

Incidence of urinary pathogens among healthy-looking university students and Antibacteriogram pattern

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Publication History

Received: 03 April 2014

Accepted: 08 May 2015

Published: 20 May 2015

Citation

Amazu LU, Ojo YO, Azikiwe CCA, Ifezulike CC. Incidence of urinary pathogens among healthy-looking university students and Antibacteriogram pattern. *Medical Science*, 2015, 17(69), 31-34

ABSTRACT

Background: An infection is the invasion and multiplication of a pathogenic microorganism in a bodily part, tissue or whole system of an animal (Man) and causes some tissue injuries that may lead to some clinical presentation. Factors that account for emerging resistant strains of bacteria have remained unresolved and healthy-looking but, infected may be a major factor.

Objective: The study was aimed at isolating urinary pathogens among healthy-looking students and carrying out bacteriogram of bacterial isolate.

Material and Method: Two hundred students (100 per sex) of Madonna University, Elele and of ages 18-24 were recruited and their oral consent obtained. The students were instructed to abstain or must have abstained from all forms of antibacterial agent for at least a week. The females were not menstruating or must have had at least two days post menses in the case of recent menses. Adequate instruction for an appropriate collection of clean-catch mid-stream and terminal urine was done. There was No personal identification of the student but, sex and age were noted. All samples were collected in sterile universal container and sent to microbiology Laboratory as soon as voided. Samples were seeded separately on blood and MacConkey agar as soon as on arrival to the Laboratory after which urine microscopy was carried out on spun urine deposit. The seeded plates were incubated at 37°C for a minimum of 24hrs and a maximum of 48hrs after which antibacteriogram was done on significant bacterial isolate. "No growth" applied to all samples with no bacterial isolate after 48hrs incubation at 37°C. Bacteriuria was taken as presence of bacteria in urine with less than 2pus cells per high power focus (PHF). Significant isolate was taken as cultural isolate in urine with at least 3pus cells PHF. All data where possible were statistically analysed with SPSS-version 16.

Results: A total of 104(52%) students had UTI caused by bacterial pathogens, 6(3%) students had bacteriuria while 96(48%) students had no UTI. Yeast cells were present in urine deposit of 70(70%) among the females. No yeast cell was seen in those of males. No any other parasitic organism was demonstrated in all samples. Out of the 104 UTI cases, 60(57.59%) were females while 44(42.31%) were males. Incidence of UTI was highest among 24years old but, isolates from the 25years old had the highest incidence of resistance to non quinolone antibiotics while the isolates from the 18years old exhibited sensitivity to virtually all tested antibiotics. The most frequently isolated bacteria were *Escherichia coli*. Other bacteria isolates were *Staphylococcus aureus*, *Streptococci* Spp, *Klebsiella* spp and *Pseudomonas* spp. All bacterial isolates were sensitive

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to quinolone antibiotic (Ofloxacin and Ciprofloxacin). Bacterial isolates from students age 20-24 were resistant to ampicillin, cotrimoxazole, cloxacillin and nitrofurantoin.

Conclusion: The students represent a good proportion of the society exposed to poor sanitary conditions and form the most sexually active age group. UTI is present among the healthy-looking young men and women who may also be indulging in self medication from easy accessible antibiotics and herbal markets. This factor should be seriously considered in line with curbing the menace of emerging strains of resistant bacteria.

Key Words: Healthy-looking, Urinary Tract Infection (UTI), Bacteriuria, Bacterial isolates, Yeast cells.

1. INTRODUCTION

An infection is the invasion and multiplication of a pathogenic microorganism in a bodily part, tissue or whole system of an animal (Man) and causes some tissue injuries that may lead to some clinical presentation (Online Medical Dictionary, 2013). Urinary tract infection (UTI), is an infection in a part or whole of the urinary system and is one of the most common infectious diseases at the community level (Linhares *et al.*, 2013). Bacteriuria is the mere presence of bacteria in the urinary tract without causing any clinical features (Linhares *et al.*, 2013).

Urinary tract infections (UTIs) are serious health problem affecting 150 million people globally in each year. They are the second most common types of infection in humans accounting for 8.3 million doctor's visit annually in USA. They are the most common bacterial infection in patients of all ages with high risk in young women resulting in significant morbidity and health care costs (Ononuga and Awhowho, 2012). The incidence and impact of UTI in developing countries is not yet determined (Renuart *et al.*, 2012).

The antimicrobials misuse in clinical medicine has led to an increase of the microbial resistance and the consequent spread of bacterial resistant strains is a serious public health problem (Linhares *et al.*, 2013). UTI is mostly caused by bacteria but, could also be due to parasitic organisms like Schistosomes (Antony *et al.*, 2013). Uncomplicated urinary tract infections are usually treated with antibiotics as recommended by primary health care guidelines. Antibiotic treatment supports clinical cure in individual patients but also leads to emerging resistance rates in the population (Gagyor *et al.*, 2012).

Most females get UTI via contamination with enteric organism but, the health implications to their male partner may pose some challenges. The presence of glycogen and oestrogen also proffer some degree of immunity to the females but, it has been shown that females harbour more pathogens in their urogenital systems which may later in life develop into fully blown UTI (Linhares *et al.*, 2013). For example *Shigella sonnei* can be responsible for UTI during pregnancy even when no predisposing factors or an apparent source of infection can be identified (Baka *et al.*, 2013). The organism could have long colonised the urogenital tract and manifested when the female's natural protection which drops in pregnancy is lowered. Stress, trauma and inflammation increase the risk of UTI as well as host and commensal microbiota proteins contribute to mucosal defence (Aubron *et al.*, 2012).

Identification of these proteins will facilitate the development of strategies to maintain a healthy vaginal microbiome and prevent colonization with pathogenic bacteria such as *E. coli* that increase the risk for urinary tract infections, preterm labour and perinatal infection (Kalyoussef *et al.*, 2012). Untreated UTI could predispose to cancer of the urinary tract (Sun *et al.*, 2013) and increase the chance of other sexually transmitted diseases including HIV/AIDS. Urinary tract infections commonly complicate to pyelonephritis and could lead to worsening relapse schizophrenia (Aleza *et al.*, 2013; Miller *et al.*, 2013).

Microorganisms that commonly caused UTI are *E. coli*, *Klebsiella* but, extended-spectrum beta-lactamase (ESBL)-producing *Escherichia coli* have been increasingly recognized in the community and is associated with antibiotic resistant strains (Calbo *et al.*, 2006; Rodríguez-Baño *et al.*, 2008). In Spain, *E. Coli* is documented as common cause of neonatal sepsis and a later life UTI (Bouza *et al.* 2007).

2. MATERIAL AND METHOD

Two hundred students (100 per sex) of Madonna University, Elele and of ages 18-24 were recruited for the study. The purpose and method of the study were clearly explained to them and their oral consent obtained. There was no personal identification of the student but, sex and age were noted.

As a means of inclusion criteria the students were instructed to abstain or must have abstained from all forms of antibacterial agent for at least a week prior to sample collection. The females were not menstruating or must have had at least two days post menses in the case of recent menses. Adequate instruction for an appropriate collection of clean-catch mid-stream and terminal urine was done. All samples were collected in sterile universal container and sent to microbiology Laboratory as soon as voided.

Samples were seeded separately on blood and MacConkey agar as soon as on arrival to the Laboratory after which urine microscopy was carried out on spun urine deposit. The seeded plates were incubated at 37°C for a minimum of 24hrs and a maximum of 48hrs after which antibaeteriogram was done on significant bacterial isolate. "No growth" applied to all samples with no bacterial isolate after 48hrs incubation at 37°C. Bacteriuria was taken as presence of bacteria in urine with less than 2pus cells per high power focus (PHF). Significant isolate was taken as cultural isolate in urine with at least 3pus cells PHF.

Statistical analysis

All data where possible was analysed using SPSS version 16.0. Analysis of variance (one way ANOVA) was used and result presented as mean± standard deviation. Results on pattern of microbial isolates were presented as percentage fraction of the total number of subjects.

3. RESULTS

The age range of the subjects was 18-25 with a mean age of 21 ± 3.5 years. Cultural isolates were mainly *E. coli* for those of 18 years unlike other age group that exhibited a wide range of bacterial isolates. A total of 104 (52%) students had UTI caused by bacterial pathogens, microscopy showed that 6 students (3%) had bacteriuria while 96 (48%) students had no UTI. Out of the 104 UTI cases, 60 (57.59%) were females while 44 (42.31%) were males (Table 1).

Significant WBC (White blood cells) and epithelial cells were demonstrated in 65 and 66 males and females respectively. Yeast cells were present in urine deposit of 70 (70%) among the females. No yeast cell was seen in those of males. No any other parasitic organism was demonstrated in all samples (Table 2).

Incidence of UTI was highest among 24 years old but, isolates from the 25 years old had the highest incidence of resistance to non quinolone antibiotics while the isolates from those of 18 years old exhibited sensitivity to virtually all tested antibiotics. The most frequently isolated bacteria were *Escherichia coli* (62%). Other bacteria isolates were *Staphylococcus aureus* (10%), *Streptococci* specie (4%), *Klebsiella* specie (11%), *Proteus* specie (7%) and *Pseudomonas* specie (6%), (Table 3).

All bacterial isolates were sensitive to quinolone antibiotic (Ofloxacin and Ciprofloxacin). Bacterial isolates from students age 20-24 were resistant to ampicillin, cotrimoxazole, cloxacillin and nitrofurantoin (Table 3).

Table 1

Incidence of UTI per gender

	Males	Females	Total
UTI (Bacteria)	44	60	104
No UTI	56	40	96
UTI (Non bacteria)	Nil	Nil	Nil
Bacteruria	05	01	06

Table shows the incidence of UTI based on gender. 104 students had UTI while 96 had no UTI. Among the UTI cases 60 were females while out of the 96 cases of no UTI, 56 were males. Bacteruria was demonstrated in 5 males out of a total of 6 cases.

Table 2

Urine microscopy

	Males	Females	Total
Significant WBC	65	66	131
Red blood cells	Nil	Nil	Nil
Significant EC	65	66	131
Urinary cast	Nil	Nil	Nil
Yeast cells	Nil	70	70
S.haematobium	Nil	Nil	Nil

In table 2 significant WBC (White blood cells) and epithelial cells (EC) were demonstrated in 65 and 66 males and females respectively. Yeast cells were present in urine deposit of 70 (70%) among the females.

Table 3

Bacterial isolate and most common antibacteriogram pattern

Organism	% of students	Amp	Clox	Nit	Tetra	Chlo	Nalid	Cip	Oxf
<i>E. coli</i>	62	+	NA	+	++	+	+	+++	+++
<i>S. aureus</i>	10	R	R	R	R	R	R	+	++
<i>S. strep</i>	04	R	R	R	R	R	R	+	++
<i>Proteus</i>	07	R	NA	+	++	+	+	+++	+++
<i>Klebsiella</i>	11	+	NA	R	R	R	+	+++	+++
<i>Pseudomonas</i>	06	R	R	R	+	R	+	+++	+++

Antibacteriogram sensitivity pattern was highest among the Coliforms isolates. All isolates were sensitive to quinolones with the Coliforms exhibiting marked degree of sensitivity.

Key: Amp=Ampicillin, Clox= Cloxacillin, Nit=Nitrofurantoin, Tetra= Tetracycline, Chlo= Chloramphenicol, Nalid=Nalidixic acid, Cip=Ciprofloxacin, Oxf=Ofloxacin, NA=Not applicable, R=Resistant, +=weak sensitivity, ++=moderate sensitivity, +++=Marked sensitivity.

4. DISCUSSION

Healthy looking young men and women may be a good source of transmission of UTI and drug misuse or self medication may be common hence the choice of sample class. The present study demonstrated that asymptomatic healthy looking students especially the females could harbour infection. Out of 200 subjects, 104 (52%) had urinary tract infection caused by pathogenic bacteria.

Out of the 104 UTI cases, 60(57.59%) were females while 44(42.31%) were males. UTI poses a great deal of public health problem. Most females get UTI via contamination with enteric organism but, the health implications to their male partner may pose some challenges. The presence of glycogen and oestrogen also proffer some degree of immunity to the females but, it has been shown that females harbour more pathogens in their urogenital systems which may later in life develop into fully blown UTI (Linhares *et al.*, 2013). For example *Shigella sonnei* can be responsible for UTI during pregnancy even when no predisposing factors or an apparent source of infection can be identified (Baka *et al.*, 2013).

Microorganisms that commonly caused UTI are *E.coli*, *Klebsiella* but, extended-spectrum beta-lactamase (ESBL)-producing *Escherichia coli* have been increasingly recognized in the community and are associated with antibiotic resistant strains (Calbo *et al.*, 2006; Rodríguez-Baño *et al.*, 2008). Healthy looking adult especially those in the healthcare may indulge in self-medication in the presence of symptomatic UTI.

Life style and sanitary conditions contribute to a good degree of UTI got from contaminations especially among females who are mostly asymptomatic. Females of reproductive age to some extent are naturally protected against some pathogens but, could pass the organisms to their male partners who may come down with some symptoms but, indulge in self-medication. The above scenario may indeed be a major source to today's emerging world of antibiotic resistant strain of microorganisms. Untreated UTI could predispose to cancer of the urinary tract and increase the chance of other sexually transmitted diseases including HIV/AIDS (Sun *et al.*, 2013).

Urinary tract infections commonly complicate to pyelonephritis and could lead to worsening relapse schizophrenia (Aleza *et al.*, 2013; Miller *et al.*, 2013). In a similar work carried out in Spain *E. Coli* is documented as common cause of neonatal sepsis and a later life UTI (Bouza *et al.* 2007).

5. CONCLUSION

The students represent a good proportion of the society exposed to poor sanitary conditions and form the most sexually active age group. UTI is present among the healthy-looking young men and women who may also be indulging in self medication from easy accessible antibiotics and herbal markets. This factor should be seriously considered in line with curbing the menace of emerging strains of resistant bacteria.

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