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Survey of urinary tract infection among male students residing in the federal polytechnic, Ado-Ekiti

O. O. JULIUS *, V. O. OLUWASUSI and J. A. OYEBODE

Department of Science Laboratory Technology, Microbiology Unit, Federal Polytechnic, P.M.B. 5351, Ado-Ekiti, Ekiti State, Nigeria.

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Abstract

Urinary tract infections are among the most common bacterial infections in humans both in the community and hospital settings, and they occur in all age groups, and usually required urgent treatment. This study aimed at determining the prevalence of urinary tract infection among male students residing in the Federal Polytechnic, Ado-Ekiti, Ekiti State, Nigeria. Clean-catch midstream urine was collected from fifty (50) male students in the study area into clean sterile specimen bottles. The urine samples were processed and microbial isolates identified. The prevalence of urinary tract infection was significantly high (50%). Five bacterial strains were identified which are; *Staphylococcus saprophyticus*, *Staphylococcus aureus*, *Escherichia coli*, *Enterococcus faecalis* and *Pseudomonas aeruginosa*. *S. aureus* was found to be the most prevalent and predominant bacterial causing urinary tract infection in males in the study area. The best choice of active antibacterial agents would be trimethoprim, cephalosporin and Fluoroquinolones in the treatment of urinary tract infections in male.

Keywords: Assessment; Bacterial; Male students; Urinary tract infection

1. Introduction

A urinary tract infection (UTI) is a bacterial infection that affects any part of the urinary tract. Symptoms include frequent feeling and/or need to urinate, pain during urination, and cloudy urine. The main causal agent is *Escherichia coli*. Although urine contains a variety of fluids, salts, and waste products, it does not usually have bacteria in it, but when bacteria get into the bladder or kidney and multiply in the urine, they may cause a urinary tract infection (UTI) (Aiyegoro *et al.*, 2007). A urinary tract infection (UTI) is a condition where one or more parts of the urinary system (the kidneys, ureters, bladder and urethra) become infected. Urinary tracts infections are the most common of all bacterial infection and can occur at any time in the life of an individual (Aiyegoro *et al.*, 2007).

Almost 95% of cases of urinary tract infections are caused by bacteria that typically multiply at the opening of the urethra and travels up to the bladder much less often, bacteria spreads to the kidney from the blood stream. Urinary tracts infections are caused by the presence of bacteria urine, although fungi and viruses could be involved (Green *et al.*, 2010).

Majority of men have recurrent infection within one year (Ojo and Anibijuwon, 2010). *Escherichia coli* causes 75 – 90% of uncomplicated UTIs, whereas *Staphylococcus saprophyticus* causes an estimated 5 – 15% of UTIs frequently in younger women. *Enterococcus* and other gram – negative rod other than *E. coli* have also been implicated in some cases (Benjamin *et al.*, 2009).

* Corresponding author: O. O. JULIUS

Urinary tract infection occurs in both acute and chronic forms. In the former patient complain of severe and low back pain that may associate with fever due to the associated bacteriamia, while in the later, a sensation of perennial fullness is felt (Vorland *et al*, 2001).

The common source of *E. coli* infections in women is the faecal flora. The higher prevalence in female as compared with males is attributed to the shortness of female urethra and so is more liable to contamination during sexual intercourse, urethra massage and even urination with chronic flora that resides in perineal skin. It also includes the effects by turbulence of the urinary stream (Starr and Taggart, 2002). This research aimed at assessing the rate of urinary tract infections among students, especially male gender resident within the campus of the Federal Polytechnic, Ado-Ekiti, Nigeria.

2. Material and methods

2.1. Study Population

Fifty (50) male students residing in the campus of the Federal Polytechnic, Ado-Ekiti were recruited for this study. Each of these students gave a written consent of their willingness to participate in the study.

2.2. Collection of urine specimen

Sterile sampling bottles were given to each student to collect their first urination in the morning into clean voided, mid-stream urine (msu). Specimens were collected from 50 male students residing in the campus of Federal Polytechnic, Ado-Ekiti. Each of them was instructed on the mode of collection of the mid-stream urine that is, during forceful urination after the first 10 – 20 mL has been voided. They were adequately educated on precautions to prevent contamination of specimen.

2.3. Microbiological Analysis

All glass wares were sterilized in hot air oven at 160 °C for 15 minutes. 2.8 g of nutrient agar was weighed and dissolved in 100 mL of distilled water. It was properly mixed and put inside autoclave and it was placed on sterile bench and allowed to cool.

A serial dilution of the urine sample was made inside ten test tubes by measuring or pipetting 5 mL of distilled water into each of the ten test tube. The urine sample was properly shaken and 1ml of the urine sample was pipette into 0.01 mL of test tube and mixed properly from which 1ml was pipette into 0.02ml test tube and mixed properly and transferred into 0.03 mL and 0.010 mL respectively i.e. 10^1 , 10^2 , 10^3 , etc.

Each of the test tubes was labeled properly with reference to the student name initials. From the serial dilution, 0.03 mL was poured into sterile Petri dishes i.e. 20 Petri dishes and the sterile nutrient agar was poured on it and was properly mixed and it was allowed to gel. It was incubated for 24 hours at 37 °C.

2.4. Biochemical Identification of Organisms

Gram's Reaction: The smears of the isolates were prepared on clean grease-free slides and heat-fixed. Then 2 drops of Crystal violet was added and left for 60 seconds, and followed by Gram's iodine for 60 seconds. The slides were rinsed with water and decolorized using alcohol for 15 seconds and then rinsed with water. The decolourized slide was counter stained with Carbol fuchsin for 60 seconds. It was rinsed off using water. The slides were air-dried and viewed under the microscope using oil immersion lens.

Calatase Test: Three (3) mL of hydrogen peroxide were pipette into a test tube. Wire loop was flamed to red hot and allowed to cool. It was then used to pick the organism and dropped inside the hydrogen peroxide inside the test tube. The test that gives bubbles indicates the presence of *Staphylococcus aureus* while the organism picked that gives no bubbles shows the presence of *Streptococci pneumoniae* which denotes negative (no bubbles) and positive test (with bubbles).

Oxidase test: A smear of 24 hours old culture was made on a filter paper that was soaked with the substrate of freshly prepared oxidase reagent (tetramethyl-p-phenylenediamine). When cytochrome C oxidase is present, it oxidizes the reagent tetramethyl-p-phenylenediamine to indophenols purple color end product which indicated a positive reaction. When the enzyme is not present, the reagent remains reduced and is colorless which indicated a negative reaction (Olutiola *et al.*, 2000).

3. Results

Physical parameter of male students' urine samples collected and screened is shown in table 1. It shows the age, colour and appearance; the age range was between 21 and 28, the colours observed on the urine samples were pale yellow, yellow and white, while the appearance showed 50% turbidity and 50% clear.

Table 2 shows the biochemical characteristics of bacterial isolates from the male urine sample. Five bacterial organisms were identified which are; *Staphylococcus saprophyticus*, *Staphylococcus aureus*, *Escherichia coli*, *Enterococcus faecalis* and *Pseudomonas aeruginosa*. Some isolates were gram positive cocci, while some were gram negative rod.

Staphylococcus aureus were the most predominant isolate causing UTI in males; this is followed by *Staphylococcus saprophyticus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Enterococcus faecalis* was the least with a prevalence of 4.4% (Table 3).

A total of fifty samples were examined for presence of bacteria. 50% were found to be positive for urinary tract infections. The percentage frequency of occurrence of these bacterial isolates is depicted in figure 1. *S. aureus* was found to have the highest frequency of occurrence (52.2%); followed by *S. saprophyticus* (26.1%), *E. coli* (10.1%) and the least frequency of occurrence was found in *P. aeruginosa* (7.2%).

Table 1 Physical parameters of male urine samples

S/N	Age	Colour	Appearance
1	27	Yellow	Turbid
2	23	Yellow	Clear
3	23	Pale yellow	Clear
4	25	Yellow	Clear
5	25	White	Clear
6	22	Yellow	Turbid
7	22	Yellow	Turbid
8	26	Yellow	Turbid
9	26	Pale yellow	Turbid
10	24	Pale yellow	Turbid
11	23	Yellow	Turbid
12	24	Pale yellow	Clear
13	26	Yellow	Clear
14	24	Yellow	Turbid
15	28	Yellow	Clear
16	27	Yellow	Clear
17	25	Yellow	Turbid
18	22	Yellow	Turbid
19	25	Yellow	Turbid
20	29	White	Clear
21	25	Pale yellow	Turbid
22	20	Yellow	Clear
23	25	Yellow	Turbid

24	21	White	Clear
25	21	Yellow	Clear
26	22	Yellow	Turbid
27	26	Yellow	Turbid
28	28	Yellow	Turbid
29	28	Pale yellow	Clear
30	21	Pale yellow	Clear
31	25	White	Clear
32	22	Pale yellow	Clear
33	22	Yellow	Turbid
34	24	Yellow	Turbid
35	27	Pale yellow	Clear
36	23	Yellow	Clear
37	23	Yellow	Clear
38	27	Yellow	Turbid
39	25	Yellow	Clear
40	22	Yellow	Clear
41	24	Yellow	Turbid
42	26	Yellow	Turbid
43	21	Yellow	Turbid
44	22	Yellow	Clear
45	24	Yellow	Turbid
46	24	Yellow	Clear
47	28	Yellow	Clear
48	23	Pale yellow	Turbid
49	25	Pale yellow	Clear
50	22	Yellow	Turbid

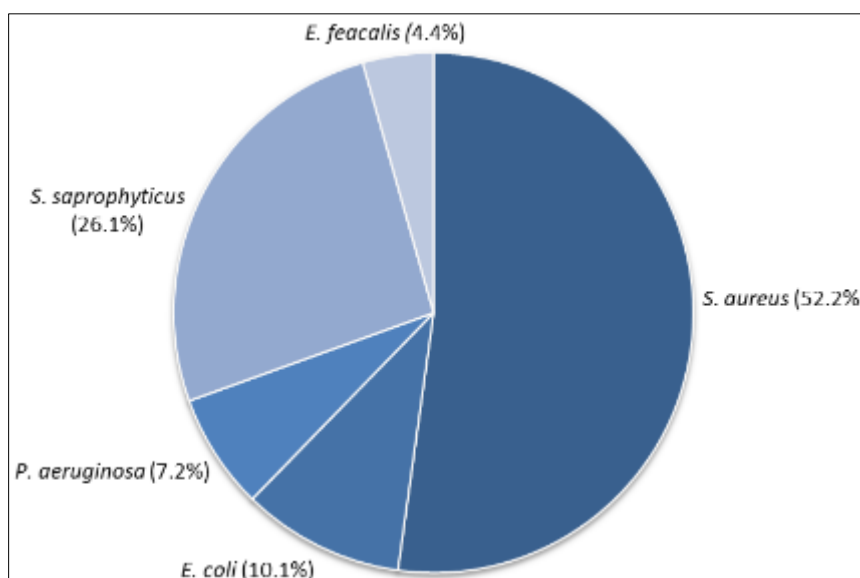
Table 2 Biochemical characteristics of isolates from male urine samples

Isolates	Gram stain	Catalase	Motility	Indole	Suspected bacterial
1	+ cocci	+	+	-	<i>Staphylococcus saprophyticus</i>
2	+ cocci	+	-	-	<i>Staphylococcus aureus</i>
3	- rod	+	+	+	<i>Escherichia coli</i>
4	+ cocci	-	-	-	<i>Enterococcus faecalis</i>
5	- rod	+	+	+	<i>Pseudomonas aeruginosa</i>

+ = positive; - = negative

Table 3 Prevalence of uropathogens

Isolated organisms	Number (%)
<i>S. aureus</i>	36(52)
<i>E. coli</i>	7(10.1)
<i>P. aeruginosa</i>	5(7.2)
<i>S. saprophyticus</i>	18(26.1)
<i>E. faecalis</i>	3(4.4)
Total	69(100%)

**Figure 1** Frequency (%) of occurrence of bacterial isolates from male urine

4. Discussion

Fifty (50) urine specimens were examined for presence of urinary tract infections (bacteria). 25 students were found positive for urinary tract infections; having not less than 10^3 colony forming units of bacteria per 1ml of clean voided, mid-stream urine. The organisms that grow on the plates, however, other did not have any bacteria growth. This could be due to indiscriminate consumption of antibiotics by the students since some of them confessed using non prescribed antibiotics whenever they found any difficulty in urination. An oral interview was made apart from collecting the urine, whether they have indulge in drug abused and whether they have toilet disease or sexual transmitted diseases before. Questions were also asked about the condition of their toilet whether it is clean or dirty.

The doubtful bacteria i.e. the bacteria that did not grow on plate could also be due to contamination during specimen collection. Although, the students were all educated on how to collect the specimen aseptically, maximum efficiency cannot be guaranteed since most of the students are not sterility conscious.

There is also a possible link between the prevalence of urinary tract infection among the students and the level of personal hygiene or the state of the toilet facilities in the hostel. Most of the students examined rated the hostel toilet as bad; bad in this content implies that some students used the toilet and leave it unflushed and when it is dirty therefore, there is accumulation of urine sediment forming a thick scum. In this case, students could be a factor that predisposes people to urinary tract infections.

Staphylococcus aureus were the predominant isolate causing UTI in this study. This agrees with previous reports of Drew *et al.* (2005) and Aiyegoro *et al.* (2007). However two recent studies in Benin City (urban settlement), Nigeria

indicate *Staphylococcus aureus* as the predominant isolate (Omorieg and Eghafona, 2009). These studies were on asymptomatic subjects as compared to this current study which was on persons with symptoms of UTI. It is possible that the agents of symptomatic and asymptomatic UTI differ. However, this will require further investigations to verify.

The reason for the high prevalence of *Staphylococcus aureus* in males is not clear, though lack of circumcision receptive *anal* intercourse and HIV infection are recognized risk factors for UTI in males (Orrett and Davis, 2006). The susceptibility profile indicates that the fluoroquinolones were the most active antibacterial agents followed by the aminoglycosides (Green *et al.*, 2010). This result is in agreement with recommendations of Stamm and Hooton (1993). Nalidixic acid, nitrofurantoin, sulphamethoxazole–trimetoprim, amoxicillin and amoxicillin–clavulanate showed very poor activity. This may be due to long term use of these drugs over the years. Also, prescription of antibiotics without laboratory guidance as well as over the counter sales of antibiotics without prescription are rife in the Nigerian setting (Omorieg and Eghafona, 2009).

5. Conclusion

Conclusively, a high incidence of urinary tract infections was demonstrated among the male students residing in Federal Polytechnic, Ado-Ekiti. Those that had no significant urinary tract infections as at the time of the project work were 25 while those that are negative was also 25. Therefore, urinary tract infection should be treated based on symptoms alone. Oral antibiotics such as trimethoprim, cephalosporin, fluoroquinolone are equally effective for both short and long term cure rate.

The following recommendations may reduce the risk from sexual activities: In women using contraceptive, consider alternative particularly if exposed to spermicide from condom or diaphragms. And also avoid sex with multiple partners. This can cause many health problems, including sexual transmitted diseases and UTIs.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical approval was obtained from the institution's research committee before collection of samples from the subjects in the study area.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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