Full Length Research Paper

Urinary tract infection among female students residing in the campus of the University of Ado Ekiti, Nigeria

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Accepted 19 January, 2010

Seven hundred and eighty (780) female students residing in the campus of the University of Ado Ekiti were examined for significant bacteria indicative of urinary tract infections. Analysis of their clean-voided, midstream urine revealed that 507 (65%) female students have significant bacteria, 146 (18.75%) indicated insignificant bacteria while 127 (16.25%) showed no growth. Fifty eight (58) bacterial isolates were obtained from samples positive for bacteria. Eight (13.8%) were sensitive to streptomycin, seven (12.1%) to tetracycline, nitrofurantoin and ampicillin, while only four (6.9%) isolates were sensitive to dalacine. However, bacterial isolates obtained from this survey generally showed similar pattern of resistance to antibiotics. The fifty-eight (58) bacterial isolates were tentatively characterized into six genera. The frequencies of occurrence of the bacterial species are in the order: Escherichia coli (32.75%), Proteus sp. (17.25%), Klebsiella sp. (13.79%), Staphylococcus sp. (12.07%), Streptococcus sp. (8.63%) and Pseudomonas sp. (5.17%). However, six (10.34%) of the isolates were unidentified.

Key word: Female student, university campus, bacteria, antibiotics, resistance.

INTRODUCTION

Urinary tract infections (UTI) are serious health problems affecting millions of people each year. They are the second most common type of infections in the body, accounting for about 8.3 million visits to the hospitals each year (UDHHS, 2004). UTIs are caused by the presence of bacteria in urine, although fungi and viruses could be involved. Majority of women have recurrent infection within one year (Siiri et al., 2009). Escherichia coli causes 75 - 90% of uncomplicated UTIs (Karen et al., 2006) whereas Staphylococcus saprophyticus causes an estimated 5 - 15% of UTIs frequently in younger women (Micheal et al., 2007). Enterococcus and other gram negative rods other than E. coli have also been implicated in some cases (Benjamin et al., 2009).

Significant bacteria is defined as the persistent isolation of > 10⁵ colony forming units (cfu) of bacteria per ml of clean voided, mid-stream urine specimens plated within 6 h of collection. In females, it is possible that slow growing microaerophiles such as Lactobacillus, Corynebacterium and Streptococcus mileri may be involved in the pathogenesis of urinary tract infections. Symptoms are usually precipitated by sexual intercourse (Micheal et al., 2007).

UTIs occur in both acute and chronic forms. In the former, patients complain of severe and low back pain that may associate with fever due to the associated bacteraemia, while in the latter, a sensation of perennial fullness is felt. The common causative agent is E. coli but micrococcal infections may account for up to 10 - 20% of cases in sexually active women (Vorland et al., 2001). This infection reaches the bladder by the ascending route, with the main symptoms as urinary frequency and dysuria. Other infections that are due to less common pathogens usually occur in the presence of gross structural abnormality of the urinary tract or neurological effects.

The common source of E. coli infections in women is the faecal flora. Introital colonization precedes the development of urinary tract infections in women and girls. In males, the organisms frequently originate from the sub pepticul sac. 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

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Table 1. Prevalence of isolates.

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli</td>
<td>32.75</td>
</tr>
<tr>
<td>Klebsiella sp.</td>
<td>13.79</td>
</tr>
<tr>
<td>Staphylococcus sp.</td>
<td>12.07</td>
</tr>
<tr>
<td>Streptococcus sp.</td>
<td>8.63</td>
</tr>
<tr>
<td>Proteus sp.</td>
<td>17.25</td>
</tr>
<tr>
<td>Pseudomonas sp.</td>
<td>5.17</td>
</tr>
<tr>
<td>Unidentifiable Isolates</td>
<td>10.34</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
</tr>
</tbody>
</table>

urination with chronic flora that resides in the perineal skin. It also includes the effect of turbulence of the urinary stream (Starr and Taggart, 2002).

This present work is carried out in order to determine the prevalence of UTI in female students residing in the campus of the University of Ado Ekiti largely because of the unavailability of basic infrastructural facilities like pipe borne water and good toilet. Also the use of antibiotics among this category of student is largely uncontrolled.

MATERIALS AND METHOD

Study population

Seven hundred and eighty female students residing in the campus of the University of Ado-Ekiti were recruited for this study. Each of these students gave a written consent of their willingness to participate in the study.

Collection of urine specimen

Clean-voided, mid-stream urine (msu) specimens were collected from 780 female students residing in the campus of the University of Ado-Ekiti. Each of the students was instructed on the mode of collection of the msu that is, during forceful urination after the first 10 - 20 ml has been voided. Subjects were adequately educated on precautions to prevent contamination of specimen. The specimens were collected into sterilized, wide necked, leak proof, plastic universal containers obtained from HD Supply, Aylesbury, UK.

Microbiological analysis

Primary isolation was done on nutrient agar to allow the growth of all bacteria in the urine. Each specimen of urine was shaken properly to ensured homogeneity. Ten fold serial dilutions were made of each specimen and 1 ml of the appropriate dilutions (10^-5) was used as inoculum using the pour plate method (Nonzon et al., 2002). Plates with growth were indicated as significant bacteria while plates that showed growth only at 10^-5 dilution were indicated as insignificant bacteria. However, plates that did not show growth at 10^-5 dilution were recorded as negative.

Identification of organisms

All bacterial isolates were characterized on the basis of colonial morphology, cellular morphology, reaction to Gram’s stain, motility test (Fawole and Oso, 1998) and biochemical tests. The tentative identities of the isolates were obtained from Bergey’s Manual of Determinative Bacteriology (Buchanan and Gibbons, 1974).

Sensitivity tests

Diagnostic sensitivity test agar (DST agar) was used for antibiotics sensitivity test. The method described by Sighn et al. (1997) was employed. The bacterial isolates were subjected to in vitro susceptibility tests against some common third generation antibiotics.

RESULTS

A total of five hundred and seven (507) of the 780 students urine examined have significant bacteria count of more than 10^5 cfu/ml while 147 students have insignificant bacteria count (< 10^3 cfu/ml). The other 126 students were regarded as negative for bacteria (< 10^3 cfu/ml) (Table 1). These results indicated that 65% of the students were significant for bacteria, 18.85% had insignificant bacteria while 16.15% were negative for bacteria.

A total of fifty eight (58) bacterial isolates were obtained from the urine specimens that indicated the presence of bacteria in them. The isolates were tentatively identified to belong to six (6) genera including Escherichia, Klebsiella, Staphylococcus sp., Streptococcus sp., Proteus sp. and Pseudomonas sp. The frequency of occurrence of these organisms is shown in Table 1. E. coli showed the highest prevalence (32.75%) and Pseudomonas (5.17%) has the least prevalence.

The demographic distribution of significant bacteria specimens by age is shown in Figure 1. Specimens from students within the sexually active ages of 16 and 30 years revealed unusually high bacterial count in their urine (62.6 - 70.3%). The bacterial isolates had varied degrees of sensitivity to the antibiotics used (Figure 2). Eight (13.8%) of the 58 isolates were sensitive to streptomycin, 7 (12.1%) to tetracycline, nitrofurantoin and ampicillin while 4 (6.9%) isolates were sensitive to dalacine.

DISCUSSION

Seven hundred and eighty (780) urine specimens were examined for presence of bacteria or otherwise. Five hundred and seven (65%) were found positive for urinary tract infections; having not less than 10^5 colony forming units of bacteria per 1 ml of clean voided, mid-stream urine. However, 147 (18.85%) other specimens have insignificant or doubtful bacteria having less than 10^3 cfu of bacteria per 1 ml. This could be due to indiscriminate consumption of antibiotics by the students since some of them confessed using non prescribed antibiotics whenever difficulty in urination is noticed. The doubtful bacteria
could also be due to contaminations during specimen collection. Although, the students were educated on how to collect the specimens aseptically, maximum efficiency can not be guaranteed since most of the students are not sterilely conscious.

From the private interviews conducted with the students, it was observed that most of the UTI cases were asymptomatic except for very few cases. Most of the students do not experience lower abdominal pain, difficulty in urination and other characteristic symptoms of UTIs, but have significant bacteria.

The study implicated six microorganisms as possible aetiological agents of the UTI cases observed. These organisms; *E. coli, Proteus sp., Klebsiella sp., Staphylo-
coccus sp., Streptococcus sp. and Pseudomonas sp. are the common causative agents of urinary tract infections as earlier reported by Mars (2002); James et al. (1976), Meers et al. (1990). This higher prevalence of E. coli (32.75%) may be due to faecal contamination, the predilection of the organisms from the toilets and the shortness of the female urethra. (Nicolle, 2001). This prevalence however, is also reported in earlier works by Smith et al. (2003) where they found out that E. coli accounts for 32% of UTI cases. Proteus sp. with 17.25% prevalence has a significant association with UTI. Its active motility and swarming ability can in comparison with other organisms transverse easily through the urethra. Other organisms implicated were Klebsiella sp. (13.79%), Staphylococcus sp. (12.07%), Streptococcus sp. (8.63%) and Pseudomonas sp. (5.17%). Six of the positive cases were caused by a mixed culture of these organisms accounting for 10.34%.

There is also a possible link between the prevalence of UTI among students and the level of personal hygiene or the state of toilet facilities in the hostels. Most of the students examined rated the hostels toilets as bad. Bad, in this context implies that there is no adequate supply of water to clean and flush the toilets regularly. When dirty therefore, there is an accumulation of urine sediments forming a thick scum. In this case students could become infected during urination. Sexual activity is another factor that predisposes people to UTI. Staphylococcus aureus for example, which is a member of skin flora might stay on the skin and get transmitted during sexual intercourse. Figure 1 gives a demographic situation of the cases examined by age. It was observed that majority of the positive cases fall between age 23 and 26 years. 58% of the total sample population falls within this bracket treated among the female students residing in the campus of the University of Ado-Ekiti, Nigeria. Those that had a non significant UTI as at the time of this assay were also high while those that are negative were only 127 (16.3%). As earlier reported by several workers E. coli was also implicated as the most common causative agent of UTI among female students of this University. We therefore recommend that factors that promote the occurrence of UTI in our campuses should be addressed promptly.

REFERENCES


