Urinalysis and Urinary Tract Infection among Female Students of Chukwuemeka Odumegwu Ojukwu University Uli, Anambra State

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ABSTRACT

Urinary tract infection (UTI) is caused by the presence and growth of pathogens anywhere in the urinary tract. It is among the most common bacterial infections in humans, especially in women. Students living together are more exposed to this because of communal sharing of personals, inadequacy of toilet facilities. Urinalysis of 250 female students involving their clean-voided midstream urine in Chukwuemeka Odumegwu Ojukwu University Uli campus aged from 16 to 35 years using reagent test strip to look out for infection, identification and characterization of isolates by their morphology and biochemical tests, and antimicrobial susceptibility of isolates were carried out. The results obtained were as follows; age specific prevalence of infection showed that sexually active females of ages 16-29 years were more exposed to UTIs with 70.21 – 77.97% infections. The species infection were; E.coli (68.91%), Staphylococcus aureus (21.8%), Pseudomonas spp (5.04%) and Proteus spp (4.2%). This high prevalence of infection among female students could be as a result of poor personal hygiene, lack of proper toilet facilities, their voiding pattern by contamination of urinary tract with faecal matter, and reduced fluid intake. It is therefore recommended that the risk factors predisposing females to various UTIs be addressed in the Campus by organizing seminar for students on the infections. Provision of proper toilet facilities by the government and school authority, is recommended.

INTRODUCTION

Urinary tract infections (UTI) is the most common infection experienced by human after respiratory and gastro-intestinal infections and also the most common cause of both community-acquired and hospital acquired (nosocomial) infections for patients admitted in the hospitals (Kennedy et al., 1995). In healthy patients, most uropathogens originate from rectal flora and enter the urinary tract via the urethra into the bladder (Handlay et al., 2002). The patients age may influence the type of infective organism present with Staphylococcus saprophyticus accounting for 10% of UTIs in young females compared to less than1% in elderly patients (Kennedy et al., 1995).

UTIs are among the infectious diseases, students living together are more exposed to because of communal sharing of personals, inadequacy of toilet facilities and also the indiscriminate use of antibiotics (Ojo and Anibijuwon, 2010).

UTIs are challenging not only because of the large number of infections that occur each year but also because the diagnosis of UTIs is not always straight forward. Physicians must distinguish UTI from other diseases that have a similar clinical presentation (Health Partners, 2013).
Urinary tract infections are majorly caused by bacteria organism (Mohanty and Jolly, 1996). When bacteria from the rectal area enter the urinary tract via the urethra to the bladder and multiply in the urine, an infection occurs (Innerbody, 2015). In many cases, bacteria first travel to the urethra, when bacteria multiply an infection can occur. An infection limited to the urethra is called urethritis. If bacteria move to the bladder and multiply a bladder infection called cystitis, and if the infection is not treated promptly bacteria may then travel further up to the ureter to multiply and infect the kidneys and is called pyelonephritis (Potters and Perry, 1997; Innerbody, 2015).

Young post pubertal females are susceptible to uncomplicated UTIs because of sexual intercourse in combination with delayed post coital bladder emptying, use of diaphragm and spermicidal contraceptives that alter the normal vaginal flora and may allow colonization by pathogenic E. coli (Gabre-Selassive, 1998). Ignorance of risk factors and indiscriminate use of drugs that is self-medication may have resulted to high resistant to antibiotics and to non-symptomatic UTIs which are the two most important factors in the epidemiology of the UTIs (Ezeigbo et al., 2015).

Urinalysis (UAs) is one of the most commonly ordered laboratory tests in primary care and urinary tract infections (UTIs) which are very common in adults. It is used to detect and access a wide range of disorders such as urinary tract infections, kidney disease and diabetes. Urinalysis involves examining the appearance, concentration and content of the urine.

A review of the prevalence of UTI among students in a private University in Western Delta, Nigeria gave prevalence (77.3%) (Otajevuo and Eriagbor, 2014). In a similar study carried out among female students of the University of Agriculture, Markurdi, Benue State, Nigeria gave a prevalence of 47%. The higher prevalence in females as compared with males is attributable to the shortness of the female urethra and so is more liable to contamination during sexual intercourse, urethra massage and even urination with chronic flora that resides in the perineal skin. It also includes the effects of the turbulence of the urinary stream (Starr and Taggart, 2002).

A retrospective study of 123 patients with positive urine culture in Aminu Kano teaching hospital Kano showed E. coli as the most encountered uropathogen accounting for 39.8%, Proteus spp 26%, klebsiella 21.1% while Pseudomonas spp gave 0.8%. Females were found to have higher frequency of UTI (54.5%) than males (45.5%) (Ghedi, 2009).

Furthermore, analysis of clean voided midstream urine of 780 female students residing in Ado Ekiti campus of the State University showed E. coli as the highest (32.75%) followed by Proteus spp (17.25%) klebsiella spp (13.7%), Staphylococcus spp (12.07%), Streptococcus spp (8.63%). and Pseudomonas spp (5.17% ) (Ojo and Anibiwujon, 2010).

These information on UTIs in the various institutions however informed similar study in the Eastern part of Nigeria involving female students of Chukwuemeka Odumegwu Ojukwu University, Anambra State.

MATERIALS AND METHODS

The Study area

The study was carried out in Chukwuemeka Odumegwu Ojukwu University Uli campus, Anambra State. Uli is a rural community in Ihiala Local Government Area in Anambra State, South Eastern Nigeria. Its closest neighboring towns are Amorka, Egbuoma, Ihiala, Ozara, Ubulu. Uli town extends westward to the confluence of the rivers of Atamiri and Enyinja and across Usham Lake, down to the lower Niger region. The inhabitants engage in various types of businesses such as farming, trading, civil service and others.

Members of the community depend on boreholes, well and rain water stored in tanks for their water supplies. The farms are often situated near their houses. Basic infrastructure such as good roads, pipe-bore water, proper sewage disposal systems and electricity are in short supply, general education and awareness is below average.

Population sample and collection of specimens

The population samples were consented female students in the campus who were given sterile universal bottles well labelled for collection of mid-stream urine. The universal bottles contained boric acid which prevents the rapid multiplication of bacteria when present so as to avoid having false influence on the results. 250 urine samples were collected from the consented students in the morning hours before 10am. Students who were taking antibiotics at the time of collection were excluded.

All samples were immediately despatched to the laboratory where further examinations were carried out.
URINALYSIS

Urine samples were analyzed first using a reagent test strip (medi-test combi 11) by dipping strip inside the samples (urine) then placed adjacent to combi 11 and noting their reactions to the parameters on the test strip and were recorded as; ketone, protein, bilirubin, leukocytes, specific gravity, urobilinogen, glucose, nitrite, and pH. Most changes in these parameters were used to look out for infection. Also in the course of this analysis, the colour and appearance of the urine samples were checked. According to Ezeigbo et al. (2015), 90% of cloudy urine samples are caused by infections.

IDENTIFICATION OF BACTERIAL ISOLATES

The isolates were identified by standard and microbiological method (Barza, 1993). Identification was confirmed using Bergner’s manual of determinative bacteriology with morphological characteristics and specified biochemical test.

CHARACTERIZATION OF ISOLATES

The smears of all isolates were made on slides with distilled water, air dried and heat fixed. Each of the slides was flooded with crystal violet for one minute, washed with running water after one minute. This was followed by decolonization using 95% (v/v) ethanol until runoff was clear and the smear was then counter stained for 60 seconds. The slides were rinsed with water and air dried.

With a drop of immersion oil on the stained smear, it was observed under the microscope with 100x objective lens. Gram positive organism such as Staphylococcus aureus appeared deep purple while gram negative organism such E. coli appeared red.

ANTIMICROBIAL SUSCEPTIBILITY OF ISOLATES

Antimicrobial susceptibility of isolates was tested by the disk diffusion method using muller-hinton medium and also making use of antibiotic disc with the minimum inhibitory concentration (MIC). The sample that had bacteria cells were inoculated on chromomeric media and incubated at 37°C for 24hrs in an incubator.

Antimicrobial agent test were Amoxicin, Ampicillin, Ciprofloxacin, Ofloxacin, Norfloxacin, Augumentin, Cephatexin, Septrin, Gentamycin, Streptomycin, Peflacine and Cefrixone. 

These antibiotics were chosen as they are the antibiotics of choice in the treatment of urinary tract infection (UTI).

RESULTS

The overall prevalence of UTI amongst female students in the school was (47.6%). In the age related infection, 20-24 years had the highest prevalence of (77.97%) followed by 16-19 years (71.43%) while the least rate of infection (68.18%) was obtained from the age group of 30-35 years (Table 1).

The species prevalence amongst COOU female students was E. coli (68.91%), Staphylococcus aureus (21.85%), Pseudomonas spp (5.04%) and Proteus spp (4.20%) (Table 2).

The morphological and biochemical characteristics of the bacterial isolates are shown in Table 3. Among the 4 bacteria isolated, Pseudomonas spp, was positive in catalase and methyl red, not applicable to urease and manitol. There was acid production in glucose, lactose and sucrose across all isolates with gas production in lactose and sucrose. E. coli, was negative in all biochemical tests, except indole. Staphylococcus aureus was positive in giemsa stain, catalase and coagulase and Proteus spp was only positive in catalase.

Table 1: Age specific prevalence of UTIs among female students of COOU

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Number examined</th>
<th>Number positive</th>
<th>Percentage(%) infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-19years</td>
<td>63</td>
<td>45</td>
<td>71.43</td>
</tr>
<tr>
<td>20-24years</td>
<td>118</td>
<td>92</td>
<td>77.97</td>
</tr>
<tr>
<td>25-29years</td>
<td>47</td>
<td>33</td>
<td>70.21</td>
</tr>
<tr>
<td>30-35years</td>
<td>22</td>
<td>15</td>
<td>68.18</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>119</td>
<td>47.60</td>
</tr>
</tbody>
</table>
Table 2: Prevalence of the various bacterial isolates observed in urine cultures of COOU female students.

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Percentage Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>21.85%</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>68.91%</td>
</tr>
<tr>
<td>Pseudomonas Spp</td>
<td>5.04%</td>
</tr>
<tr>
<td>Proteus Spp</td>
<td>4.20%</td>
</tr>
</tbody>
</table>

Table 3: Morphological and biochemical characteristics of bacterial isolates.

<table>
<thead>
<tr>
<th>Test</th>
<th>Pseudomonas spp</th>
<th>E. coli</th>
<th>Staph Spp</th>
<th>Proteus Spp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphology</td>
<td>Rod</td>
<td>Rod</td>
<td>Cocci</td>
<td>Rod</td>
</tr>
<tr>
<td>Giemsa Reaction</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Catalase</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Coagulase</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Citrate</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oxidase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indole</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Urease</td>
<td>Na</td>
<td>Na</td>
<td>+</td>
<td>Na</td>
</tr>
<tr>
<td>Methyl red</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Glucose</td>
<td>A/-</td>
<td>A/G</td>
<td>A/G</td>
<td>A/G</td>
</tr>
<tr>
<td>Lactose</td>
<td>A/G</td>
<td>A/G</td>
<td>A/-</td>
<td>A/-</td>
</tr>
<tr>
<td>Sucrose</td>
<td>A/G</td>
<td>A/-</td>
<td>A/-</td>
<td>A/-</td>
</tr>
<tr>
<td>Manitol</td>
<td>Na</td>
<td>A/-</td>
<td>A/-</td>
<td>Na</td>
</tr>
</tbody>
</table>

Key: Na = Not applicable; A/G = acid and gas production; A = Gas production; - = Negative; + = Positive.

DISCUSSION

Urinary tract infection (UTI) is a serious health problem affecting millions of people each year. The study was carried out among the female students of Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State. The results obtained, revealed a significant number of apparently healthy female students, as (47.6%) were infected with UTIs. There is relatively low prevalence in this institution when compared to the university of Ado-Ekiti (65%) (Ojo and Anibiwojo, 2010); Abia State Polytechnic Aba (77.3%) (Ezeigbo et al., 2015).

Age specifics for UTIs amongst female students of COOU showed that students within the age of 16–29 years were more susceptible to the infection. This is in agreement with (Scholar 2016) publication on the risk factors for recurrent UTI in young women to be as a result of their sexual activity and use of contraceptives. Also vaginal microflora can be the predisposing factor for the increased prevalence of this group as opined by Achebe and Ikpeze (2009).

Morphological and biochemical characteristics showed the presence of basically four bacteria (Pseudomonas spp, Proteus spp, Staphylococcus spp, and Escherichia coli). This is confirmed by various works done among female students in higher institutions (Achebe and Ikpeze, 2009; Ezeigbo et al., 2015; Omonigbo et al., 2001; Otajewu and Eriagbor, 2014). Also, the major fungal infection observed was Candida spp which supports the finding of Ezeigbo et al. (2015) and Obiogbolu et al. (2009). E. coli is the most prevalent of all the bacteria occurring in the UTIs followed by Staphylococcus species, the Pseudomonas and Proteus spp. This was observed by Otajewu and Eriagbor (2014), and Vorland et al. (2001).

It was observed that a huge discrepancy existed between the ages and the prevalence of UTIs. This could mean that in the Campus, all the students are exposed to the same variable irrespective of age differences. These variables might include the public toilet system, the same sexual activeness and also equilibrium in personal hygiene maintenance. It can also be postulated that this is as a result of reduced fluid intake and infrequent voiding pattern in females of the School age.

CONCLUSION AND RECOMMENDATION

Analysis of urine samples of female students of COOU, Uli Campus by urinalysis showed high prevalence of UTIs. This high prevalence among female students were as a result of poor personal hygiene, lack of proper toilet facilities, contamination of urinary tract by faecal matter, reduced balanced food and fluid intake, and their voiding pattern. Age specific prevalence was high in the age 16 – 29 years old which is as a result of higher sexual promiscuity in the University and high use of contraceptives.

It is therefore recommended that the risk factors predisposing females to various UTIs be addressed in the Campuses promptly. The government and the school authority should provide proper toilet facilities and the government agencies responsible for
city planning should go into action and ensure that landlords of various houses around the school premises have a proper sewage system and toilet facilities also.

The indiscriminate use of antibiotics should be discouraged and proper analysis carried out to ascertain the microorganism and its antibiotics sensitivity before antibiotic use.

References


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