MERIT RESEARCH JOURNALS
www.meritresearchjournals.org

Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 5(6) pp. xxx-xxx, June, 2017
Available online http://www.meritresearchjournals.org/mms/index.htm

Original Research Article

Prevalence of Urinary Tract Infection of Female Patients in Northern Bangladesh

M. Jakir Hossain[1*], Afser Siddiqi[2], M. Mostafizur Rahman[3], Khairun Nahar Khan[4] and Ahmed Imtiaj[5]

[1]Research Fellow (PhD), Faculty of Biological Sciences, Middle East Technical University, Ankara, Turkey.

[2]Assistant Professor, Department of Skin and Venereal Diseases, Rajshahi Medical College Hospital, Rajshahi-6000, Bangladesh

[3]Medical Officer, Department of Skin and Venereal Diseases, Rajshahi Medical College Hospital, Rajshahi-6000, Bangladesh

[4] M. Sc in Psychology, National University of Bangladesh and Medical Technologist (Pathology), Islami Bank Medical College Hospital, Rajshahi-6000, Bangladesh.

[5]Associate Professor, Department of Botany, University of Rajshahi, Rajshahi-6205, Bangladesh.

***Corresponding Author's E-mail: mjakirbotru@gmail.com: Mobile: +905539657270, Fax: +88 0721 750064,**

Abstract

Urinary Tract Infection (UTI) is the most severe bacterial infections in humans and common disease of women especially young ladies than men. Every year millions of people are affecting from this serious health problem. Out of collected 150 samples, UTIs positive patients were about 94 (63%) where the age range was 15-35 years. As causal agent *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Ecscherichia coli* and *Proteus* spp. are bacterial isolates, whereas, only *Candida* spp. was identified as fungal isolates. The result also depict that, Ciprofloxacin, Gentamycin and Augmentin were the most effective antibiotics sensitive to the bacterial isolates. Nystatin is a broadly used antifungal agent was found to show unique sensitivity to the fungal component especially to *Candida* spp. The highest prevalence of UTIs reported in this study could be as a result of poor personal and environmental hygiene, unhygienic toilet facilities and lack of portable water.

Key words: Antibiotics, Microorganisms, Personal hygiene, Sensitivity test, UTIs

INTRODUCTION

Urinary tract consists of the kidney, ureter, bladder, and urethra and any part of these structures can become infected and UTI is the infection of any part of this tract, where bacteria can enter into the sterile urinary system through the urethra or more rarely through the blood stream (Feitosa *et al*., 2009). Although, the cystitis (infection of the bladder) and pyelonephritis (infection of the urethra) are the most common, UTIs are caused by bacteria that can live in the digestive tract, the vagina or around the urethra. *E. coli*, *Staphylococcus aureus, Klebsiella aerogenes, Pseudomonas aeroginosa, Proteus* spp., *Streptococcus facalis* and *Enterobacter* spp. are usually implicated in UTI patients (Oladeinde *et al*., 2015; Okonko *et al*., 2010; Al-Haddad, 2005). Gram-negative bacteria have been found to be most frequent in UTI cases (Omonigbo *et al*., 2001; Ebie *et al.,* 2001) and the prevalence and degree of occurrence of one or two of these microorganisms over others are dependent on the environment (Omonigbo *et al*., 2001). Stewart *et al* (1993) reported that the isolation of an unusual multiple resistance *Corynebacterium* from urine of a comatose patient. The pathogen was reported to be resistance to Sulphurfurazole, Trimethroprion, Nalidixic acid, Cefazolin, Floxacin, Norfloxacin, Vancomycin and Fusidin (Omonigbo *et al*., 2001). In healthy females, the prevalence of bacteriuria increases with age from 1% in females within 5-14 years of age to more than 20% in females at least 80 years of age (Colgan *et al*., 2006). This is higher among individuals in lower socioeconomic classes and those with past history of UTIs (Turpin *et al*., 2007). There is also increase in the risk of developing UTIs due to sexual activity, catheterization, contraceptive usage, urethral structure, kidney stone, etc (Emiru *et al*., 2013; Ramzan *et al*., 2004). The aim of this study therefore, is to determine the prevalence of UTIs among these vulnerable and sexually active females and to determine the sensitivity of the isolated microorganism to regular antibiotics.

MATERIALS AND METHODS

Study Area

Islami Bank Hospital is a tertiary health service providing institution located in Rajshahi city which is the major settlement and commercial medical centre in the northern part of Bangladesh. The patients from whole northern areas gather here for their desired heath services. Although, Rajshahi is an environment friendly, clean and healthy city in Bangladesh, in spite of this, a few area of this city is thickly populated and has stagnant water particularly during the rainy seasons with garbage or litter dumps. Many people are exposed to poor hygiene and availability of portable water. These factors easily promote infection and transmission among the population.

Sample Collection

Midstream urine samples (MSU) were collected from 150 female patients without symptoms of UTIs during the months of April to June, 2016. The samples were analyzed using standard bacteriological assay, and sensitivity tests were done on the isolates applying a range of antibiotic with the help of a cross sectional study design. MSU were collected with sterile wide-necked leak-proof plastic universal containers and each of the patients was adequately educated on the precaution to prevent contamination of the specimen. The samples were taken to the Microbiology Laboratory of the institution for analysis. The samples were analyzed within 30 minutes to 1 hour of collection. The sample size was determined using kreijcie and Morgan (1970) formula for determining sample size: S= X2NP (1-P)/d2 (N-1) +X2P (1-P).

Microbiological Analysis

Culturing of the urine samples

Using a micropipette, 1.0 mL of each urine sample was collected and serially diluted up to ten folds. From the appropriate dilution, 0.1 mL was transferred into pre sterilized nutrient agar, MacConkey, manitol salt agar (MSA) and potato dextrose agar (PDA) plates (Cheesbrough, 2006). After overnight incubation at 37 ℃ for 24 hours, the plates were then examined macroscopically for bacterial growth. Thereafter, the bacterial colonies were counted. The specimen that produced ≥ 105 CFU/Ml of urine were considered significant while specimens that produced < 105 colonies of urine were considered insignificant or due to contamination (Oladeinde *et al*., 2015; Emiru *et al*., 2013; Okonko *et al*., 2010). Representative of growing colonies were picked with a wire loop from incubated nutrient agar and MacConkey plates and pure cultures were made with repeated sub-culture. Resulting cultures were used for gram stain, fermentation and biochemical tests which include catalase, coagulase, indole, urease, oxidase tests etc., aimed at identifying the bacterial isolates. Cultured plated on PDA were incubated at room temperature for 5 days (Cheesbrough, 2006). The results were taken and accurately recorded.

Sensitivity Test

For the antibiotic sensitivity test, diagnostic sensitivity test agar (DSTA) was used. The method described by Singh *et al.* (1997) was employed against some common antibiotics and the bacterial isolates were subjected to *in-vitro* susceptibility test.

RESULTS AND DISCUSSION

UTI is a serious health problem affecting millions of people every year and the present study was carried out to assess the prevalence rate of UTIs among the female patients medicated at Islami Bank Hospital, Rajshahi, Bangladesh. Age distribution of UTIs affected female patients shown in Table 1. The age intervals 15-23 years had the highest prevalence of 75.0% while the least rate of infection was 45.2% obtained from the age range of 33 to above. It was also observed that prevalence rate of infection was decreased with the increase of age. The prevalence rates were 75.0%, 39.0% and 40.0% followed by the age group 15-23 years, 24-27 years and 33-above years, respectively. These findings were similar to the result obtained by Ani and Mgbechi (2008). The results obtained revealed that a significant number of apparently healthy female patients (62.6%) were infected with UTIs. Otajevwo and Eriagbor (2014) reported that a higher prevalence rate of UTIs were 77.3% among students of a private university in Western Delta, Nigeria. However, similar study carried out on the female students of the University of Agriculture, Makurdi, Benue State Nigeria, revealed a lower prevalence rate was 47.0% (Amali *et al*., 2008). (Table 1)

The morphological and biochemical characteristics of the bacterial isolates are shown in Table 2. A total of five bacterial isolates were identified, which include *Klebsiella* spp., *Pseudomonas* spp., *E. coli*, *Proteus* spp. and *Staphylococcus* spp. (Table 2)

The results denoted that *Candida* spp. were observed as only fungal agent. The microscopic and macroscopic morphology of fungi isolated shown in Table 3.

The antibiotic sensitivity pattern of the isolates were also studied and presented in Table 4. Some of the isolates were found to be resistant to antibiotics with less or no zone of inhibition in the plates. Ciprofloxacin,

Table 1. Age distribution of UTIs among the female patients

Age intervals (Years)	Number of patients examined	Number positive (%)
15-23	20	15 (75.0)
24-27	60	39 (65.0)
28-32	50	32 (53.3)
33-above	20	08 (40.0)
Total	150	94 (62.6)

Percentage was calculated as (number positive/number of patients examined) ×100

Table 2. The morphological and biochemical characteristics of bacterial isolates

Test	Bacterial Strains				
	Pseudomonas	***E. coli***	***Staphylococcus***	***Proteus***	***Klebsiella***
Gram reaction	-	-	+	-	-
Catalase	+		+	+	+
Coagulase	-	+	-	-	-
Citrate	+	+	+	+	+
Urease		-	+		
Methy red	+	-	+	+	+
Glucose	A/-	A/G	A/G	A/G	A/G
Lactose	A/G	A/G	A/-	A/-	A/G
Sucrose	A/G	A/-	A/-	A/-	A/-
Morphology	Rod	Rod	Cocci	Rod	Rod

A/G= Acid and gas production; A= Gas production; - = Negative; + = Positive; NA= Not applicable

Table 3. Physical and microscopic appearance of isolated fungi

Physical appearance	Microscopy	Probable Isolate
A creamy to yellowish colony with smooth pasty glistering, wrinkled and dull colour.	Single cluster of Blastoconidia which is round and elongated with pseudohyphae observed.	*Candida* spp.

Table 4. Antibiotic sensitivity pattern of the isolates

Microbial Strains	Antibiotics (Inhibition Zone)						
	Ampicilin	**Gentamycin**	**Streptomycin**	**Augmentin**	**Ciprofloxacin**	**Septrin**	**Nystatin**
Pseudomonas	8.2	22.0	Nil	21.0	15.0	Nil	NA
E. coli	23.0	15.0	11.0	21.0	20.1	17.0	NA
Proteus	Nil	17.4	10.0	19.1	19.2	18.2	NA
Staphylococcus	Nil	23.0	Nil	21.0	17.0	16.0	NA
Candida	NA	NA	NA	NA	NA	NA	18.0
Klebsiella	Nil	19.0	16.0	22.0	18.4	14.0	NA
SP (%)	40	100	60	100	100	80	100

NA= Not applicable, SP=Sensitivity pattern

Gentamycin and Augmentin were found to have the highest zone of inhibition. A total of 6 microorganisms include five bacterial isolates: *Escherichia coli, Proteus* spp., K*lebsiella* spp., *Pseudomonas* spp. and *Staphylococcus* spp. as well as *Candida* spp. as the only fungi which were the possible cause of infection. This result also agrees with the findings of Vasudevan (2014), Okonko *et al*. (2010), Obiogbolu *et al.* (2009), Al-Haddad (2005) and Mars (2001), who also identified these organisms as the possible and common causative agent of UTIs. The presence of *E. coli* may be due to faecal contamination of the organisms from the toilets and could be easily transmitted to females due to the shortness of their urethra (Nicolle, 2001). On the susceptibility to the selected antibiotics, a significant result was obtained with Ciprofloxacin, Gentamycin and Augmentin. Earlier reports

of Okonko *et al.* (2009) also gave similar results. The success of Ciprofloxacin could be due to its broad spectrum activities. Other drugs have varying and fair activities on the different isolates. A lower incidence rate obtained in this study compared to the results of Otajevwo and Eriagbor (2014) could be linked to the indiscriminate use of antibiotics by some of the students; who confirmed the use of drugs whenever they noticed any problem with urination and other symptoms. (Table 4)

In addition, the sexual activities of these patients were supposed to a contributory factor that predisposed these patients to UTIs. The high rate of infection in this study could also be linked to the level of personal and environmental hygiene of the patients. Most of the buildings in study area, particularly those affordable to the patients were lack proper toilet facilities and as such predisposed them to UTIs.

CONCLUSION

Although, urine is considered to be sterile and believed to be germ-free, any source of possible infection occurs through urethra which initiates the incidence of infection. The present study revealed a high prevalence rate of UTIs among female patients in Islami Bank Hospital, Rajshahi, Bangladesh. The age range of majority of the patients are 15-23 yrs considered as youths, and therefore should be adequately informed and educated on the need of personal and environmental hygiene. The government should ensure that proper toilet facilities are available in Rajshahi and similar surroundings. Indiscriminate use of antibiotics should be discouraged to avoid resistance to antimicrobial drugs. The high prevalence recorded in this study makes it necessary for people, particularly females to be adequately educated on matters affecting their reproductive health.

REFERENCES

Al-Haddad AM (2005). Urinary tract infection among pregnant women in Al-Mukalla District Yemen. Eastern Mediterranean Health J., 11(3): 505-510.

Amali O, Indinyero M, Umeh E, Awodi N (2008). Urinary tract infections among female students of the University of Agriculture, Makurdi, Benue State, Nigeria. The Internet J. Microbiol., 7(1). Available online: ispub.com/IJMB/7/1/10562.

Ani OC, Mgbechi EK (2008). Prevalence of urinary tract infections (UTI) in sexually active women of Abakiliki, Ebonyi State Nigeria. Animal Research International, 59(2): 876-879.

Cheesbrough M (2006). District laboratory practice in tropical countries part 2. Cambridge University Press, UK, pp 108-113.

Colgan R, Nicole LE, Mcglone AA (2006). Asymptomatic bacteriuria in adult." Am. Fam. Phys., 74: 985-990.

Ebie MY, Kandakai-Olukemi YT, Ayanbadejo J, Tanyigna KB (2001). Urinary tract infections in a Nigerian military hospital. Nig. J. Microbiol., 15: 31- 37.

Emiru T, Beyene G, Tsegaye W, Melaku S (2013). "Associated risk factors of urinary tract infection among pregnant women at Felege Hiwot Referral Hospital, Bahir Dar, North West Ethiopia." BMC Research Notes, 6: 292-297.

Feitosa DC, da Silva MG, de Lima Parada CM (2009). Accuracy of simple urine tests for diagnosis of urinary tract infections in low-risk pregnant women. Rev Lat Am Enfermagem, 17(4): 507-513.

Mars PS (2002). Urinary tract infection. Merck manual of diag1178-8.nosis and therapy. Merck Research lab. Railway NJ pp. 11784-next.

Nicolle LE (2001). Urinary tract infections in long-term-care facilities. Infection Control and Hospital Epidemiology, 22(30): 167-175.

Okonko IO, Ijandipe LA, Ilusanya AO, Donbraye-Emmanuel OB, Ejembi J, Udeze AO, Egun OC, Fowotade A, Nkanga AO (2010). Detection of urinary tract infection (UTI) among pregnant women in Oluyoro Catholic Hospital, Ibadan, South-Western Nigeria. Malaysian J. Microbiology, 6(1): 16-24.

Oladeinde BH, Omoregie R, Oladeinde OB (2015). Asymptomatic urinary tract infection among pregnant women receiving antenatal care in a traditional birth home in Benin city, Nigeria. Ethiopian J. Health Sci., 25(1): 3-8.

Omonigbo SE, Obasi EE, Akukalia RN (2001). In vitro resistance of urinary isolates of *Escherichia coli* and *Klebsiella* species to Nalidixic acid. Niger J. Microbiol., 15(1): 22-29.

Otajevwo FD, Eriagbor C (2014). Asymptomatic urinary tract infection occurrence among students of a private University in Western Delta, Nigeria. World Journal of Medicine and medical Sciences, 2(5): 1-26.

Ramzan M, Bakhsh S, Salam A, Khan GM, Mustafa G (2004). Risk factor in urinary tract infection. Gomal J. Med. Sci., 2: 50-53.

Singh B (1997). Molecular methods for diagnosis and epidemiological Journal for Parasitology, 27: 1135-1145.

Stewart RC, Nowbath V, Carmichael M, Klugman KP (1993). Corynebacterium group D2 Urinary Tract Infection. South African Med. J., 83(2): 95-96.

Turpin CA, Minkah B, Danso KA, Frimpong E (2007). Asymptomatic Bacteriuria in pregnant women attending antenatal clinic at Komfo Anokye teaching hospital, Kumasi, Ghana. Ghana Med. J., 41: 26–29.

Vasudevan R (2014). Urinary tract Infection: An overview of the infection and the associated risk factor. J. Microbiol. Experimentation, 1(2): 1-15.