 2008; 34(6): 699-707.
7. Epoke, C.O, Anyanwu, G.O and Opara, A.A. The Prevalence of Significant Bacteriuria in Diabetic Patients. *Diabetic International*, 2002; 10: 16-17.
8. Famurewa O. Prevalence of Urinary Tract Infection in women in Ado-Ekiti, Ekiti State, Nigeria. L'igiene Morderna, 1992; 97: 580 – 591.
9. Foxman B. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. *Dis Mon.*, 2003; 49: 53-70.
10. Gupta K., Hooton T.M., Stamm W.E. Increasing antimicrobial resistance and the management of uncomplicated community acquired urinary tract infections. *Ann Intern Med.*, 2001; 135: 41-50.
11. Jain V., Das V., Agarwal A. and Pandey A. Asymptomatic bacteriuria and obstetric outcome following treatment in early versus late pregnancy in north India women. *India J. Med Res.*, 2013; 137: 753 – 758.

12. Jayalakshmi J. and Jayaram V.S. Evaluation of various screening tests to detect asymptomatic bacteriuria in pregnant women. *Indian J Pathol Microbiol,* 2008; 51(3): 379-381.
13. Khattak A M, Khattak S, Khan H, Ashiq B, Mohammad D, Rafiq M. Prevalence of asymptomatic bacteriuria in pregnant women. *Pak J Med Sci*., 2006; 22: 162-165.
14. Kothari A. and Sagar V. Antibiotic resistance in pathogens causing community-acquired urinary tract infections in India: a multi center study. *J Infect Developing Counties,* 2008; 2(5): 354-8.
15. Krieger J.N. Urinary tract infections; what's New? The Journal of Urology, 2002; 168: 2351–2358. [PubMed]
16. McCormick T., Ashe R.G., Keamey P.M. Urinary tract infection in pregnancy. The Obstetrician and Gynaecologist, 2008; 10: 156-162.
17. McIsaac W.J., Mazzulli T., Moineddin R., Raboud J., Ross S. Uropathogen antibiotic resistance in adult women presenting to family physicians with acute uncomplicated cystitis. *Can J Infect Dis Med Microbiol.* 2004; 15: 266-70.
18. Nurullaev R.B. The role of Asymptomatic bacteriuria in epidemiologic study of the urinary tract infection (UTI). *Lik Aprava.* 2004; 7: 23-5.
19. Ojiegbe G.C. and Nworie W.C. Asymptomatic Bacteriuria among school people in Enugu Urban Area, Enugu, Nigeria. Journal Medical Laboratory Science, 2000; 9: 42–46.
20. Orrett F.A., Davis G.K. (2006). A comparison of antimicrobial susceptibility profile of urinary pathogens for the years, 1999 and 2003.*West Indian Med J.* 55(2): 95-9. Part 2 © Monica Cheesbrough.
21. Paterson D.L. and Bonomo R.A. Extended-spectrum beta-lactamases: a clinical update. http://www.ncbi.nlm.nih.gov/pubmed/16223952. *Clin Microbiol Re,* 2005 Oct; 18(4): 657-686.
22. Ramzan M, Bakhsh S, Salam A, Khan G M, Mustafa G. Risk factors in urinary tract infection. *Gomal J Med Sci*., 2004; 2: 1- 4.
23. Roberts J.A. Management of pylonepritis and upper Urinary tract infection .*J. Urol. Clin. North Am.* 2000; 2: 76-120.
24. Sahm D.F., Thornsberry C., Mayfield D.C., Jones M.E., Karlowsky J.A. (2001). Multidrug resistant urinary tract isolates of *Escherichia coli*: prevalence and patient demographics in the United States in 2000. *Antimicrob Agents Chemother*, 2000; 45: (5); 1402-6.

25. Schaeffer A.J. Differentiating between symptomatic and asymptomatic urinary tract infections using genetic tools. *Journal of Urology*, 2014; 191(2): 287-288.
26. Strom B.L., Colins M.,West S.L., Kreisberg J. and Weller S. Sexual activity, contraceptive use, and other risk factors for symptomatic and asymptomatic bacteriuria. A case control study. *Ann Intern Med.*, 1987; 107(6): 816-823.
27. Tambekar D.H., Dhanorkar D.V., Gulhane S.R., Khandelwal V.K., Dudhane M.N. Antibacterial susceptibility of some urinary tract pathogens to commonly used antibiotics. *Afr J Biotechnol*., 2006; 5: 1562-1565.
28. Vasudevan, R. Urinary tract infection: An overview of the infection and the associated risk factors. *Journal of Microbiology and Experimentation*, 2014; 1(2): 08.
29. Vazyquez, J.C. and Villar, J. (2005) Treatment for symptomatic urinary tract infection during pregnancy. Cochrane database of systematic review issue 4 art NO CD002256.