



## Asymptomatic Urinary tract Infections in Psychotic Patients at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

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### Abstract

The prevalence of asymptomatic urinary tract infections in psychotic patients and the sensitivity of isolated bacteria to commonly used antibiotics were determined. Clean voided mid-stream urine samples were obtained from 60 psychotic and 60 non-psychotic patients at the university of Port Harcourt teaching hospital (UPTH), Rivers state, Nigeria. The patients were made up of both males and females aged between 16 and 60 years. All the urine samples were cultured for the presence of bacteria which were identified on the basis of cultural characteristics and biochemical tests using standard methods. From the results, 9(15%) bacterial isolates were obtained from psychotic patients and 12 (20%) bacterial isolates from non-psychotic (control) patients. *Escherichia coli* with 4 (44.4%) isolates was the most predominant organism, followed by *Staphylococcus aureus* with 3(33.3%) and *Staphylococcus spp.* with 2 (22.2%) isolates in the psychotic patients. In the non psychotics, *Klebsiella spp.* with 4 (33.3%) isolates was the most predominant, followed by *Staphylococcus aureus* with 3 (25%), *Escherichia coli* and *Pseudomonas aeruginosa* with 2 (16.7%) isolates respectively and *Proteus spp.* with 1 (8.3%) isolate. Antibiotic sensitivity test was done using different antibiotics by the agar diffusion method and their zones of inhibition recorded. The overall results obtained indicated varied patterns of antibiotic sensitivity and resistance. There was no statistically significant difference at  $p>0.05$  observed in the antimicrobial sensitivity tests for both groups and no significant relationship was established between level of hygiene and the psychotic state.

**Keywords:** Urinary tract infection, asymptomatic, psychotic patient, antibiotic sensitivity, urine.

### Introduction

Urinary tract infections (UTIs) often involve proliferation of bacteria in the urinary tract resulting in infection of one or more parts of the urinary system such as the kidney, ureters, bladder or urethra. Urine formed in the kidney is a sterile fluid that serves as a good culture medium for multiplication of bacteria<sup>1</sup>. Urinary tract infections can be grouped into asymptomatic and symptomatic cases based on the pathogenesis of the infection and it is a disease that commonly affects people of all age groups and sexes<sup>2</sup>. Asymptomatic bacteriuria has, however, been found to be closely related to age<sup>3</sup>. Urinary tract infections have no regard for age or gender and bacterial counts can be as low as 100 colony forming units (CFU) per millimeter of urine<sup>4,5</sup>.

In asymptomatic urinary tract infections symptoms are usually absent despite the colonization of the urogenital tract by a sizeable population of pathogenic bacteria. In healthy women, the prevalence of bacteriuria increases with age, from about 1 percent in females aged 5 to 14 years to more than 20 percent in women above 80 years living in the community<sup>6</sup>. Organisms isolated in patients with asymptomatic bacteriuria will be influenced by patient variables: healthy persons will likely have *E. coli*, whereas a nursing home resident with a catheter is more likely to have multi-drug-resistant polymicrobial flora such as

*Pseudomonas aeruginosa*.<sup>7</sup> *Enterococcus spp.* and gram-negative bacilli are common in men<sup>8</sup>. It is necessary to distinguish contamination from infection. Quantitative criteria for identifying significant bacteriuria in an asymptomatic person are: at least 100,000 colony-forming units (CFUs) per ml of urine in a voided midstream clean-catch specimen and at least, 100 CFUs per ml of urine from a catheterized specimen<sup>9-11</sup>. It should be noted, however, that urine will permit growth of bacteria and if there is to be a delay of up to two hours or more in transporting samples or in setting up cultures in the laboratory then it should be refrigerated at 4°C; this will also preserve the white cell count during sample collection<sup>10,12</sup>.

Psychosis refers to a disorder of mind and behavior with characteristic distortion of the thought process and perception, and may impair personality and cognitive functions. The sufferer is usually said to have lost touch with reality and often referred to as a psychotic. People with psychosis may have: hallucination – a sensory perception in absence of external stimuli; and delusions – an unshakable belief, usually false, often not in agreement with the individual's academic and socio-cultural status<sup>13</sup>. As a result, decisions, responses and actions taken on account of this belief are often contrary to the society's expectations of the patient.

## Material and Methods

Urine samples were collected from 60 psychotic patients and 60 non-psychotic patients who served as the control group. The patients were aged between 16 and 60 years. The study population was made up of both in-patients and out-patients at the Department of Mental Health of the University of Port Harcourt Teaching Hospital (UPTH), Rivers state. Mid-stream clean catch urine was collected in sterile universal containers from the patients<sup>14-16</sup>. Demographic data was obtained by means of a structured questionnaire. Before culture, the urine was mixed by inverting the container and physical examination was performed by observing the colour for cloudiness. A loopful of each urine sample was streaked onto cystine lactose electrolyte - deficient (CLED) agar and incubated at 37°C for 24 hours<sup>9</sup>. The plates that showed significant growth were selected and the colonies were aseptically isolated using an inoculation loop and subsequently sub cultured onto agar slants for use in further tests.

The colonies on the agar plate were observed and the total number and types counted and recorded. Cultural characteristics such as size, shape, and color of these colonies helped to identify what type of bacteria were present while the number of colonies served as an indication of the quantity of bacteria originally present in the urine sample. A total colony count of 100,000cfu/ml (200cfu per 0.002ml) was taken as significant growth<sup>9</sup>. Antimicrobial sensitivity test was also carried out for the isolated bacteria using commercially prepared antibiotic discs.

Chi-square and one tailed Fisher's exact test were used to calculate probabilities and determine significance. A p-value of less than or equal to 0.05 was considered to be statistically significant ( $p \leq 0.05$ ).

## Results and Discussion

Out of the 60 samples obtained from psychotic patients enrolled in this study, 9 (15%) showed heavy and appreciable bacterial growth while 51 (85%) had no appreciable bacterial growth as seen in table 1. In the samples obtained from the control subjects, 12 (20%) had appreciable bacteria growth while 48 (80%) had no appreciable bacteria growth.

As shown in figure 1, out of the 9 isolates obtained from the psychotic patients, 5 (55.6%) were Gram-positive bacteria while 4(44.4%) were Gram-negative bacteria. The Gram positive bacteria isolated were 3(33.3%) of *Staphylococcus aureu* and 2 (22.2%) of *Staphylococcus spp.* *Escherichia coli* was predominant amongst the Gram-negative bacteria isolated.

Figure 2 shows the distribution of isolates in the non-psychotic group. Gram-negative bacteria were more prevalent than the Gram-positive ones, constituting 9 (15%) of the total isolates. These included *Escherichia coli* 2 (16.7%), *Klebsiella spp.* 4 (33.3%), *Pseudomonas aeruginosa* 2 (16.7%) and *Proteus spp.* 1 (8.3%).

Gram positive bacteria accounted for 3 (25.0%) of the total isolates which was predominantly *Staphylococcus aureus*.

Tables 2 and 3 show the result of antimicrobial sensitivity test of the isolates in both groups of patients. A high level of susceptibility of the organisms to most of the antibiotics was seen. The antimicrobial sensitivity test results show that the isolates from both groups of patients were generally highly susceptible to ciprofloxacin, cotrimoxazole, pefloxacin, augmentin, levofloxacin, rifampicin, amoxil, streptomycin, and gentamicin. There was however, a notable resistance to nalidixic acid in the gram negative bacteria as seen in table 2.

Table 4 shows the antimicrobial sensitivity test result of *E.coli* and *Staph.aureus* isolates from both groups of patients. The differences observed in the sensitivity of the two isolates from the two groups of patients was not statistically significant. The observed differences in the susceptibility of the isolates, *E.coli* and *Staph. aureus* from the two groups of patients to the tested antimicrobial drugs is also not statistically significant at a significance level of 5% ( $p > 0.05$ ) as seen in table 5 and 6.

**Discussion:** This study reports the microbiological examination of urine samples of 60 psychotic patients aged between 16 and 60 years. This investigation showed that the incidence of asymptomatic urinary tract infections in this population was 15.0%. The most predominant bacteria isolated from the urine samples in this study was *E. coli* (44.4%), followed by *Staph. aureus* (33.3%) and *Staph. spp.* (22.2%). This finding is similar to other reports which indicate that Gram-negative bacteria, particularly *E. coli* is the most commonly implicated pathogen in patients with urinary tract infections<sup>4,17,18</sup>. However, results from control subjects revealed the following bacterial isolates: *Klebisella spp* (33.3%), *Staph.aureus* (25.0%), *E. coli* (16.7%), *Pseudomonas aeruginosa* and *Proteus spp* (18.3%). This is in line with the findings of previous works<sup>1,19</sup> which found *Klebisella spp.* to be more prevalent than *E. coli* in urinary tract infections. The high incidence of *E.coli* in psychotic patients could be attributed to the fact that it is a commensal of the bowel and that infection is mostly by fecal contamination due to poor hygiene. Indeed, the impaired thought process which is most central in psychosis worsens the sufferer's capacity for sound reason and judgement. The sense of hygiene of such a patient will obviously be poor. Furthermore, the higher incidence of bacterial pathogens seen in females among both populations is in agreement with current generally established findings that urinary tract infections are more common in females than in males and may be attributable to the fact that commensals of the intestine are more involved in urinary tract infections especially in females and also because of the anatomic proximity of the urethra to the genito-urinary area of their urinary system<sup>3,16</sup>. Improper wiping after urination or defecation can result in transfer of organisms from the anus to the distal urethra and the enteric bacteria *E.coli* is commonly implicated in most urinary tract infections in women in whom its endogenous spread from the perianal region to the distal

urethra is easily accomplished. It has also been noted, however, that although improper personal hygiene plays a role in the development of urinary tract infections, there are other contributory factors as recent investigations have shown that certain strains of *E.coli* are better able to colonize the urethra than others<sup>9,10</sup>. Other pathogens isolated in order of prevalence include *Pseudomonas aeruginosa*, *Staph. aureus*, and *Staph. spp.* and in the control subjects, *E.coli*, *Pseudomonas aeruginosa*, and *Proteus spp.* This also revealed that the isolated pathogens in this study were coliforms which are index organisms of safety, good hygiene and sanitary quality. This conforms to the report that the dominant etiologic agents

accounting for more than 85% of cases of urinary tract infections are the Gram-negative bacilli which are normal flora of the intestinal tract<sup>20</sup>. The prevalence and degree of occurrence of one or two of these organism over others are however, dependent on the environment<sup>1</sup> From the information obtained by the use of questionnaires, about 90% of the psychotic patients had not had sexual intercourse in the last six months unlike in the control patients where about 60% were sexually active. This may be a contributing factor to the lower incidence of asymptomatic urinary tract infections in the result for psychotic patients since sex is one of the predisposing factors to UTIs<sup>21</sup> as seen in the result of this research.

**Table-1**  
**Distribution of Urinary Tract Infection (UTI) in relation to sex of patients**

Sex	Psychotic patients			Non psychotic patients		
	No. tested	No. positive	No. negative	No. tested	No. positive	No. negative
Females	24	7	17	29	8	21
Males	36	2	34	31	4	27
Total	60	9	51	60	12	48

**Table-2**  
**Antibiotics sensitivity pattern of isolates of gram negative bacteria from psychotic and non psychotic patients**

	Psychotic				Non psychotic							
	<i>E.coli</i>	<i>E.coli</i>	<i>E.coli</i>	<i>E.coli</i>	<i>E.coli</i>	<i>Kleb. spp.</i>	<i>Pseudo spp.</i>	<i>E.coli</i>	<i>Kleb. spp.</i>	<i>Kleb. spp.</i>	<i>Preteus spp.</i>	<i>Pseudo. spp.</i>
CPX	S	S	S	S	S	S	S	S	S	S	S	S
SXT	S	S	S	S	S	S	S	S	S	S	S	S
S	S	S	S	S	S	S	S	S	S	S	R	S
PN	S	R	S	S	S	S	S	S	R	S	R	S
CEP	S	R	S	S	S	S	S	R	S	S	S	S
OFX	S	R	S	S	S	S	S	S	S	S	S	S
NA	R	R	S	S	R	R	S	R	R	R	R	S
PEF	S	S	S	S	S	S	S	R	S	S	S	S
CN	S	S	S	S	S	S	S	S	S	S	S	S
AU	S	S	S	S	S	S	S	S	S	S	S	S

**KEY:** CPX - ciprofloxacin 10µg , SXT - co-trimoxazole 30µg, S - streptomycin 30µg, PN - ampicillin 30µg, CEP - cefpodoxime 10µg, OFX - ofloxacin 10µg, NA - nalidixic acid 30µg, PEF - perfloracin 10µg, CN - gentamicin 10µg, AU - augmentin 30µg, R – resistant, S-sensitive.

**Table-3**  
**Antibiotics sensitivity pattern of isolates of gram positive bacteria from psychotic and non -psychotic patients**

	Psychotic				Non psychotic				
	<i>Staph. spp.</i>	<i>Staph. aureus</i>	<i>Staph. aureus</i>	<i>Staph. Aureus</i>	<i>Staph. spp.</i>	<i>Staph. aureus</i>	<i>Staph. aureus</i>	<i>Staph. Aureus</i>	
CPX	S	S	S	S	S	S	S	S	
E	S	S	S	S	S	S	S	R	
LEV	S	S	S	S	S	S	S	S	
CN	S	R	S	S	S	S	S	R	
APX	S	S	S	S	S	S	S	R	
RD	S	S	S	S	S	S	S	S	
AMX	S	S	S	S	S	S	S	S	
S	S	S	S	S	S	S	S	S	
NB	S	S	S	R	R	S	S	R	
CH	S	S	S	S	R	S	S	R	

**KEY:** CPX - ciprofloxacin 10µg, E - erythromycin 30µg, LEV - levofloxacin 20µg, CN - gentamicin 10µg, APX - ampiclox 20µg, RD - rifampicin 20µg, AMX - amoxil 20µg, S - streptomycin 30µg, NB - norfloxacin 10µg, CH - chloramphenicol 30µ R – resistant, S – Sensitive.

**Table-4**  
**Antimicrobial sensitivity profiles of bacteria isolates from urine samples of the patients tested**

Organism	Psychotic	Non psychotic	P – value
<i>E.coli</i>	4	2	0.3552
<i>Staph. Aureus</i>	3	3	0.6601

**Table-5**  
**Antimicrobial sensitivity profiles of *E.coli* isolates from urine sample of the patients tested**

Antibiotics	Isolates sensitive to antimicrobial drugs		p-value
	Psychotic	Non-psychotic	
CPX	4	2	0.7273
SXT	4	2	0.7273
S	4	2	0.7273
PN	3	2	0.6515
CEP	3	1	0.6667
OFX	3	2	0.6515
NA	2	0	0.5357
PEF	4	1	0.5758
CN	4	2	0.7273
AU	4	2	0.7273

**KEY:** CPX - ciprofloxacin 10µg , SXT - co-trimoxazole 30µg, S - streptomycin 30µg, PN - ampicillin 30µg, CEP - cefpodoxime 10µg, OFX - ofloxacin 10µg, NA - nalidixic acid 30µg, PEF - pefloxacin 10µg, CN - gentamicin 10µg, AU - augmentin 30µg

**Table-6**  
**Antimicrobial sensitivity profile of *Staphylococcus aureus* isolates from urine samples of the patients tested**

Antibiotics	Psychotic	Non psychotic	p-value
CPX	3	3	0.7165
E	3	2	0.6082
LEV	3	3	0.7165
CN	2	2	0.7381
APX	3	2	0.6082
RD	3	3	0.7165
AMX	3	3	0.7165
S	3	3	0.7165
NB	2	2	0.7381
CH	3	2	0.6082

**KEY:** CPX - ciprofloxacin 10µg, E - erythromycin 30µg, LEV - levofloxacin 20µg, CN - gentamicin 10µg, APX - ampiclox 20µg, RD - rifampicin 20µg, AMX - amoxil 20µg, S - streptomycin 30µg, NB - norfloxacin 10µg, CH - chloramphenicol 30µg.

**Antimicrobial sensitivity result:** The highest antimicrobial resistance against *E.coli* was observed in nalidixic acid with 50% resistance in psychotics and 100% resistance in non psychotics. Some researchers<sup>22,23</sup> had reported nalidixic acid as the drug of choice for the treatment and management of asymptomatic bacteriuria in pregnant women and symptomatic bacteriuria in general. There were also reports that nalidixic acid was effective against different types of gram negative bacteria such as *E.coli* and *Klebsiella aerogenes* in uncomplicated UTIs<sup>22,23</sup>. In contrast, this study revealed a low sensitivity of these organisms to nalidixic acid as all the gram negative isolates such as *E.coli*, *Klebsiella spp.* and *Proteus spp* from different patients in the control group were resistant to it. *Psuedomonas aeruginosa* only showed a very low sensitivity to it. This finding is in agreement with Bhargavi and co-workers<sup>24</sup>

who reported a higher percentage of resistance of Gram negative bacteria to nalidixic acid. Most of the isolates in both groups were highly susceptible to ciprofloxacin, gentamicin, erythromycin, levofloxacin, ampiclox, ofloxacin, streptomycin, and pefloxacin as had earlier been reported in some studies<sup>25,26</sup>. The high susceptibility observed in the fluoroquinolones, in terms of measured zone of inhibition may be due to the fact that they are relatively more expensive and newer antimicrobial drugs and thus therefore less available for abuse. 55.5% of all isolates were resistant to at least one antibiotic in the psychotic patients while the control subjects 58.3% of all isolates was observed to be resistant to at least one antibiotic.

The difference in the colonization rate of *E.coli* and *Staph. aureus* in psychotic and non psychotic patients was not

significant at 5% level of significance ( $p > 0.05$ ) as seen in table 4. Furthermore, insignificant difference in the comparative mean zones of inhibition of the isolates to the various

antibacterial agents implies that equal level of resistance was exhibited by the isolates for both *E.coli* and *Staph.aureus* (Table 5, 6) in the two groups of patients ( $P > 0.05$ ).

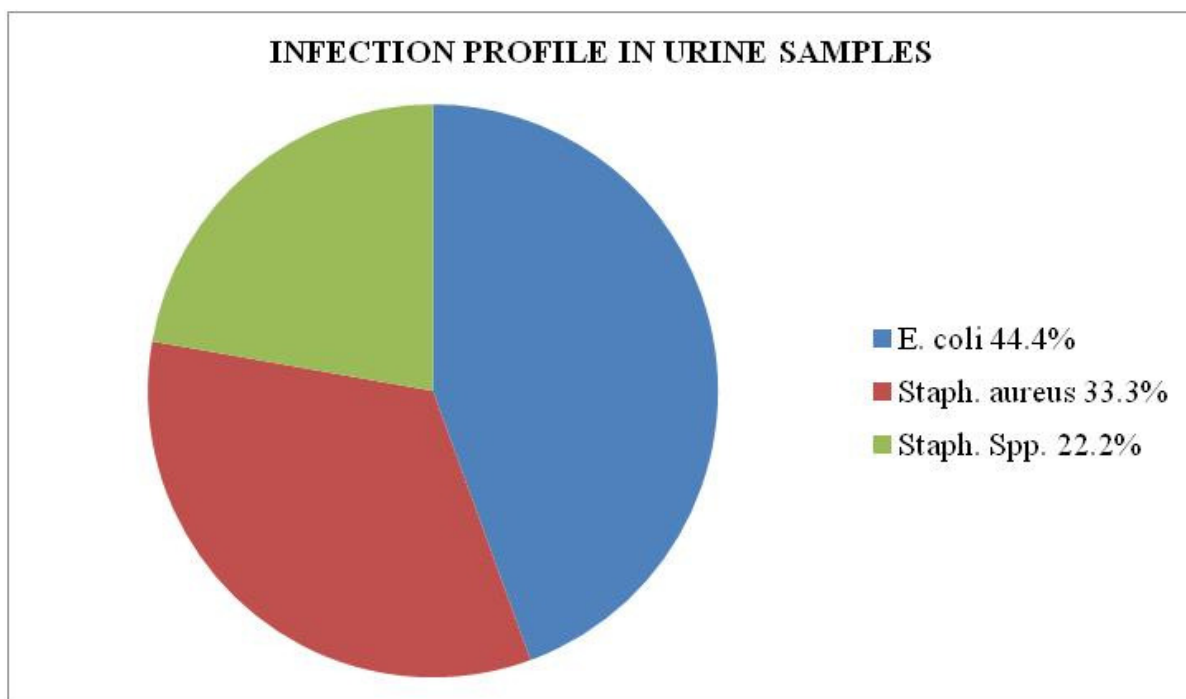


Figure-1  
Percentage distribution of isolated organisms in psychotic patients

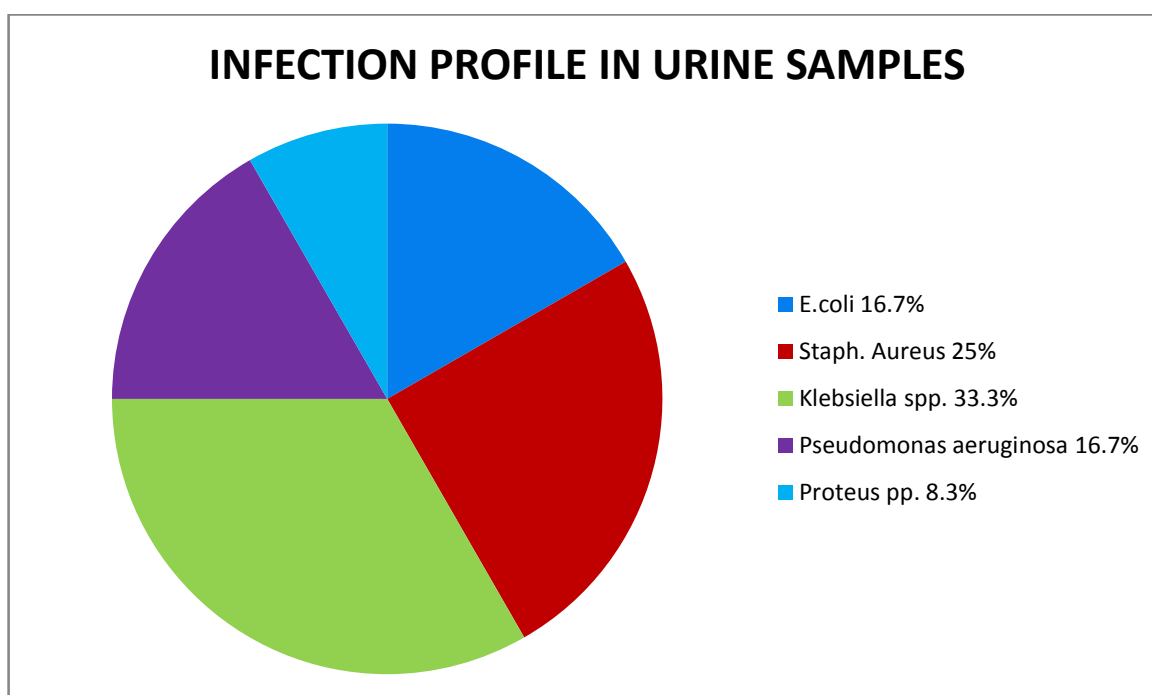


Figure-2  
Percentage distribution of isolated organisms in non psychotic patients

## Conclusion

The study found that *E. coli* and *S. aureus* are the more common isolates and principal etiological agents of asymptomatic UTIs and they are generally susceptible to ciprofloxacin, pefloxacin, ofloxacin, streptomycin, and gentamicin even though susceptibility to antibiotics is more precise on individual basis.

After statistical analysis it was concluded that the incidence of asymptomatic urinary tract infection in psychotics and non psychotics was not significantly different at 5% level of significance suggesting that psychotic state is not a major contributory factor to bacterial colonization and there is no activity or behavior of any of the groups, which may unduely predispose them to *E.coli* or *S.aureus* infection.

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