

PREVALENCE OF URINARY TRACT INFECTION AMONG STUDENTS IN A NIGERIAN UNIVERSITY

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ABSTRACT

The prevalence of urinary infection was assessed among students in the hostels of the University of Agriculture in Abeokuta, Ogun State, South Western Nigeria. One hundred and thirty-four urine samples were collected, assayed microbiologically. Sensitivity tests were also carried out on the isolates. The overall prevalence of urinary tract infection was 47%. Females (34.3%) were significantly ($p=0.0001$) more infected than males (12.7%) ($P < 0.00001$). There was no significant difference between the age groups and urinary tract infection ($P = 0.333$) although half of students in age groups 15 – 20 years and 21 – 25 years were infected. *Escherichia coli* occurred most frequently followed by *Proteus mirabilis*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. Most of the isolates were sensitive to Ampicillin, Gentamicin, Nitrofurantoin and Ofloxacin.

INTRODUCTION

Urinary tract infection is one of the major diseases that affect people of all age groups and sexes and can be separated into asymptomatic and symptomatic cases based on the pathogenesis of infection (Azubike et al., 1994). Urinary tract infections can also be categorized as ascending and descending. Infections which are confined to the urethral or the bladder are ascending and referred to as urethritis or cystitis respectively. On the other hand, the pathogens spread from another infected body site to the kidneys down along the ureter to the bladder. Such descending urinary tract infections cause severe kidney infection, a condition known as pyelonephritis (Parsons, 1985).

The normal urinary tract is sterile but gets infected with the normal flora by overcoming the natural defense of the normal sterile urinary tract, thus acting as opportunistic pathogens (Mekerron et al., 1984). The diagnosis of urinary tract is usually confirmed by microscopy, culture and biochemical /serologic assays of properly collected urine samples while the treatment of an individual that is infected is based on the antibiotic sensitivity patterns to the bacteria isolated. The urinary tract infection is most commonly caused by gram-negative bacilli in the family Enterobacteriaceae and usually belongs to genera *Escherichia*, *Proteus*, *Klebsiella*, *Enterobacter* and *Pseudomonas*.

The objective of this study is to find the pathogenic bacteria commonly associated with urinary tract infection among students living in the hostels of the University of Agriculture, Abeokuta, to characterize differences where they exist in the pattern of infection with respect to social and hygiene habits. It has also been observed that most of students generally abuse antimicrobial drugs whenever they suspect urinary tract infection. Thus, this study also considers antimicrobial sensitivity patterns of the pathogenic bacteria. The findings would assist the authorities of various institutions operating hostel accommodations to prevent and control urinary tract infections.

MATERIALS AND METHODS The University of Agriculture, Abeokuta (UNAAB) is located next to the Ogun-Oshun River Development Authority off the Abeokuta-Ibadan road in the North East end of Abeokuta with a student population of five thousand, six hundred and seventy-seven (5,677) of this number, only 474 of the students population are accommodated in the hostels.

Between January and April 2004, one hundred and thirty-four clean-catch midstream urine samples were collected from each student living in UNAAB hostels into a sterile screw capped plastic containers. Of the 134 urine samples, 65 (48.5%) while 69 (51.5%) were from female students Considerations were also given

to the age distribution of the source of samples. Students aged 15 – 20 years constituted 62 (46.3%) while those aged 21 – 25 years and 26 – 30 years were 48 (35.8%) and 24 (17.9) respectively.

Ten (10) ml of each urine sample was centrifuged at 2000 revolution per minute (rpm) for 5 minutes, the supernatant was discarded and the sediment examined microscopically for red blood cell (RBC), white blood cells (WBC), bacteria, blood parasites, casts, crystals and epithelial cells. Each urine sample was streaked with a sterilized platinum wire loop on MacConkey and Nutrient agar plates. The plates were incubated at 37°C for 18 hours to isolate growing microorganisms. Representative of growing colonies were picked with a wire loop, pure cultures were made with repeated streaking. Resulting pure cultures obtained were used for biochemical tests aimed at identifying the bacteria isolates. Isolates were particularly subjected to Gram staining, urease, methyl-red, oxidative-fermentation and Quellung reactions (Davidsohn and Henry, 1974).

The Kirby-Bauer antibiotics susceptibility disk diffusion technique was used for sensitivity tests (Kibry et al., 1966). The multi disc used contains the following antibiotics; Ampicillin (AMP) – 25 mcg; Gentamicin (GEN) – 10 mcg; Nitrofurantoin (NIT) – 200 mcg; Cotrimoxazole (COT)– 50 mcg; Ofloxacin (OFX) – 10 mcg; Cefuroxime (CER) – 30 mcg; Cephalexin (CEPH) – 25mcg; Tetracycline (TET) – 50 mcg.

RESULTS

The overall prevalence of urinary tract infection was 47% of which males were 17 (12.7%) and females 46 (34.3%). The computed chi-square (X²) analysis for the test of no association between sex and urinary tract infection presented in Table 1. A value of 22.05% which was statistically significant at less than 1% level was observed. Thus, the null hypothesis of no association is rejected.

The intensity of urinary tract infection within the age groups is presented in Table 2. The table also shows that half of the students in the age group 15 – 20 years 31 (23.1%) and 21 – 25 years 24 (17.9%) had urinary tract infection respectively.

Table 1: Prevalence of urinary tract infection by sex

Sex	Total number of samples examined	Urinary tract infection	
		Positive (%)	Negative (%)
Female	69	46 (34.4%)	23 (17.2%)
Male	65	17 (12.7%)	48 (35.8%)
Total	134	63 (47.0%)	71 (53.0%)

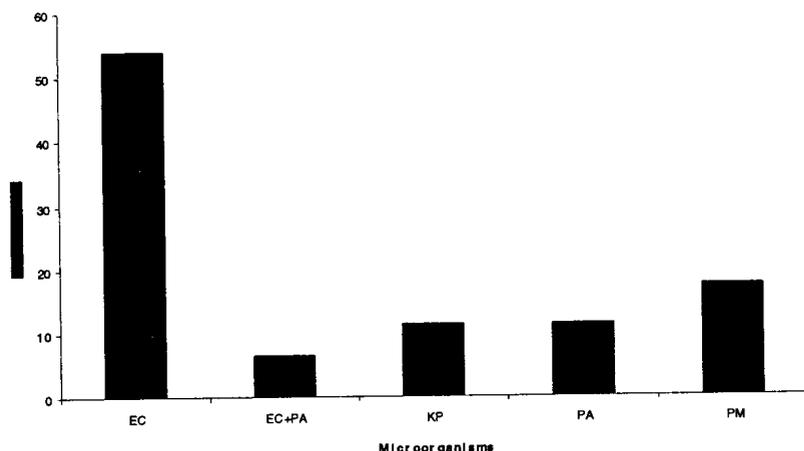
Table 2: Age-prevalence of urinary tract infection

Age (Year)	Total number of samples examined	Urinary tract infection	
		Positive	Negative
15 - 20	62	31 (23.1%)	31 (23.1%)
21 - 25	48	24 (17.9%)	24 (17.9%)
26 - 30	24	8 (6.0%)	16 (11.9%)
Total	134	63 (47.0%)	71 (53.0%)

Chi-square analysis for the test of no association between age and urinary tract infection gave a value of 2.197 which was statistically insignificant, hence, null hypothesis of no association was accepted

The frequency of distribution of microorganisms in urinary tract infection among the students is presented in Figure 1. *Escherichia coli* was highest in the prevalence followed by *Proteus mirabilis*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa* in equal frequency distribution and *Escherichia coli* with *Pseudomonas aeruginosa* in combination.

Figure 1: Frequency distribution of microorganisms involved in the urinary tract infection



EC = *Escherichia coli*; KP = *Klebsiella pneumoniae*; PA = *Pseudomonas aeruginosa*
 PM = *Proteus mirabilis*

Antibiotic sensitivity pattern of various isolates from urine samples is presented in Table 3. Most of the isolates were sensitive to Ampicillin, Gentamicin, Nitrofurantoin and Ofloxacin except *Pseudomonas aeruginosa* that is sensitive to Gentamicin and Ofloxacin only.

Table 3: Antibiotic sensitivity pattern of microorganisms isolated

Bacteria	Total no. of isolates	Frequency distribution of antibiotic sensitivity							
		AMP	GENT	NIT	COT	OFX	CER	CEPH	TET
*EC	34	38	38	38	0	38	0	0	0
EC + PA	4	-	-	-	-	-	-	-	-
KP	7	7	7	7	0	7	0	0	0
*PA	7	0	11	0	0	11	0	0	0
PM	11	11	11	11	0	11	0	0	0

* frequency included combined isolates

EC = *Escherichia coli*; KP = *Klebsiella pneumoniae*; PA = *Pseudomonias aeruginosa*; PM = *Proteus mirabilis*

DISCUSSION

The overall prevalence of urinary tract infection in this study was 47% and females were significantly ($p=0.0001$) more infected than males. Previous reports; (Ameil et al., 1973; Roberts et al., 1983; Hellstrum et al., 1991, Wammanda et al., 2000) of studies carried out in different parts of the world indicated higher incident among females than in males. The higher prevalence in females could be due to short urethral in females. Also, the spread of normal flora in faecal materials from the anus to the vaginal from where the bladder could be infected as a result of poor anal cleaning (Azubike et al., 1994) could be responsible for the observed results in female urine samples. Although 50% of the students aged 15 – 25 years had urinary

tract infection in the hostels, there was no significant difference between the age group and infection as observed in this study. This is in agreement with the report of Rumamoto *et al.*, 1999.

Of the species of bacteria recovered from the urine samples in this study *Escherichia coli* was the most frequently, followed by *Proteus mirabilis*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa*. This result contrasts the report of Azubike *et al.*, (1994) but agrees with most other reports (Svanberg-Eden and Cindo, 1979; Rotimi, 1984; Ritu *et al.*, 1986; Wammanda *et al.*, 2000). Most of the isolates were sensitive to antibiotics tested i.e. Ampicillin, Gentamicin, Nitrofurantoin and Ofloxacin. Most of the bacteria isolates encountered are normal flora of faecal materials. This is an indication of poor hygiene practices and poor sanitations in the hostel toilets. Therefore, the need for good personal hygiene practices among students residing in the hostels and in the community is pertinent.

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