

Occurrence of bacteriuria amongst inmates of Federal Neuropsychiatric Hospital Calabar, Nigeria.

Abstract

Aims: To determine the occurrence of bacteriuria, influence of gender and duration of illness on the prevalence of this infection among inmates of Federal Neuropsychiatric Hospital, Calabar.

Study design: Ethical approval, consent from the patients, questionnaire administration, collection and processing of clean catch mid-stream urine specimens.

Place and duration of study: Federal Neuropsychiatric Hospital Calabar, Nigeria between August, 2010 and September, 2011.

Sample: Urine samples from two hundred (200) inmates and one hundred (100) apparently healthy staff of the same hospital (control subjects).

Methodology: Urine samples were collected in sterile universal bottles and analyzed using standard laboratory diagnostic techniques and cultured using Lee and Williams technique. The modified Kirby-Bauer sensitivity testing technique was used for antimicrobial testing of the isolates.

Results: Significant bacteriuria was established in 60(30%) of the inmates while only 8(8%) of the control subjects had bacteriuria. The difference in infection between the inmates and the control subjects was statistically significant ($P = 0.001$). Females 40(40%) were more infected than male subjects 20 (20%) but this was not statistically significant ($P = 0.052$). Inmates with 16-20 weeks of duration of illness had the highest level of infection 4(40%) while inmates with 1-5 weeks of duration of illness had the lowest level of infection 12(28%) and this was statistically significant ($P = 0.001$). The commonest urinary pathogens isolated amongst both the test and control subjects were *Escherichia coli* (34) followed by *Proteus spp* (14) while *Staphylococcus saprophyticus* was the least isolated organism.

Conclusion: This work has shown that bacteriuria is common among inmates of Federal Neuropsychiatric hospital, Calabar and the need to put in place strategies to control this infection among this category of patients.

Key Words: inmates, Neuropsychiatric hospital, Urinary tract infection, Calabar.

Introduction

Surveillance of infections in psychiatric hospitals has faced operational difficulties owing to the required strategies based on available standard criteria to the unique needs of these patients population (Loving *et al.*, 1992). Some epidemiologic studies of infections in hospitals reported that the urinary tract infections (UTIs) are the most frequent infections in psychiatric inpatients (Haenen *et al.*, 1997; Reilly *et al.*, 2008; Muller *et.al.*, 1997). Factors associated with UTIs include age, gender, type of psychiatric disease, use of invasive devices such as catheter, and recently genetic background has been considered (Espuñes *et al.*, 2011). Application of antimicrobial agents for treatment of UTIs produces clinically relevant adverse reaction because of their interactions with psychotropic drugs prescribed to psychiatric patients (Espuñes *et al.*, 2011). The results from a survey to estimate the prevalence of health care associated infections (HAI) indicated that UTIs were the most common type of HAI in acute and non acute hospital inpatients; moreover, in non-acute hospital, 5% of psychiatric inpatients was affected by a HAI (Reilly *et al.*, 2008). According to a prevalence survey done in Norway of infections among hospitalized patients, the psychiatry ward presented the lowest rate of hospital infections and the UTIs were the most common infections among inpatients (Hoving *et al.*, 1981). This study was carried out to determine the occurrence of bacteriuria among inmates of Federal Neuropsychiatric Hospital, Calabar and the effects of gender and duration of illness on this category of patients with a view to suggesting new strategies the management of these patients in the study area.

Materials and Methods

Study Area

This study was carried out between August, 2010 and September, 2011 in Federal Neuropsychiatric Hospital, Calabar. This hospital is located in the centre of Calabar, the capital city of Cross River State, where people with mental illness within the state and the neighbouring cities come for treatment.

Subjects and Consent

A total of 200 subjects aged 15 to 50 years who were confirmed by the attending physicians to be a bit normal i.e. those inmates who can be asked to perform certain task and they will oblige and 100 apparently healthy staff of the hospital (control subjects) were investigated. Ethical clearance was sought and obtained from the ethical committee of the hospital. Informed consent was also sought and obtained verbally from the patient (or patient's relations for those below 18 years) before inclusion in the study. The unharmed nature and advantage of the research was also explained to each patient or their relation.

Collection of Samples

Patients after due counselling were enrolled consecutively for the study. Sterile universal bottles were issued to each subject for the collection of clean catch mid-stream urine specimen. The age, sex and hospital form numbers were recorded on the specimen bottles.

Questionnaire Administration

Questionnaires were also administered on each of the subjects for the following information; prior history of UTI, antibiotic usage, gender and duration of illness.

Processing of Urine Samples

Each urine specimen was cultured onto cysteine lactose electrolyte deficient agar (CLED) and blood agar using Lee and Williams's method (Leigh and Williams 1964). Specimens were also examined both macroscopically and microscopically. Gram stain and standard biochemical tests

were used to identify the organisms on the differential media. The media used included Sabouraud agar, serum and corn meal agar for identification of *Candida albicans*. *Staphylococcus aureus* was identified using catalase and coagulase tests including Mannitol salt agar as described by Stokes, (1975). *Escherichia coli* was identified using indole reaction in peptone water and Kligler's iron agar medium as described by Cruickshank *et al* (1975).

The modified Kirby-Bauer sensitivity testing technique was used for antimicrobial testing of the isolates (Bauer *et al.*, 1966). Organisms showing significant bacteriuria of 10^5 CFU/ μ l were inoculated into peptone water to match 0.5 Mcfarland turbidity standards (1.5×10^8 bacteria/ml) before spread plating on Muller Hinton Agar. Commercially prepared antimicrobial discs of known minimum inhibitory concentrations (MIC) were placed aseptically on the surface of the sensitivity agar after drying sufficiently and pressed down with sterile forceps to make enough contact with the agar. The plates were incubated at 37°C for 24 hours and the zones of growth inhibition determined. Thereafter sensitivity to a particular antibiotic was determined if the diameter of its zone of inhibition by a drug was greater than, equal to, or not more than 4mm less than that on the control culture (Cruickshank, *et al.*, 1975). The following antimicrobial sensitivity discs were used; Septrin (30 μ g), Chloramphenicol (30 μ g), Sparfloxacin (10 μ g) Amoxicillin (30 μ g) Augmentin (30 μ g), Gentamycin (10 μ g), Ofloxacin (30 μ g), and Streptomycin (30 μ g), Ciprofloxacin (10 μ g), Refloxacin (10 μ g).

Data Analysis

Statistical analysis was performed using a commercial statistical package: SPSS version 16.0 for windows and Microsoft Excel Tool Pak (SPSS for Windows: SPSS Benedeux, Gorinchem, Netherlands). The Chi-squared (X^2) test was used to test the variables according to age and gender. P-values < 0.05 were considered significant while $P > 0.05$ were considered not significant.

Results

Of the 300 subjects, 200 were patients on admission in Federal Neuropsychiatric Hospital Calabar while 100 were apparently healthy individuals (Control subjects) working in the same study area where the investigation was carried out. Out of the 200 test subjects, 60(30%) had urinary tract infection while 8 (8%) of the control subjects had infection. Table 1 shows the prevalence of urinary tract infection among subjects examined. The highest rate of infection in test subjects (71.4%) and control subjects (16.7%) were in age group 36-40 and 31-35 years, respectively. The lowest prevalence of infection in test subjects (0%) occurred in age group 21-25 while that of the control subjects occurred in the age groups 15-20, and 36-50 years, respectively. The rate of infection in test subjects who were 41 years and above was less. There was no statistically significant difference between the occurrence of infection in the test subjects and in the control subjects ($X^2 = 21.585$, $df = 6$, $p = 0.001$). The prevalence of urinary tract infection among patients examined by gender is shown on table 2. The highest prevalence of infection occurred in females (40%) while males had (20%). There was no statistically significant difference between the occurrence of infection in females and males ($X^2 = 3.778$, $df = 1$, $p = 0.052$).

Table 3 shows the prevalence of urinary tract infection in relation to the duration of illness among test subjects. The highest prevalence of infection occurred among test subject with illness range 16-20 weeks (40%) while the lowest occurred in the range 1-5 weeks (28.6%). There was a statistically significant difference between occurrence of infection and duration of illnesses ($X^2 = 180.0$, $df = 3$, $p = 0.001$). Table 4 shows the distribution of organisms isolated among test and control subjects examined. *Escherichia coli* has the highest frequency (88.2%) followed by *Proteus spp* (85.7%), *Pseudomonas aeruginosa* (83.3%), *Klebsiella spp* (85.7%), *Pseudomonas aeruginosa* (83.3%), *klebsiella spp* and *Staphylococci saprophiticus* has the lowest frequency but high percentage of (100%) respectively.

Table 1: Prevalence of bacteriuria among subjects examined by age

Age group (years)	Test Subjects		Control subjects	
	No. examined	No. (%) with infection	No. examined	No. (%) with infection
15-20	20	4(20)	22	0(0.0)
21-25	36	0(0.0)	26	2(7.7)
26-30	48	12(25)	36	4(11.1)
31-35	36	20(55.6)	12	2(16.7)
36-40	28	20(71.4)	4	0(0.0)
41-45	16	2(12.5)	0	0(0.0)
46-50	16	2(12.5)	0	0(0.0)
Total	200	60(30)	100	8(8.0)

Table 2: Prevalence of bacteriuria among subjects examined by gender

Sex	Test Subjects		Control subjects	
	No. examined	No. (%) with infection	No. examined	No. (%) with infection
Males	100	20(20)	50	0(0.0)
Females	100	40(40)	50	8(16)
Total	200	60(30)	100	8(8.0)

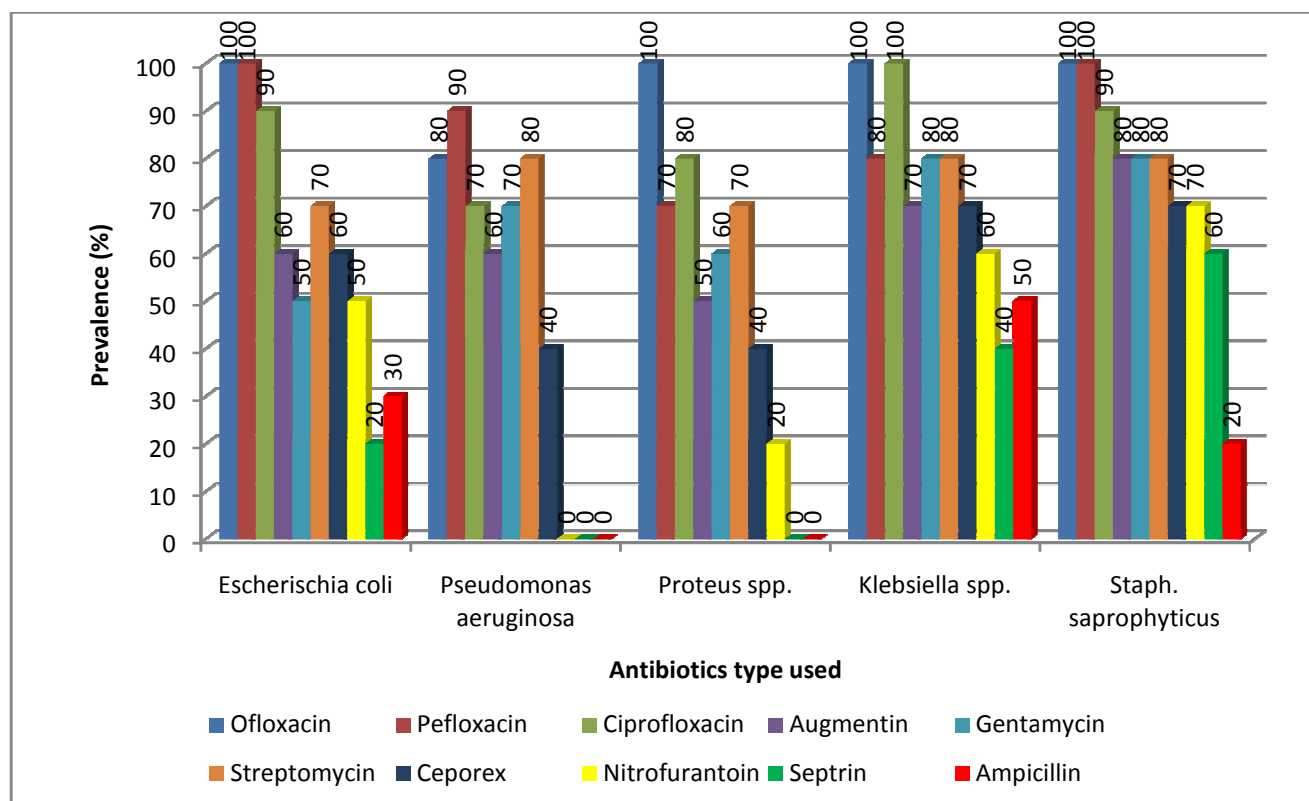
Table 3: Prevalence of bacteriuria among subjects examined according to duration of illness

Duration of illness (weeks)	No. examined	No. (%) with infection
1- 5	42	12(28.6)
6 -10	96	28(29.2)
11-15	52	16(30.8)
16 – 20	10	4(40.0)
Total	200	60(30.0)

Table 4: Distribution of organisms isolated among test and control subjects examined

Organisms isolated	No. of Organisms isolated	No. (%) of organisms isolated	
		Test subjects	Control subjects
<i>Escherichia coli</i>	34	30(88.2)	4(11.8)
<i>Pseudomonas aeruginosa</i>	12	10(83.3)	2(16.7)
<i>Proteus spp</i>	14	12(85.7)	2(14.3)
<i>Klebsiella spp</i>	6	6(100)	0(0.0)
<i>Staphylococci</i>	2	2(100)	0(0.0)
<i>Saprophyticus</i>			
Total	68	60(88.2)	8(11.8)

Fig. 1 shows the sensitivity pattern of all the bacterial isolates from the inmates. All the bacteria isolates were 100% sensitive to Ofloxacin except *Pseudomonas aeruginosa* which had 80% sensitivity level. *Pseudomonas aeruginosa* was resistant to Nitrofurantoin, septrin and ampicillin while Proteus was resistant to septrin and ampicillin. In all Oflooxacin, peflacine and ciprofloxacin showed a reasonable level of sensitivity (> 70%).



Discussion

Urinary tract infections (UTI) are common bacterial complication that is associated with morbidity but not mortality in psychiatric patients (Espuñes *et al.*, 2011). There is a relative paucity of research about the prevalence of UTIs in psychiatric population because UTIs are not always reportable diseases (Espuñes *et al.*, 2011). This study was an attempt to evaluate the prevalence of urinary tract infection (UTI) among inmates of Federal Neuropsychiatric hospital Calabar. Urinary tract infection was bacteriologically confirmed in 30% of subjects examined. This further confirms the report that high prevalence of UTIs are usually associated to mental conditions like changes in level of consciousness, periods of altered perception, disorganized speech, or lethargy (Juthani-Mehta *et al.*, 2009). The high prevalence of UTIs observed in this study may be as a result of the effect of the underlying host factors that complicate UTI in psychiatric conditions like lethargy, anxiety and Alzheimer disease and also genetic factors that may be involved in UTIs present in patients with mental problems (Espuñes *et al.*, 2011). This 30% prevalent rate in the test subjects was statistically significant compared to the 8% in the control subjects enrolled in this study.

The prevalence of urinary tract infection among patients examined by age showed a higher rate of infection among the age group 26-40 years; this may probably be due to the fact that this age bracket are active in terms of sexual intercourse which are common among people of this age range (Andriole *et al.*, 1985). Prevalence of UTI among patients examined by gender, showed a higher prevalence in females than in males and this was statistically significant. This is in agreement with other reports which stress that UTI is more frequent in females than males (Cheesbrough, 2002; Burbige *et al.*, 1984) and also probably due to the proximity of female urethra to the anal region. The duration of illness of psychiatric patients has a significant role in contributing to the UTI, because it has shown in this study that patients with long duration of illness 16 – 20 weeks (40%) have more infection than those with shorter duration 1- 5 weeks

(28.6%). The organism may have been self introduced by the patients or introduced into the urinary tract through invasive means (Creasy *et al.*, 2014). *Escherichia coli*, *Proteus* spp and *Pseudomonas aeruginosa* were the commonest bacterial organisms isolated. This can be compared to that of Gabastou *et al.*, 1995 and Sáinz *et al.*, 2008 who reported the most frequently isolated bacteria strains in psychiatric patients with UTIs to include *Escherichia coli*, *Proteus mirabilis*, *Klebsiella* spp. This finding is also similar to other reports which indicated that *Escherichia coli* were the commonest pathogen isolated in patients with UTI (Burbige *et al.*; 1984; Ebie *et al.*; 2001). It has also been reported that *Escherichia coli*, *Pseudomonas aeruginosa*, *Proteus vulgaris* are normal flora of the gastro intestinal tract and so could easily contaminate the urinary tract (Creasy *et al.*, 2014).

Conclusion This work has shown that bacteriuria is common among inmates of Federal Neuropsychiatric hospital, *Escherichia coli*, *Proteus* spp and *Pseudomonas aeruginosa* were the commonest bacterial organisms isolated and females were more infected probably due to the proximity of their urethra to the anal region. We therefore recommend the need to put in place strategies to control this infection among this category of patients in our environment.

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