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Comparative diagnosis of urinary tract infection (UTI) using urinary nitrite and significant bacteriuria (SBU)

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ABSTRACT

The clinical laboratory diagnosis of urinary tract infection was compared in two hundred (200) midstream urine samples using bacteria culture and urinary nitrite detection technique. The comparative susceptibility of the isolates to common antibiotics was evaluated using completely randomized design (CRD). The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) for each antibiotics test was evaluated using standard laboratory procedures. Approximately fifty one percent (101/200) of urine samples that were culture yielded significant bacteriuria (SBU) as compared to (32.59%, 65/200) which had positive nitrite detection. Also eighteen percent (18%, 35/200) of the negative nitrite detection test showed evidence of significant bacteriuria. Significant bacteriuria was significantly associated at $p<0.05$ with culture isolation technique. A total of nine (9) different bacterial isolates were detected in this study. The isolates and their frequency of occurrence were Escherichia coli 30(29.7%), Pseudomonas aeruginosa 15(14.9%), Klebsiella pneumonia 13(12.8%), Enterococcus faecalis and Citrobacterfreundii 10(9.9), Proteus mirabilis 9(8.9), Staphylococcus aureus 8(7.7%), Serretiamarcesens and Streptococcus specie 3(3.0%).The mean total viable count ranged from $31.50\pm3.15x10^{7}cfuml^{-1}$ to $262.5\pm1.09x10^{8}cfuml^{-1}$. The antibiotics susceptibility profile reveals a high level of susceptibility of most isolates to Gentamycin(50%), Ciprofloxacin(83%), Tarivid(100%), Augumentin(50%) and Levofloxacin(100%) with mean zone of inhibition ranging from 18.6mm to 20.3mm. However, high resistance profile of hundred percent was observed with nalidixic acid, ampicillin and septrin while reflacin resistant rate was 66.7%. Intermediary susceptibility was observed with streptomycin (50%) and ceporex (66.7%). This study therefore reveals the diagnostic superiority of culture method to urinary nitrite detection technique. In addition, it also reveals Escherichia coli as the most frequently isolated agent of bacteriuria. Furthermore, the study shows a high level of susceptibility of urinary isolates to Gentamycin, Ciprofloxacin Levofloxacin, Augumentin and Tarivid.

Keywords: Urinary Tract Infection (UTI), Significant Bacteriuria (SBU), Urinary Nitrite, Minimum Inhibitory Concentration (MIC), Minimum Bactericidal Concentration (MBC)

INTRODUCTION

Urinary tract infections (UTIs) are infections associated with the multiplication of organisms in the urinary tract. It is the most common diseases occurring from infant up to adulthood. They are among the most common infectious diseases encountered by clinicians in developing countries with an estimated annual global incidence of at least 8.3 million doctor visit yearly [23]. Urinary tract infections affects both sex but occurs more frequently in women than men, with half of women having at least one infection at some point in their lives. The incidence of UTIs also increases during pregnancy which if not properly treated can lead to serious health issues such as low birth weight, preterm birth and severe consequences to both mother and fetus [14]. Studies in Sweden and other parts of Europe have shown that one in five adult women experience a UTI at some point, confirming that it is an exceedingly common worldwide problem [23]. In 2007, approximately 3.9 percent of office visits in USA were related to symptoms caused by UTI. According to Willey *et al*., (2011), UTIs occurs as a result of interactions between the uropathogen and host and their pathogenesis involves several processes such as attachment to the epithelial surface, colonization and dissemination through the mucosa causing tissue damage. After the initial colonization period, pathogens can ascend into the urinary bladder resulting in symptomatic or asymptomatic bacteriuria and if not

treated it causes up to 30 percent of mothers to develop pyelonephritis and increases risk of low birth weight and preterm birth [14]. Many different microorganisms can cause UTIs though the most common pathogens are *Escherichia coli* and other Enterobacteriacae, which accounts for approximately 80-85 percent of the total isolates. In complicated urinary tract infections and hospitalized patients, organisms such as *Enterococcus faecalis* and highly resistant Gram-negative rods including *Pseudomonasspp.* are comparatively more common. The presence of nitrite in urine is also an indication of bacteriuria. The diagnosis of urinary tract infection is therefore a vital tool as several tests are required and treatment is based on information obtained from the antibiotic susceptibility testing [3]. This study is therefore aimed at comparing the diagnosis of urinary tract infections using urinary nitrite and significant bacteriuria.

MATERIALS AND METHODS

Collection of Samples

Two hundred (200) mid-stream urine samples were collected from different hospitals in Calabar, Nigeria which included University of Calabar Teaching Hospital, General Hospital, Asi-Ukpo Diagnostic and Medical Centre and College of Health Technology Medical Centre. The study sites were all located within Calabar metropolis, Nigeria. Samples were collected following informed consent and the duration of study was within three to six months. The age range in this study was between 15-70years. These samples were analyzed at the Microbiology Laboratory, University of Calabar, Calabar, Nigeriausing standard procedures as described by CLSI, 2009.

Analysis of Clinical Specimen

The methods employed for the analysis of clinical samples were the dipstick urinalysis and the culture method. Both methods were performed following the guidelines by the clinical and laboratory standard institute, 2009. All bacteria isolates were identified and characterized using their morphological, and biochemical characteristics following standard procedures described by Cowan and Steel (1974). Results were interpreted according to the guidelines of Clinical and Laboratory Standards Institute [4].

Antibiotic Susceptibility Testing

Antibiotic susceptibility testing was performed using disc diffusion method on Muller Hinton agar [1]. The commercial antibiotics discs used and the concentration for both gram positive and negative organisms were Ciproflox 10mcg, Norfloxacin 10mcg, Gentamycin 10mcg, Amoxil 20mcg, Streptomycin 30mcg, Erythromycin 30mcg, Chloramphenicol 30mcg, Ampiclox 20mcg and Levofloxacin 20mcg (Gram positive disc) and Tarivid 10mcg, Reflacin 10mcg, Ciproflox 10mcg, Augmentin 30mcg, Gentamycin 10mcg, Streptomycin 30mcg, Ceporex 10mcg, Nalidixic acid 30mcg, Septrin 30mcg and Ampicilin 30mcg (Gram Negative disc). The medium for the test was prepared according to manufactures directives and a 0.5 McFarland standard of the test organisms were inoculated onthe surface of the already prepared agar plate. The plates were allowed to stand for 30minutes to allow effective diffusion and then incubated at 37^{o}C for 18-24hrs. Zones of growth inhibition were then measured to the nearest millimeter and recorded. The MIC and MBC were evaluated using standard procedures. The organisms were identified as eitherresistance, intermediary or susceptible based on CLSI standard [5]. Control strain was used to check for the quality ofdisc and reagents.

RESULTS

Table 1 shows the prevalence of bacteriuria evaluation by culture according to gender and age.This reveals that out of the two hundred (200) midstream (MSU) urine samples analyzed, (28%, 56/200) were from the males while (72%, 144/200) were from the females. It also reveals that the incidence of UTIs was high in females compared to the males. In female, the incidence was high within the ages 26-36yrs(26.4%) and 59-70yrs (31.9%) while that of the males was high within the ages 48-58(26.8%) and 59-70yrs (39.3%). FIG.1. shows the percentage of growth, it was observed that (50.5%, 101/200) yielded significant growth, (35.5%, 71/200) yielded no significant growth while (14.0%, 28/200) yielded no growth. The relationship between nitrite positivity and significant bacteriuria were shown in Table 2 and FIG 2 respectively. Out of the two (200) hundred samples investigated, sixty five (65/200, 32.5%) were nitrite positive while (101/200, 50.5%) showed significant bacteriuria. Furthermore, all the nitrite positive samples showed evidence of significant bacteriuria and in addition, thirty six samples (36/200, 18%) of nitrite negative samples also showed evidence of significant bacteriuria. At $p < 0.05$, the result reveals that there was statistically significant association between culture method and significant bacteriuria. The culture method was therefore more diagnostic for detecting significant bacteriuria than using urinary nitrite technique. FIG. 3 shows the prevalence of bacterial isolates. This reveals that *Escherichia coli* were the most prevalent bacteria and account for 29.7% (30/101) of the total isolate.

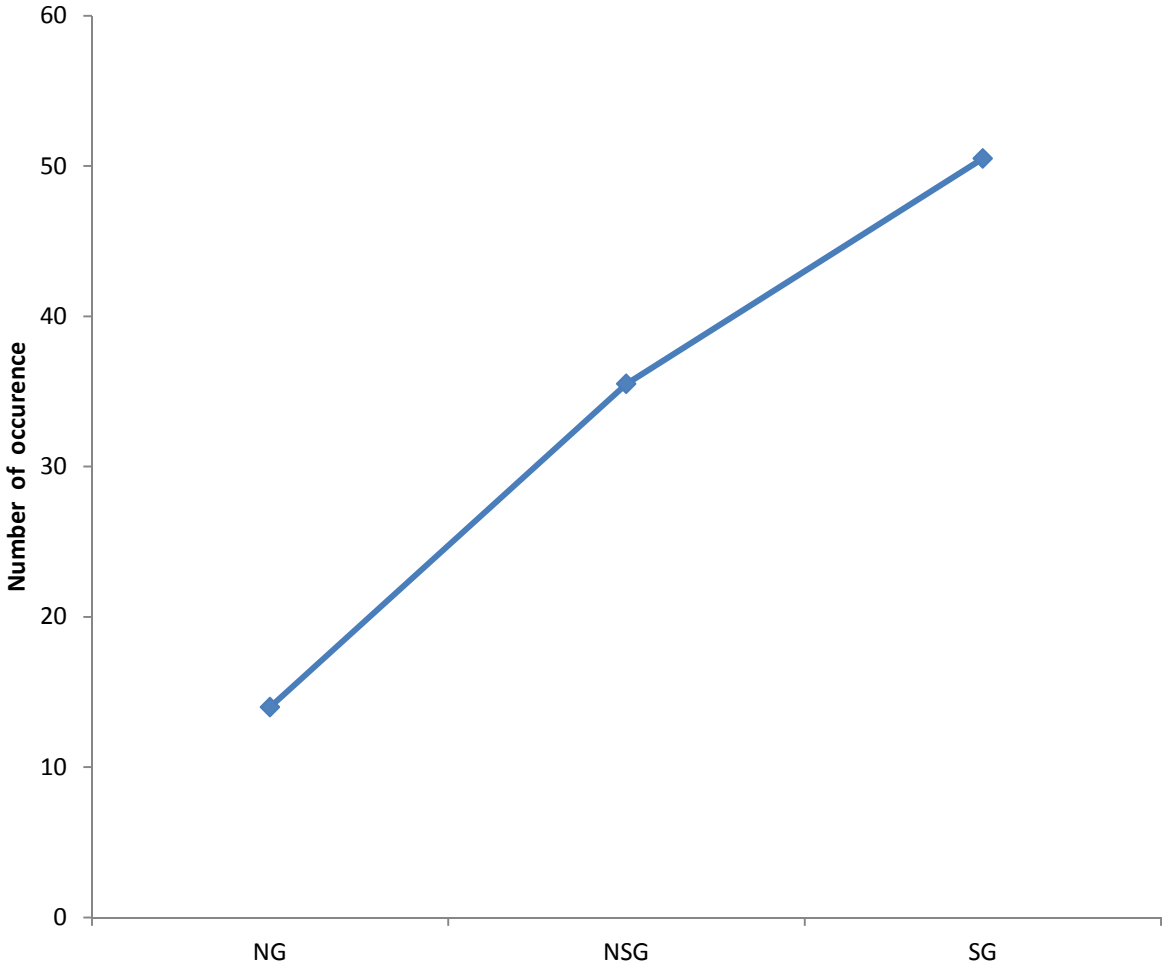

FIG.1. Frequency of occurrence of culture method
NG - No growth, NSG - No significant growth, SG - Significant growth

TABLE 2 Relationship between Urinary Nitrite Positivity and Significant Bacteriuria

CR	SBU (n=101, %)	PNT (n=65, %)	NSG (n=99, %)	NNT (n=135, %)	NNWSBU (n=36, %)
0-20	0(00.0)	0(00.0)	99(100.0)	99(73.3)	0(00.0)
21-41	7(06.9)	0(00.0)	0(00.0)	7(05.2)	7(19.4)
42-62	15(14.9)	0(00.0)	0(00.0)	15(11.1)	15(41.7)
63-83	14(13.9)	1(01.5)	0(00.0)	13(09.6)	13(36.1)
84-104	0(00.0)	1(01.5)	0(00.0)	0(00.0)	0(00.0)
105-125	15(14.9)	14(21.5)	0(00.0)	1(0.74)	1(02.8)
126-146	7(06.9)	6(09.2)	0(00.0)	0(00.0)	0(00.0)
147-167	9(08.9)	9(13.8)	0(00.0)	0(00.0)	0(00.0)
168-188	8(07.9)	8(12.3)	0(00.0)	0(00.0)	0(00.0)
189-209	6(05.9)	5(07.7)	0(00.0)	0(00.0)	0(00.0)
≥ 210	20(19.8)	21(32.3)	0(00.0)	0(00.0)	0(00.0)

CR =Colonial range; SBU = Significant bacteriuria; NT = Positive nitrite test ; NSG = No significant growth; NNT = Negative nitrite test NNWSBU =Negative nitrite with significant bacteriuria

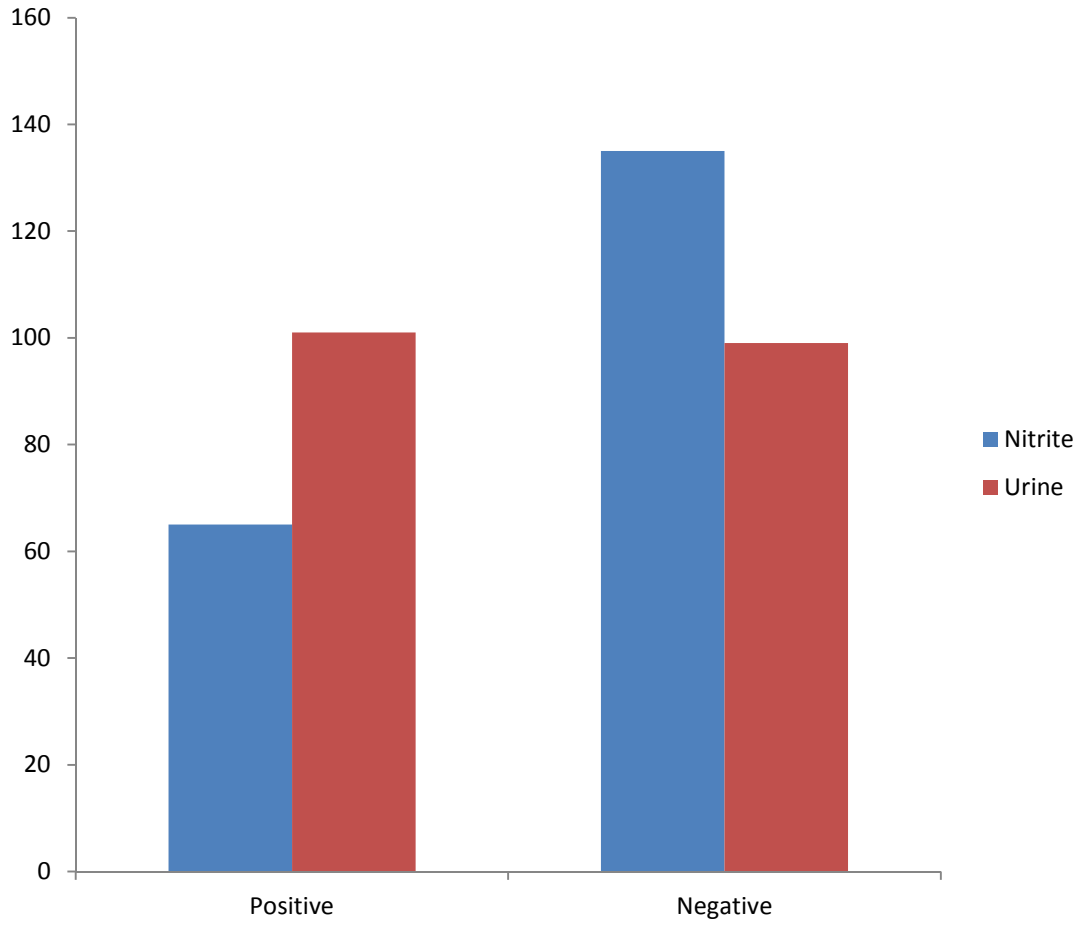

FIG.2. Result of urinary nitrite test and urine culture test

This was followed by *Pseudomonas aeruginosa* 14.9% (15/101), *Klebsiellapneumoniae* 13.8% (13/101) *Enterococcus faecalis* and *Citrobacterfreundii* 9.9% (10/101) *Proteus mirabilis* 8.9% (9/101), *Staphylococcus aureus* 7.9% (8/101), *Serretiamarcesens and Streptococcus spp* 3.0% (3/101).

The antibiotic sensitivity testing reveals that the isolates showed high sensitivity profile to Gentamycin (50%), Ciprofloxacin (83%), Tarivid (100%), Augumentin (50%) and Levofloxacin(100%). Intermediate susceptibility was observed with Streptomycin (50%) and Ceporex (66.7%) while high resistance profile of 100% was observed with Nalidixic acid, Septrin, Ampicillin, while the resistance of Reflacin was 66.7%. Almost all the Gram negative organisms showed a high level of susceptibility to Tarivid, Ciproflox, Gentamycin and Augumentin as shown in FIG. 4. *Escherichiacoli* were sensitive to Tarivid, Ciprofloxacin and Gentamycin. Intermediate susceptibility was observed with Reflacin, Ceporex, Augumentin and Streptomycin while resistance was observed with nalidixic acid, septrin and ampicillin. *Pseudomonas spp.* was sensitive to only Tarivid and Ciprofloxacin. *Klebsiella spp.* was susceptible to Tarivid, Ciproflox and Augumentin.*Citrobacter and Proteus spp*.showed the same susceptibility profile Tarvid, Ciprofloxacin, Gentamycin and Augumentin. *Serretia spp.* was susceptible to Tarivid, Gentamycin and streptomycin while resistance was observed with ampicillin, ceporex, augumentin, nalidixic acid, septrin and reflacin. The gram positive organism were highly susceptible to Gentamycin (100%), Levofloxacin (100%), and ciproflox (83%). As shown in FIG.5. *Enterococcus spp* was susceptible to Gentamycin (18.6mm) and Levofloxacin (18.3mm).*Staphylococcus spp.*was susceptible to Ciprofloxacin (19.3mm), Gentamycin(18.3mm) and Levofloxacin (18.6mm). Intermediate susceptibility was observed with Norfloxacin (16.3mm), Ampicolx (17.3mm) while Streptomycin (14.3mm), Erythromycin (12.0mm), Chloramphenicol (7.3mm) and Amoxil (4.3mm) were resistant. *Streptococcus spp.* was susceptible to almost all the antibiotics used, Ciproflox (18.3mm), Norfloxacin (18.0mm), Gentamycin (19.3mm), Levofloxacin (18.0mm), Ampiclox (19.3mm), Erythromycin (18.6mm) and Chloramphernicol (18.3mm). Intermediate susceptibility was only observed with Amoxil (16.3mm) while streptomycin (9.3mm) was resistant. Table 3 and 4 summarize the result of the antibiotics susceptibility study of both gram negative and positive organisms. Results were presented using their mean ± SME to show which is more effective. Table 5 also shows the summary of the MIC and MBC result performed on the different bacterial isolates. It was observed that the MIC for the different bacterial isolates ranged from 0.0625mcgml^{-1} to 0.125mcgml^{-1} while the MBC ranged from 0.25mcgml^{-1} to 0.5mcgml^{-1}.

TABLE 1 Prevalence of UTI according to age and gender

Age groups	Male (n=56, %)	Female (n=144, %)	Total (n=200, %)
15-25	5(08.9)	15(10.4)	20(10.0)
26-36	8(14.3)	30 (26.4)	54(27.0)
37-47	6(10.7)	25(17.4)	31(15.5)
48-58	15(26.8)	20(13.9)	35(17.5)
59-70	22(39.3)	46(31.9)	60(30.0)

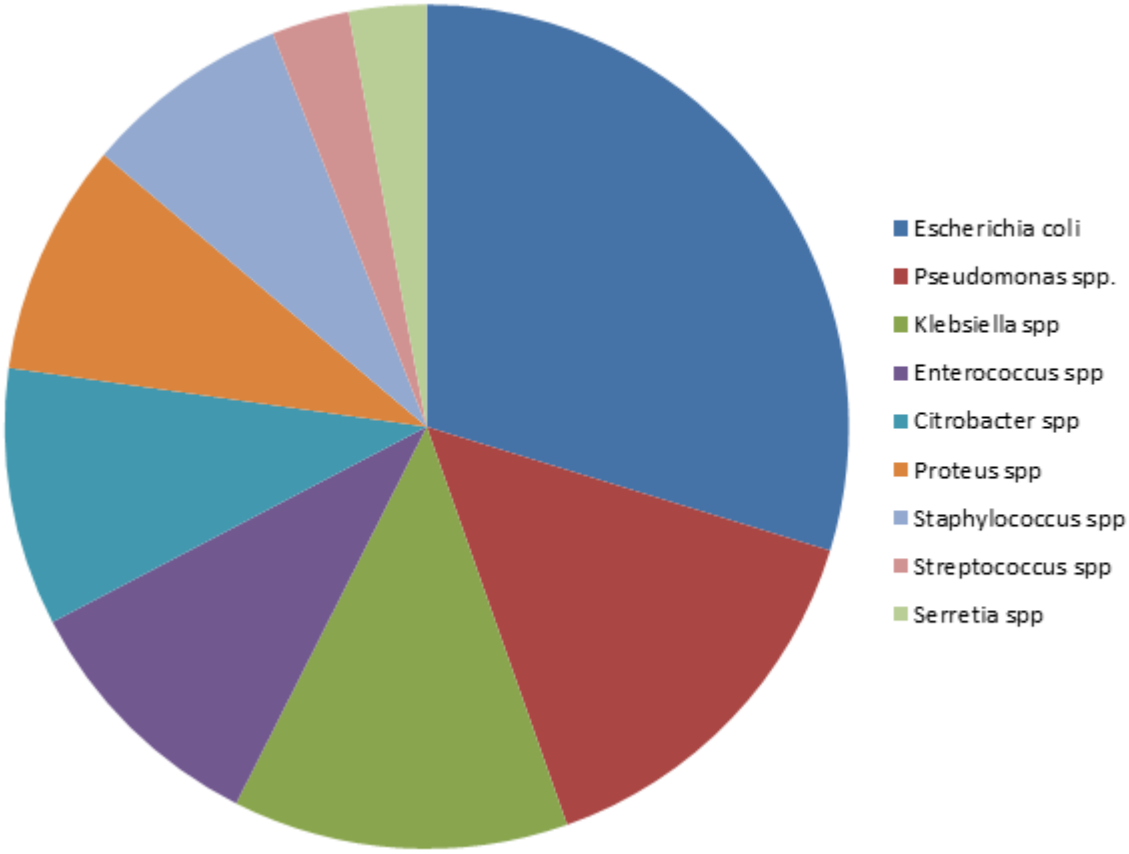

FIG.3. Frequency of occurrence of bacteria isolates

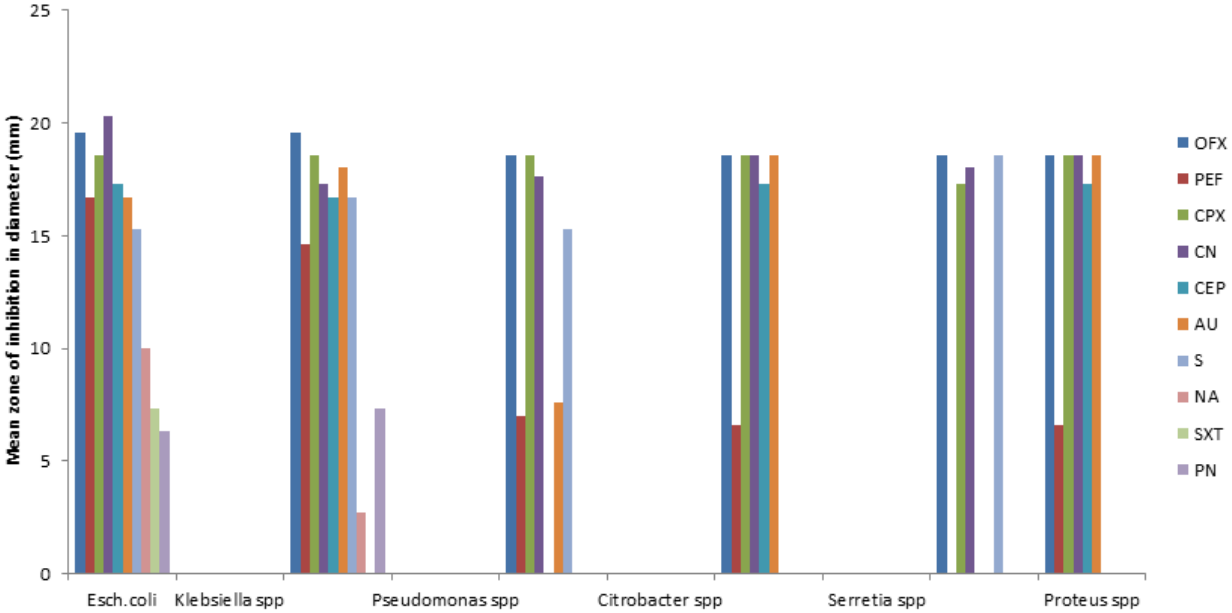

FIG. 4: Effect of different antibiotics tested against gram negative organisms
Tarivid(OFX), Reflacin(PEF), Ciproflox(CPX), Gentamycin(CN), Ceporex(CEP), Augumentin(AU), Streptomycin(S), nalidixic acid(NA), septrin(SXT), ampicillin(PN)

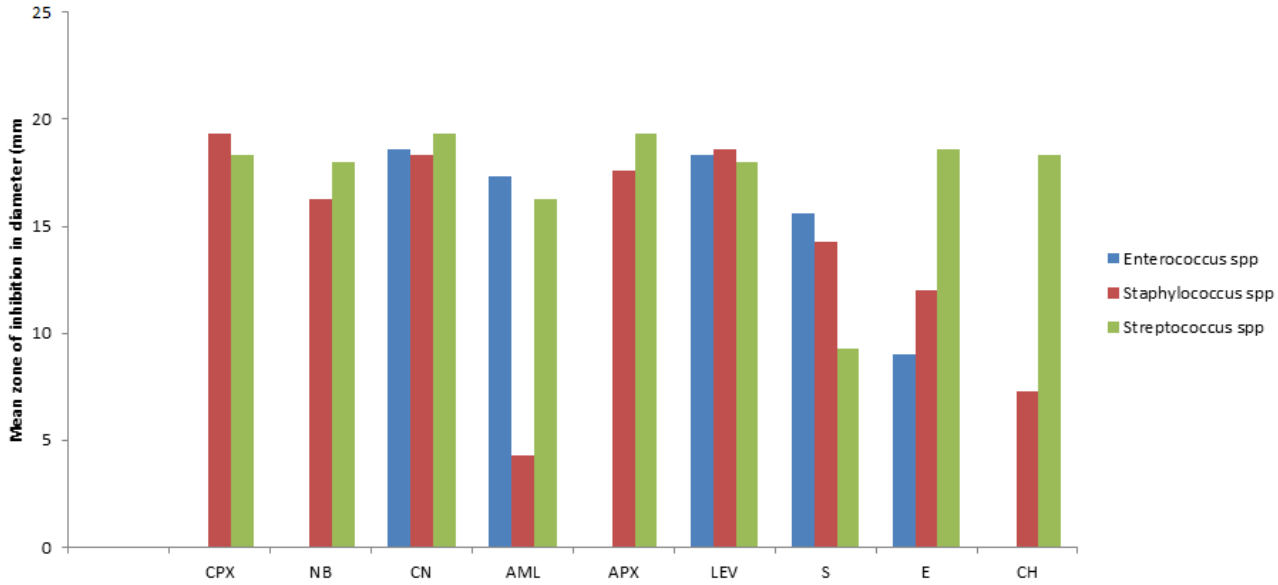

FIG. 5: Effect of different antibiotics on tested against gram positive organisms
Ciproflox(CPX),Norfloxacin(NB),Gentamycin(CN),Amoxil(AML),Ampiclox(APX), Levofloxacin(LEV), Streptomycin(S), Erythromycin(E), Chloramphenicol(CH)

TABLE 3 Effect of different antibiotics tested against gram negative organism in urinary culture

Organism	No of occurrence	OFX 10mcg	PEX 10mcg	CPX 10mcg	CN 10mcg	CEP 10mcg	AU 30mcg	S 30mcg	NA 30mcg	SXT 30mcg	PN 30m/g
E.coli	30	19.6± 0.33^{a}	16.6± 0.33^{cd}	18.6± 0.66^{ab}	20.3± 0.33^{a}	17.3± 0.33^{bc}	16.7± .066^{d}	15.3± 0.66^{d}	10± 1.15e	7.3± 1.33f	6.3± 0.33f
Peseudomonas	15	18.8± 0.66^{a}	7.0± 0.82^{c}	18.6± 0.66^{a}	17.6± 0.33^{ab}	0.100± 0.00^{d}	7.6± 0.88^{c}	15.3± .066^{b}	0.00± 0.00^{d}	6.3± 0.66^{c}	0.00± .00^{d}
Klebsiella spp.	13	19.4± 0.66^{a}	14.6± 0.66^{c}	18.6± 0.66^{a}	17.3± 0.66^{b}	16.7± 0.33^{b}	18.0± .00^{ab}	16.7± 0.66^{b}	2.7± .033^{e}	0.00± 0.00^{f}	7.33± 0.66^{d}
Citrobact spp.	10	18.8± 0.66^{a}	6.66± 0.66^{d}	18.6± .066^{a}	18.6± 0.66^{a}	17.3± 0.66^{ab}	18.6± 0.66^{a}	16.00± 0.00^{b}	10.6± 0.66^{c}	18.6± 0.66^{a}	16.7± 0.66^{b}
Proteus spp.	9	18.6± 0.66^{a}	6.66± .066^{d}	18.6± 0.66^{a}	18.6± 0.66^{a}	17.3± 0.77^{ab}	18.6± 0.66^{a}	16.00± 0.00^{b}	10.6± 0.66^{c}	18.6± 0.66^{a}	16.7± 0.66^{b}
Serretia spp.	3	18.3± 0.33^{a}	0.00± 0.00^{a}	17.3± 0.00^{a}	18.0± 0.00^{a}	0.00± 0.00^{a}	0.00± 0.00^{a}	18.6± 0.66^{a}	0.00± 0.00^{a}	0,00± 0.00^{a}	0.00± 0.00^{a}

Results are presented as mean ± standard error

≥18 Sensitive
15-17 Intermediary
≤ 15 Resistant

Mean (average) zone of inhibition with same letter superscript signifies no significant difference while those with different superscript letter along each horizontal array differ significantly at ($p<0.05$) from each other, this mean they is difference on the antibiotic effect on each isolate

TABLE 4 Effect of different antibiotics tested against gram positive organism in urine culture

Isolated organism	No of occurrence	10m/g CPX	10m/g NB	10m/g CN	20m/g AML	20m/g LEV	20m/g APX	20m/g RD	30m/g S	30m/g E	30m/g CH
Enterococcus spp.	10	0.00± 0.00^{d}	0.00± 0.00^{d}	18.6± 0.66^{ab}	17.3± 0.33^{ab}	18.3± 0.33^{ab}	0.00± 0.00^{d}	0.00± 0.00^{d}	15.6± 0.66^{b}	9.0± 1.00^{b}	0.00± 0.00^{d}
Staphylococcus spp.	8	19.3± 0.66^{a}	16.3± 0.33^{c}	18.3± 0.33^{ab}	4.3± 0.66^{g}	18.6± 0.66^{ab}	17.3± 0.33^{bc}	12.6± 0.66^{e}	14.3± 0.33^{e}	12.0± 1.15^{e}	7.3± 0.66^{f}
Streptococcus spp.	3	18.3± 0.33^{ab}	18.0± 0.00^{ab}	19.3± 0.66^{a}	16.3± 0.33^{c}	18.0± 0.33^{ab}	19.3± 0.66^{a}	9.6± 0.33^{d}	9.3± 0.66^{d}	18.6± 0.66^{ab}	18.3± 0.33^{ab}

≥18 Sensitive
15-17 Intermediary
≤15 Resistant

Mean (average) zone of inhibition with same letter superscript signifies no significant difference while those with different superscript letter along each horizontal array differ significantly at ($p<0.05$) from each other, this mean they is difference on the antibiotic effect on each isolate

TABLE 5 Summary of MIC and MBC on the different bacterial isolates

TEST BACTERIA	CPX mcg/ml		OFX mcg/ml		CN mcg/ml		LEV mcg/ml		AU mcg/ml	
	MIC	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**	**MIC**	**MBC**
Escherichia coli	0.125	0.50	0.25	0.25	0.125	0.50	0.125	0.50	0.125	0.25
Pseudomonas aeruginosa	0.125	0.50	0.25	0.25	0.0625	0.25	0.125	0.25	0.125	0.50
Klebsiella pneumonia	0.125	0.25	0.25	0.50	0.125	0.50	0.125	0.50	0.0625	0.25
Citrobacterfreundii	0.0625	0.25	0.125	0.25	0.125	0.25	0.625	0.50	0.0625	0.50
Proteus mirabilis	0.125	0.50	0.25	0.25	0.125	0.25	0.125	0.50	0.125	0.25
Serretiamarcenses	0.125	0.25	0.125	0.25	0.125	0.25	0.125	0.50	0.125	0.25
Enterococcus faecalis	0.125	0.25	0.25	0.25	0.125	0.25	0.125	0.50	0.0625	0.25
Staphylococcus aureus	0.0625	0.25	0.125	0.50	0.125	0.25	0.125	0.25	0.0625	0.25
Streptococcus spp	0.125	0.50	0.25	0.25	0.125	0.25	0.125	0.50	0.125	0.50

DISCUSSION

Urinary tract infections are among the most common infections affecting all age groups. It is usually associated with females and occurs mostly among women of reproductive age. However, this study was aimed at comparing the diagnosis of urinary tract infections (UTIs) using urinary nitrite and significant bacteriuria (SBU). My finding in this study reveals that the incidence of UTI was more prevalent in females compared to the males. This findings is in harmony with reports of other studies which shows that they are higher prevalence of UTIs in adult women than in men [8] [27]. This relatively high prevalence of UTIs in female is believed to be due to factors such as poor personal hygiene, promiscuity, drug abuse, use of contraceptives and the close anatomical relationship of the female urethra to the vagina [16]. The uropathogens identified in this study were mostly enterobacteriaceae and this is similar to those of other studies who confirms that enterobacteriaceac especially *E. coli* are the most predominant organism responsible for urinary tract infections [19]. The presence of these uropathogens in females actually calls for concern as some of these bacteria have been reported by several researchers that when present in significant proportions are able to cause miscarriages, prevent future conceptions, cause several complications in labour as well as risk for the fetus [18] [12].

The population studied comprises of both male and females' patients with age ranged between fifteen to seventy years. In male, the highest frequency of occurrence was observed in the age range between 59-70years (39.3%). The incidence is high because it is believed that most men at this age tend to develop prostate problems which are due to loss of prostate fluid and enlargement of the prostate gland. When this happens, it impedes and slows the flow of urine thus raising the risk of them developing UTIs [26]. In female, the highest occurrence was observed within the age's 26-36years (26.4%) and 59-70years (31.9%). This result is in line with other reports which identify that the incidence of UTIs in female increases gradually with age [8]. Within the age range, 26-36years, the high incidence is believed to be due to the fact that most females are sexually very active and most of them also use contraceptives. This action introduces a lot of bacteria into the urinary tract. For instance, during sexual intercourse, it is believed that bacterial are being massaged up the urethra into the bladder and this makes it liable to trauma and infection. Also between 59-70years, the high incidence may be due to menopause and estrogen loss [11] [20].

This biological change is known to put older women at risk of developing primary and recurring UTIs. With estrogen loss the walls of the urinary tract thin out, weakening the mucous membrane there by reducing its ability to resist bacterial colonization. Estrogen is known to maintain the normal acidity of vaginal fluid and also preventing bacterial colonization so loss of it can lead to serious health issues such as UTIs [24].

Escherichia coli were the most predominant organism accounting for 29.7% (30/101) of the total isolates. This finding is in concordance with studies of other researchers [9] which reveals that *E. coli* was the leading agent responsible for UTIs with 32.7% of the total isolates. This is partly so because *E. coli* is the most predominant bacteria in the gastro intestinal tract of human and as such it can easily move to the bladder after a bowel movement. Other uropathogens isolated from this study were *Pseudomonas aeruginosa* accounting for 14.9%, *Klebsiellapneumoniae* 12.8%, *Enterococcus faecalis* and *Citrobacterfreundii* 9.9%, *Proteus miribilis* 8.9%, *Staphylococcusaureus* 7.9%, *Serretiamarcesens* and *Streptococousspp* 3.0% respectively. These results is in line with other reports which reveals that members of the enterobacteriaceae are the most predominant organism responsible for urinary tract infections and that they formed a greater proportion of the microflora of gastro intestine tract [21]. This confirmed why gram negative rods were the most isolated organisms in this study and they accounts for 79.2% of the total isolates and gram positive organism accounts for 20.8% of the total isolates

The comparative diagnostic analysis of dipstick urinalysis and culture method evaluated shows that both methods can be used in the diagnosis of UTI but the culture method was more effective and reliable as most times the urinary

nitrite technique may result in false negative and positive result. This is in harmony with reports from several investigators who concluded that the dipstick urinalysis is not specific and cannot give a reliable result in the diagnosis of UTIs [22]. Also it was observed that 18% of the nitrite negative samples showed evidence of significant bacteriuria and as such, using urinary nitrite alone in the diagnosis of UTI may lead to a false negative and positive result which may lead to wrong diagnosis and exposing patients to the risk of unnecessary antibiotics. That is why recent studies of 75 papers carried out to establish whether negative dipstick urinalysis is sensitive enough to rule out UTI concluded that negative dipstick is insufficient to rule out UTIs [10]. At $p<0.05$, they was statistically significant association between the culture method and significant bacteriuria and as such, the culture method was more diagnostic for detecting significant bacteriuria than the use of urinary nitrite detection technique.

The antibiotic susceptibility study reveals that almost all the gram negative organisms were sensitive to Ciproflox(83%), Tarivid(100%), Augumentin (50%) and Gentamycin(50%). Their mean values ranged between 18.6-20.3 mm. This shows a high level of sensitivity as the result is in line with other reports [15] [25] who reported that quinolones and aminoglycoside were very effective in treating urinary tract infections. Nalidixic acid, reflacin, ampicillin and septrin showed 100% resistance among the gram negative organism with mean value ranging from 1.0-14.6mm. Nalidixic acid belongs to the first generation antibiotics and the oldest and as such they are more susceptible to the development of resistance. Also the resistant rate of these antibiotics may be due to the widespread use of this drug in hospitals when treating UTIs [2].

The gram positive cocci were also susceptible to Ciprofloxacin (83%), Levofloxacin (100%) and Gentamycin (100%). The high susceptibility of these organisms to quinolones is believed to be due to the fact that quinolones are broad spectrum and as such they exhibit excellent activity against a wide range of organisms both gram positive and negative organisms. This makes quinolones have unmatched safety profile. However, intermediary susceptibility was observed with ceporex (66.7%) and streptomycin (50%). This intermediary profile may be due to certain variables in the susceptibility test that may not have been properly controlled thereby altering the values which makes them becomes buffer zones separating susceptible from resistant strains.

Escherichia coli, Pseudomonas aeruginasa, Klebsiellapneumoniae, Citrobacterfreundii, Proteus mirbilis and Serretiamarcesens was observed to be highly resistant (100%) to Septrin which belongs to the group sulfamethoxazole. Formally, this was the drug of choice for treatment of UTIs but suddenly it has become so resistant that it can no longer be effectively used to treat UTIs. This high resistance is believed to be due to it over usage which is due its low cost. This observation is in line with that made by these researchers [17] that bacterial resistance to sulfonamides are now common and that sulphonamide resistant strains of *E. coli* and other enterobacteriaceac are common particularly in hospitals. Other gram positive organisms were resistant to erythromycin but shows a high susceptibility profile against *Streptococci spp* with mean value of 18.6mm. This result is in line with other reports from scholars like [13] which reports that erythromycin when used to treat UTI caused by *Streptococci* is highly effective and that strains resistant to erythromycin are rare among the sensitive *streptococci*. *Staphylococcus spp* shows a high susceptibility profile to Ciprofloxacin, Gentamycin and Levofloxacin, however, resistance was observed with Amoxil, Erythromycin, Chloramphenicol and Streptomycin. The resistant drugs in this study must therefore be selectively used when treating UTI and periodic monitoring and evaluation must be carried out before they are used. Recent studies in Europe and North America demonstrated an increasing resistance among uropathogens. In Spain, they were reports that 22-27% of *E. coli* was resistant to Ciproflox (Daza*et al.,* 2001). This report is in contrast to this study as it recorded high sensitivity profile of Ciprofloxacin to *E. coli* and other bacteria isolated in this study. The use of antibiotics has been of immense benefits in controlling the spread of many infectious diseases but this greatly depends on its careful usage to minimize the emergence spread of resistant strains as antibiotic susceptibility patterns to organisms changes rapidly due to over usage [28].

CONCLUSION

In conclusion, the results from this study reveals a high prevalence of urinary tract infection among the population studied and the data evaluation reveals that culture method is more diagnostic for detecting bacteriuria than using urinary nitrite technique which reliability is most times doubtful. More so, the use of antibiotics has been of immense benefit in controlling the spread of many infectious diseases but this greatly depends on its careful usage. Therefore antibiotic therapy should only be used after a thorough culture and antibiotic sensitivity test have been carried out to avoid the emergence and spread of antibiotic resistance strains. Also antibiotic therapy for the treatment of UTI should be based on sensitivity, tolerability and resistance as this will serve as a guide to clinicians for its prompt intervention.

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