Prevalence And Antibiogram Of Urinary Tract Infections Among Prison Inmates In Nigeria

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Citation

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Abstract

A total of one hundred and eight- one (181) urine samples were collected from prison inmates attending University of Nigeria Teaching Hospital, Bacteriological Centre. Of the total number screened, one hundred and forty-one 141 (77.9%) gave significant bacteriuria. Forty 40 (22.1%) showed no growth. Standard bacteriological methods and microscopy were used for the study. Echerichia coli was mostly isolated with a frequency of 47 (33.3%) followed by Klebsiella pneumoniae 28 (19.9%), Staphylococcus aureus 21 (14.9%), Proteus mirabilis 21 (14.9%), Citrobacter freundi 10 (7.1%), Staphylococcus epidermidis 7 (5.0%), Streptococcus faecalis 5 (3.5%) and Pseudomonas aeruginosa 2 (1.4%). In-vitro antibiotic susceptibility test showed that gram-negative isolates were sensitive to ciprofloxacin, nalidixic acid and gentamicin, whereas erythromycin and chloramphenicol were active against the gram-positive isolates. All the gram-negative isolates were sensitive to the quinolone drugs. These may therefore be the drugs of choice in the treatment of acute urinary tract infections

INTRODUCTION

Urinary tract infection (UTI), which is caused by the presence and growth of microorganisms in the urinary tract, is perhaps the single commonest bacterial infection of mankind. Numerous reports have also suggested the UTI can occur in both male and female patients of any age with bacteria counts as low as 100 colony forming unit (cfu) per milliliters in urine[1]. This is common in patients with symptoms of acute urethral syndrome, male with chronic prostatitis and patients with in-dwelling catheter[2]. Females are however believed to be more affected than males except at the extremes of life[3]. This is as a result of shorter and wider urethra[4]. The anatomical relationships comes from trauma during sexual intercourse as well as bacteria being massaged up the urethra into the bladder during pregnancy/childbirth[5].

The present study was aimed at the prevalence of urinary tract infections among prison inmates attending University of Nigeria Teaching Hospital (UNTH), Bacteriological center, and the antimicrobial susceptibility pattern of the isolates.

MATERIALS AND METHODS

STUDY POPULATION

A total of 181 patients clinically suspected as having urinary tract infection at the University of Nigeria Teaching Hospital (UNTH) were involved. They were made up of 115 females and 66 males with age ranging from 7-60 years.

COLLECTION OF SAMPLE

Mid stream urine were collected for both in and out prison patients attending University of Nigeria Teaching Hospital, Bacteriological Laboratory centre from July 30- August 2005. The patients were instructed on how to collect sample and the need for prompt delivery to the laboratory. The name, age and sex of the patients were properly labeled on the sterile universal container containing the urine sample.

PROCESSING OF SAMPLE/CULTURE

A modified semi-quantitative technique was employed by spreading a standard bacteriological loopful of urine over the surface of Cystine Lactose Electrolyte Deficient (CLED) agar plate. The loop used can transfer 0.01ml of urine sample. After inoculation, the plates were left on the blench for sometime, in order to allow the urine to be absorbed into the agar medium. The plates were then inverted and incubated at 37°C for 18-24 hours. The number of bacterial colonies were counted and multiplied by 100 to give an estimate of the number of bacteria present per milliliter of urine. A significant bacterial count was taken as any count equal to or in excess of 10^5 per milliliter.

IDENTIFICATION OF ISOLATES

Pure isolates of resulting growth were identified using biochemical method as described by Holt et al.[6]

ANTIBIOTIC SUSCEPTIBILITY TESTING

The agar diffusion technique as described by Bauer et al.[7] was used. Five colonies of the test organisms were streaked on agar plates using sterile inoculating wire loop. The appropriate multo-disc depending on whether the test organism plated was a gram negative or gram-positive organism was then placed firmly onto the surface of the dried plates, using sterile forceps. The plates were left at room temperature for one hour to allow diffusion of the different antibiotics from the disc into the medium. The plates were then incubated at 37°C for 18-24 hours. Interpretation of results was done using the zone sizes. Zone of inhibition of greater than 10mm were considered sensitive, 5-10mm moderate sensitive and no zone of inhibition resistant.

STATISTICAL ANALYSIS

The data were subjected to chi-square test using the method of Snedecor and Cochran[8]. Significance was accepted at $P < 0.05$ levels

RESULTS

Out of 181 urine samples diagnosed in this study, only 141 (77.9%) urine samples yielded bacterial isolates. There was absence of growth in 40 (22.1%) of the samples. 96 (68.1%) were females while 45 (31.9%) were males. This difference is statistically significant ($P < 0.05$). Among the isolates, Escherchia coli had the highest frequency of isolation with a frequency of 47 (33.3%), followed by Klebsiella species 28 (19.9%), Staphylococcus aureus and Proteus mirabilis showed equal frequency of isolation 21 (14.9%), Citrobacter freundi 10 (7.1%), Staphylococcus epidermidis 7 (1.4%). Pseudomonas aeruginosa had the lowest frequency of isolation 2 (1.4%). In overall, UTI was caused mainly by gram-negative organisms 108 (76.6%) than gram-positive organisms 33 (23.4%) Table 1

Table 2, showed the prevalence of urinary tract infection in relation to sex and age of patients. Results obtained showed that a high percentage of organisms were isolated from both males and females within the age bracket 16-24 years, 25-33 years and 34-42 years. However there were more cases in females than males.

Antibiotics susceptibility pattern of the microbial agents isolated (antibiogram) were showed in the Table 3. It was observed that gram positive isolates Staphylococcus aureus, Staphylococcus epidermidis, and Streptococcus faecalis were mostly sensitive to erythromycin, chloramphenicol and gentamicin. These isolates were resistant to the following antibiotics as follows, ciprofloxacin (cf), ampicillin (amp), nalidixic acid (nal) and tetracycline (tet). The gram-negative isolates were mainly sensitive to ciprofloxacin (cf), gentamicin (gen) and nalidixic acid (nal). The in-vitro sensitive testing showed that all gram-negative isolates were sensitive to ciprofloxacin (cf). Erythromycin and chloramphenicol were effective against the gram-positive organisms. Very high proportions of the organisms (gram positive and gram negative) were resistant to the following antibiotics, tetracycline, ampicillin, chloramphenicol and nalidixic acid.

Figure 1

Table 1: Frequency of isolation of organisms in relation to sex of patients and their overall percentage

Organism	No. of isolate		Overall %
	Male	Female	
Escherichia coli	7	40	47 (33.3)
Kleb. pneumonia	11	17	28 (19.9)
Citrobacter freundi	6	4	10 (7.1)
Pseud. aeruginosa	0	2	2 (1.4)
Proteus mirabilis	8	13	21 (14.9)
Staph. aureus	10	11	21 (14.9)
Staph. epidermidis	1	6	7 (5.0)
Strep. faecalis	2	3	5 (3.5)
Total	45	96	141 (100.0)

Figure 2

Table 2: Prevalence of urinary tract infection by age and sex

	Male		Female	
Ages	No. examined	No. positive (%)	No. examined	No positive (%)
7-15	4	2 (50)	6	4 (66.7)
16-24	14	8 (57.1)	22	19 (86.4)
25-33	18	12 (66.7)	37	32 (86.5)
34-42	22	18 (81.8)	28	25 (89.3)
43-51	5	3 (60)	15	11 (73.3)
52-60	3	2 (66.7)	7	5 (71.4)
Total	66	45 (68.2)	115	96 (83.5)

Figure 3

Table 3.: In vitro antibiotics sensitivity pattern of isolated organisms

Organism	No. Tested	CF	NAL	TET	AMP	ERY	CHI	GEN
Escherichia coli	47	100	78.7	63.8	10.6	10.6	19.1	89.4
Kleb. pneumonia	28	100	71.4	42.9	14.3	21.4	28.6	71.4
Citrobacter freundi	10	100	80.0	30.0	10	10	10	90.0
Pseud aeruginosa	2	100	50.0	0	0	0	0	50.0
Proteus mirabilis	21	100	81.0	51.4	9.5	4.8	14.3	85.7
Staph. aereus	21	28.6	0	57.1	4.8	90.5	85.7	81.0
Staph. epidermidis	7	28.6	14.3	57.1	14.2	100	85.7	85.7
Strep. faecalis	5	0	0	80.0	0	100	20	80.0

CF = Ciprofloxacin **TET** = Tetracycline **ERY** = Erythromycin

NAL = Nalidixic acid **AMP** = Ampicillin **CHL** = Chloramphenicol

GEN = Gentamicin

DISCUSSION

Urine is one of the sterile body fluids, but when it is colonized with bacteria, all the structures of the urinary tracts are at risk of being invaded. In this study one hundred and forty-one 141 (77.9%) urine samples from prison inmates in Nigeria gave significant growth and no bacterial growth was recorded in 40 (22.1%). The reason for the absence of the bacterial growth recorded in forty samples may be due to the fact that patients were under going antibiotics therapy collected from the prison yard clinic before coming to the hospital for diagnosis and as such the antibiotics must have inhibited or destroyed the pathogens[9].

In this study, the most predominant organisms isolated among the prison inmates attending the University of Nigeria Teaching Hospital were Echeriachia coli (33.3%) and Klebsiella pneumoniae (19.9%). This finding agrees with other reports which indicated that gram negative bacteria mostly E. coli and Klebsiella pneumoniae are the commonest pathogens isolated in patient with urinary tract infections[10,11]

The prevalence of UTI occurred more in females than males. Of the 141 isolates obtained 96 were from females while 45 were from males. These results also agree with other reports, which showed that UTIs are more frequent in females than males during adolescence and adulthood[1, 11,12].

The most useful antibiotics in this study were ciprofloxacin, nalidixic acid and gentamicin. This is because they inhibited commonly isolated gram-negative organisms, which constituted 76.6% of the total pathogens. This also agrees with other reports[10, 11].

Other antibiotics especially erythromycin and chloramphenicol were effective against gram-positive organisms. The other antibiotics used were poorly effective against majority of the organisms isolated. However the resistance observed among most organisms against the antibiotics used may be because these antibiotics have been in –use for a long period and must have been abused and as a result the organisms must have developed mechanisms of circumventing their mode of action[12]. As an evaluation of the efficacy of the quinolone drugs used, these drugs now appear as promising therapeutic agents for the treatment of acute urinary tract infection. This is evident in the results as presented in Table 3. Also a combination therapy especially aminoglycoside (gentamicin) with a penicillin for the treatment of acute urinary tract infection is promising as this may lead to increase activity of the drug.

The study has showed that susceptibility pattern is necessary to obtain sensitivity reports before start of antibiotic treatment in case of suspected urinary tract infection. However, the decision to use a particular antibiotic depends on its toxicity, cost and attainable level.

In conclusion, there is every need to constantly monitor susceptibility pattern of specific pathogens in different populations to commonly used antimicrobial agents. This will help to check emergence of resistance strains and thus help patient management. Quinolone drugs should be used as a stand by therapeutic agent for treatment failure and in life threatening conditions. The 100% sensitivity pattern to gram-negative organisms as shown in the results substantiates this claim

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