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Evaluation of Gentamicin's Antimicrobial Resistance Pattern Against Uropathogens in a Tertiary Health Care Center in Dhaka City, Bangladesh

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Abstract
Treatment of UTI patients with aminoglycosides is a familiar incidence. Resistance of antibiotics is also a familiar incidence but it is alarming when it goes to a high ratio. The vital public health problem in developing country like Bangladesh is resistance of antibiotics to different types of bacteria causing UTI and the rates of these bacterial resistances are changing for various antibiotic therapy. Our aim was to assess the susceptible pattern of Gentamicin a drug of Aminoglycosides group against uropathogens. A total of 12943 urine samples were collected in 2016 (Jan-Dec) and out of which 1236 (9.55%) were bacteriologically positive out of these isolated 95.1% were gram negative and 4.9% gram positive organism. Male were found more prone to get UTI under 10 years and between 51-90 years of age and female were more affected in 10 to 50 years and over 90 years of age group. E. coli was the most prevalent (83.9%) isolate followed by Klebsiella spp. (6.7%), Staphylococcus aureus (2.6%), Pseudomonas spp. (2.2%), Enterococcus spp. (2.0%) and Proteus spp. (1.1%). The most predominant organism Acinetobacter spp. (100%) were found sensitive to Gentamicin in both male and female patients and Enterococcus spp. in male (62.5%) and female (58.8%) were found resistant. Around 37.4% male and 32.5% female were found resistant to E.coli.
Keywords: Gentamicin, Aminoglycosides, UTI, Resistance, Uropathogen.
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I.INTRODUCTION

Antibiotic resistance is an increasing threat to life and morbidity and mortality. Urinary Tract Infection (UTI) is a predominant infection all over the world but it is more prevalent in developing south Asian countries like Bangladesh. Urinary Tract Infection (UTI) represents as one of the most common diseases encountered in medical practices these days and encompasses a broad range of clinical fields that are associated with a common finding of positive urine cultures. Besides every year about 150 million people are affected by UTIs. Worldwide at a cost of about US$6 billion and even UTIs have demonstrated significant morbidity and mortality. (1)

They are the second most common types of infection in humans accounting for 8.3 million doctor's visit annually in USA.(2) UTI can be nosocomially ubiquitous in clinical environment so that prevalence rate of uropathogens is being alarmingly accelerated.(1) Urinary tract infection is more common in female than male, because of the short length of the urethra and its proximity to anus. Pregnancy and sexual activity also make female more susceptible to UTI. Different factors like age, sex, immunosuppression and urological instruments may affect prevalence of UTIs.(3)

To prevent these pathogens, different types of antibiotics and their super generations are used irrespectively with different doses in misused and overused forms. So uropathogens are getting resistant to efficacious drugs adopting different mechanisms of mutations and genetic transformations.(4) The etiology of UTIs and the antibiotic susceptibility of urinary pathogens, both in community and hospitals, have been changing over the past years and recently, the antibiotic resistance has become a major global problem.(5) A large proportion of uncontrolled antibiotic usage has contributed to the emergence of resistant bacterial infections.(6)

The early introduction of effective drugs against bacterial infections in the last century has changed the medical behavior and has significantly reduced the mortality rates due to these agents. However, the widespread use of antibiotics has induced different mechanisms of bacteria resistance to these drugs.(7) Bacterial resistance is naturally developed, being a consequence of bacteria adaptation to the environment. The exposure of microorganisms to different antibiotics increases the selective pressure and favors the development of resistance.(8) The most frequently prescribed antibiotics to treat UTIs are sulfamethoxazole+trimethoprim, fluoroquinolones (ciprofloxacin or norfloxacin), 1st , 2nd and 3rd generations of cephalosporins, amoxicillin + clavulanate, Aminoglycosides and nitrofurantoin. (1)

However, Gentamicin, sold under brand names Garamycin among others, is an antibiotic used to treat several

types of bacterial infections. This may include bone infections, endocarditis, pelvic inflammatory disease, meningitis, pneumonia, urinary tract infections, and sepsis among others.[8] Gentamicin was discovered in 1963.[9] It is made from the bacteria *Micromonospora purpurea*.[8] Gentamicin is on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system.[10] It is available as a generic medication.[11] The injectable's wholesale cost in the developing world in 2014 was between US$0.05 and US$0.58 per ml.[12]

In addition to, Aminoglycosides like Gentamicin "irreversibly" bind to specific 30S-subunit proteins and 16S rRNA. Specifically Gentamicin binds to four nucleotides of 16S rRNA and a single amino acid of protein S12. This interferes with decoding site in the vicinity of nucleotide 1400 in 16S rRNA of 30S subunit. This region interacts with the wobble base in the anticodon of tRNA. This leads to interference with the initiation complex, misreading of mRNA so incorrect amino acids are inserted into the polypeptide leading to nonfunctional or toxic peptides and the breakup of polysomes into nonfunctional monosomes.[13,14]

It is the most effective drugs for UTI patients in Bangladesh for treatment of UTI patients. But now a days we see the drugs does not work against uropathogens as before works. Our aim of the study to see the state of susceptibility pattern of Gentamicin against Urinary Tract Infection patients in selected areas (Badda, Gulshan, Baridhara, Rampura, Doyagonj, Gandaria, Jatrabari, Sayedabad) of Dhaka, Bangladesh.

II. MATERIALS AND METHODS

Materials

Study Design: A cross-sectional study.

Study Location: This was a retrospective analysis of laboratory data routinely collected from the microbiology department of IBN SINA Diagnostic & Consultation Center, Badda, Dhaka-1212, Bangladesh from 1st January, 2016 to 31st December, 2016. The total sample volumes were 12943.

Methods

Sample Collection and Bacteriological Assessment: Early morning midstream urine samples were collected aseptically from 12943 (Male-3638 & female-9305) patients. The urine samples were collected into sterile wide container (China) with screw cap tops. On the label were the name, age, sex and time of collection. All the patients were instructed on how to collect the urine samples aseptically and taken to the laboratory immediately for culture. In the diagnostic laboratory, each well mixed urine sample (1µL) was inoculated on MacConkey agar (Oxoid), Hichrome UTI agar (HiMedia) and Blood agar (Oxoid) media plate under class-II laminar airflow (NUVO Sanaji Malzemelzeni, Imalat Vc Ticaret A.S, Turkey). The inoculum on the plate was streaked out for discrete colonies with a sterile wire loop sterilized by auto loop sterilizer (Germany) following standard procedures. The culture plates were incubated at 37°C by an incubator (Germany) for 48 hours and observed for the growth of bacteria through formation of colonies. All the bacteria were isolated and identified morphologically, microscopy (Japan) and biochemical tests like TSI (HiMedia), MIU (HiMedia) and Simmons Citrate (HiMedia) agar following standard procedures.[15]

Antibiotic Susceptibility Assessment: The disc diffusion technique was used for antibacterial susceptibility testing of the isolates using commercial antibiotics containing discs. We used the commercial antibiotic disc Gentamicin (10µg, Oxoid). Interpretation of results was done using zone sizes. Zones of inhibition for *Enterobacteriaceae*, *P. aeruginosa*, *Acinetobacter* spp., and *Staphylococcus* spp. ≥15 mm was considered sensitive, 13-14 mm intermediate and ≤12 mm resistant, Isolates were classified as either sensitive or resistant based on the definition of the Clinical and Laboratory Standard Institute.[16] Some laboratory stains of known sensitivity of *Staphylococcus aureus* ATCC 29213, *Enterococcus faecalis* ATCC 29212, *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853 and *Streptococcus pneumoniae* ATCC 49619 were used as quality control strains for the antimicrobial discs.

Statistical Analysis: Data were assessed using the Statistical Package for Social Science (IBM SPSS Statistics, version 18, IBM Corporation, SPSS Inc. Chicago, III, USA).

III.RESULTS

The total 12943 urine samples collected from patients, 1236 (9.55%) samples were positive and 11707 (90.45%) samples were negative at 2016 (January-December) in selected areas (Badda, Gulshan, Baridhara, Rampura, Doyagonj, Gandaria,Jatrabari, Sayedabad, Dhaka, Bangladesh).

Tabel-1: Distribution table of Urinary Tract Infection (UTI) patients by age groups and gender (n=1236)

Age (Years)	<10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90
Male	53	05	19	16	26	38	73	38	05	02
Female	103	83	181	113	149	130	124	56	14	08
Total	156	88	200	129	175	168	197	94	19	10

In our study, table-1 showed the distribution table of urinary tract infection affected patients by their age

groups and gender. The highest of the study subjects under goes to the 21-30 years age group (200 patients=181 female + 19 male) and followed by 61-70 years age group (197 patients=124 female + 73 male), 41-50 years age group (175 patients=149 female + 26 male), 51-60 years age group (168 patients= 130 females + 38 males) and <10 years age group (156 patients= 103 females + 53 males) respectively. Most prevalent frequency of female and male patients affected by uropathogens was found in 21-30 years and 61-70 years age group respectively.

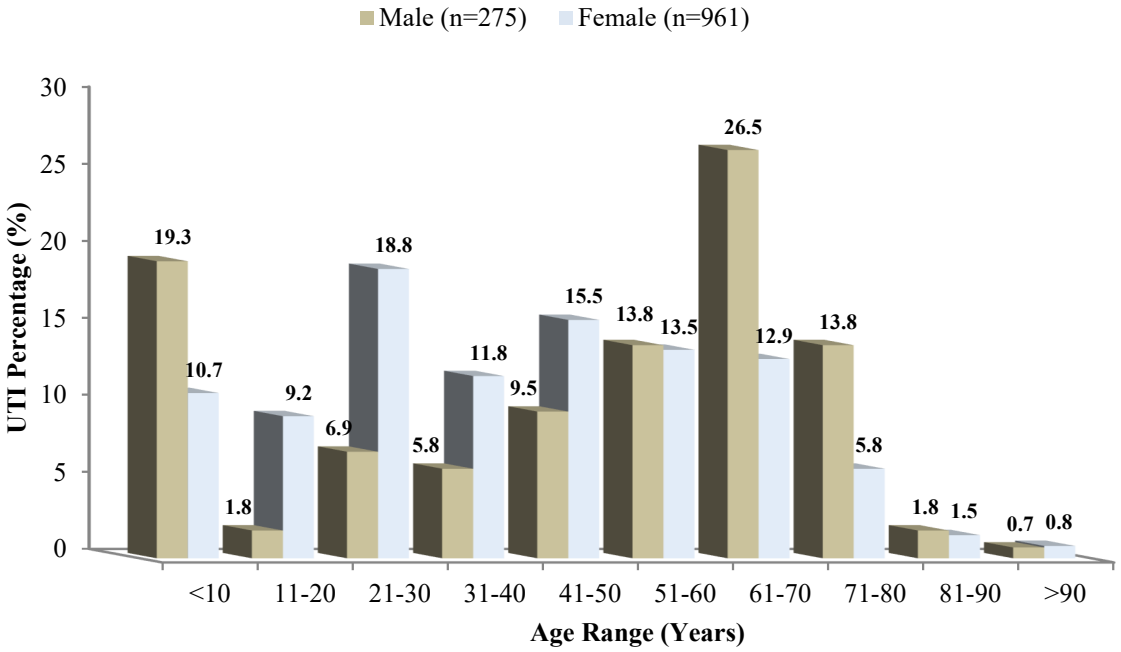

Figure-1: UTI percentage among different age groups of male (N=275) and female (N=961).

The percentage of male patients were more porne besides female patients (19.3% > 10.7%) under 10 years age groups. In between 11-20, 21-30, 31-40 and 41-50 years of age group female UTI infection (8.6%, 18.8%, 11.8% and 15.5% respectively) is higher than male (1.8%, 6.9%, 5.8% and 9.5% respectively). In between 51-60, 61-70 , 71-80 and 81-90 years age male infection (13.8%, 26.5%, 13.8% and 1.8% respectively) is higher than female (13.5%, 12.9%, 5.8 % and 1.5% respectively). Above 90 years age female infection (0.8%) is higher than male (0.7%) but here number of patients were very few.

Table-2: Distribution of specific uropathogen mediated UTI among UTI patients

Organisms	**Percentage (n=1236)**		
	Male	**Female**	**Total**
E. coli	222(18.0%)	815(65.9%)	1037(83.9%)
Klebsiella spp.	17(1.4%)	66(5.3%)	83(6.7%)
Staphylococcus aureus	5(0.4%)	27(2.2%)	32(2.6%)
Pseudomonas spp.	15(1.2%)	12(1.0%)	27(2.2%)
Enterococcus spp.	8(0.6%)	17(1.4%)	25(2.0%)
Proteus spp.	6(0.5%)	8(0.6%)	14(1.1%)
Enterobacter spp.	1(0.1%)	9(0.7%)	10(0.8%)
Acinetobacter spp.	1(0.1%)	1(0.1%)	2(0.2%)
Serretia spp.	0(0.0%)	2(0.2%)	2(0.2%)
Staphylococcus saprophyticus	0(0.0%)	2(0.2%)	2(0.2%)
Citrobacter spp.	0(0.0%)	1(0.1%)	1(0.1%)
Streptococcus Group B	0(0.0%)	1(0.1%)	1(0.1%)
Total	275(22.2%)	961(77.8%)	1236(100.0%)

Table 2 showed that the most predominant organism *E. coli* 1037(male 222 and female 815) found in UTI patients. According to number or percentage distribution, the second prevalent organism was *Klebsiella* spp. 83 (male 17 & female 66) followed by *Staphylococcus aureus* 32 (male 5 and female 27), *Pseudomonas* spp. 27 (male 15 and female 12), *Enterococcus* spp. 25 (male 8 and female 17), *Proteus* spp. 14 (male 6 and female 8) and *Enterobacter* spp. 10 (male 1 and female 9) respectively. In total bacteriologically positive cases, the most prone organism in male and female were *E. coli* (18.0% and 65.9 %) respectively. Moreover, all the isolated organisms were found highest in female except *Pseudomonas* spp. in contrast male patients. On the other hand the study

showed that the total 22.2% male patients and 77.8% female patients were found.

Table-3: Prevalence of different uropathogens among male and female patients.

Organisms	Male (n=275)		Female (n=961)	
	Number	Percentage	Number	Percentage
E.coli	222	80.7%	815	84.8%
Klebsiella spp.	17	6.2%	66	6.9%
Staphylococcus aureus	5	1.8%	27	2.8%
Pseudomonas spp	15	5.5%	12	1.2%
Enterococcus spp.	8	2.9%	17	1.8%
Enterobacter spp.	1	0.4%	9	0.9%
Proteus spp.	6	2.2%	8	0.8%
Serretia spp.	0	0.0%	2	0.2%
Staphylococcus saprophyticus	0	0.0%	2	0.2%
Acinetobacter spp.	1	0.4%	1	0.1%
Citrobacter spp.	0	0.0%	1	0.1%
Streptococcus Group B	0	0.0%	1	0.1%
Total	275	100.0%	961	100.0%

In this study, the urinary tract infections of female patients (961) were more prone to male patients (275). In male, the most predominant uropathogen were *E. coli* (80.7%) followed by *Klebsiella* spp. (6.2%), *Pseudomonas* spp. (5.5%), *Enterococcus* spp. (2.9%), *Staphylococcus aureus* (1.8%). In female, the most prevalent uropathogens were *E. coli* (84.8%) followed by *Klebsiella* spp. (6.9%), *Staphylococcus aureus* (2.8%), *Enterococcus* spp. (1.8%), *Pseudomonas* spp. (1.2%). The study noted that female patients were more infected by all of the isolated organism (*E. coli, Klebsiella* spp., *Staphylococcus aureus, Enterobacter* spp, *Serretia* spp., *Staphylococcus saprophyticus, Citrobacter* spp. and *Streptococcus* Group B) except some organisms (*Pseudomonas* spp. and *Enterococcus* spp., *Proteus* spp. and *Acinetobacter* spp.*)* but here the number were very few.

Table-4: Susceptibility pattern of Gentamicin against uropathogens among male UTI patients (n=275)

Name of organisms	Sensitive		Resistant	
	Number	Percentage	Number	Percentage
E. coli	139	62.6%	83	37.4%
Proteus spp.	5	83.3%	1	16.7%
Pseudomonas spp.	8	53.3%	7	46.7%
Klebsiella spp.	11	64.7%	6	35.3%
Enterobacter spp.	1	100.0%	0	0.0%
Staphylococcus aureus	2	40.0%	3	60.0%
Enterococcus spp.	3	37.5%	5	62.5%
Acinetobacter spp	1	100.0%	0	0.0%
Total	170	61.8%	105	38.2%

Table-4 showed that Gentamicin sensitive against isolated uropathogenic bacteria in total male patients were 61.8% and rest of resistant 38.2%. All of them (100%) *Acinetobacter* spp. and *Enterobacter* spp. were sensitive to Gentamicin but here the numbers were very few. On the other hand the most prevalent resistant organism was *Enterococcus* spp. (62.5%). In contrast of frequency, *E. coli* was the most significant organism which was 62.6 % sensitive and 37.4 % resistant to Gentamicin. However, the other isolated bacteria's sensitive pattern to Gentamicin followed by *Proteus* spp.(83.3%), *Pseudomonas* spp. (53.3%), *Klebsiella* spp. (64.7%), *Staphylococcus aureus* (40%) and *Enterococcus* spp. (37.5%) and resistant pattern followed by *Proteus* spp.(16.7%), *Pseudomonas* spp. (46.7%), *Klebsiella* spp. (35.3%) and *Staphylococcus aureus* (60%) respectively.

Table-5: Susceptibility pattern of Gentamicin against uropathogens among female UTI patients (n=961)

Name of organisms	Sensitive		Resistant	
	Number	Percentage	Number	Percentage
E. coli	550	67.5%	265	32.5%
Proteus spp.	6	75.0%	2	25.0%
Pseudomonas spp.	5	41.7%	7	58.3%
Klebsiella spp.	42	63.6%	24	36.4%
Enterobacter spp.	8	88.9%	1	11.1%
Staphylococcus aureus	17	63.0%	10	37.0%
Enterococcus spp.	7	41.2%	10	58.8%
Acinetobacter spp.	1	100.0%	0	0.0%
Citrobacter spp.	1	100.0%	0	0.0%
Streptococcus Group B	1	100.0%	0	0.0%
Serratia spp.	2	100.0%	0	0.0%
Staph. saprophyticus	2	100.0%	0	0.0%
Total	642	66.8%	319	33.2%

In our study table-5 showed that Gentamicin sensitive against isolated uropathogenic bacteria in total female patients were 66.8% and rest of resistant 33.2%. All of them (100%) *Acinetobacter* spp., *Citrobacter* spp., *Streptococcus* Group B, *Serratia* spp. and *Staph. saprophyticus* were sensitive to Gentamicin but here the numbers were very few. On the other hand the most prevalent resistant organism was *Enterococcus* spp. (58.8%) but here the numbers were very few. By contrast of frequency, *E. coli* was the most significant organism which was 67.5% sensitive and 32.5 % resistant to Gentamicin. However, the other isolated bacterias sensitive pattern to Gentamicin followed by *Proteus* spp. (75%), *Pseudomonas* spp. (41.7%), *Klebsiella* spp. (63.6%), *Enterobacter* spp. (88.9%), *Staph. aureus* (63%) and *Enterococcus* spp. (41.2%) and resistant pattern followed by *Proteus* spp.(25%), *Pseudomonas* spp. (58.3%), *Klebsiella* spp. (36.4%), *Enterobacter* spp. (11.1%) and *Staph. aureus* (37%), respectively.

IV. DISCUSSION

This study aimed to evaluate the pattern of antimicrobial susceptibility of bacteria isolated from patients with UTI seen at the IBN SINA diagnostic center, Badda, Dhaka, Bangladesh. Moreover, we have identified the crucial bacterial species associated with UTI and described the profile of resistance to Gentamicin. It is important that clinicians are aware of the regional antibiotic resistance rates before initiating experimental antimicrobial therapy for UTI treatment, as it is well-described that urinary infection with a resistant pathogen is more likely to lead to bacteriological/clinical failures.[17] In our study, we tested total 12943 urine samples and 1236 (9.55%) were bacteriological positive and 11707 (90.45%) were bacteriological negative found.

In our study we found The highest of the study subjects under goes to the 21-30 years age group (200 patients=181 female + 19 male) and followed by 61-70 years age group (197 patients=124 female + 73 male), 41-50 years age group (175 patients=149 female + 26 male), 51-60 years age group (168 patients= 130 females + 38 males) and <10 years age group (156 patients= 103 females + 53 males) respectively. According to frequency in total infected patients, we saw that mostly female patients are affected by uropathogens in all the age groups in contrast male patients. It was noted that the highest frequency of UTIs observed in women when compared to men, which is often attributed to a shorter urethra that facilitates colonization by these microorganisms.[1] Most prevalent frequency of female and male patients affected by uropathogens was found in 21-30 years and 61-70 years age group respectively. However, there were found significant difference between the age groups and sex of urinary tract infection patients at 5% ($P<0.05$).

In the fugure we saw the percentage of male patients were more porne in contrast female patients (19.3% > 10.7%) under 10 years age groups. Our finding is supported by the fact that uncircumcised male infants appear to be at increased risk of UTIs in the first three months of life. In a study of 100 otherwise healthy infants ranging in age from five days to eight months and admitted to the hospital because of a first known UTI. Most of the UTIs in infants younger than three months of age were in males, but female infants predominated thereafter.[18] We also found in between 11-20, 21-30, 31-40 and 41-50 years of age group female UTI infection (8.6%, 18.8%, 11.8% and 15.5% respectively) is higher than male (1.8%, 6.9%, 5.8% and 9.5% respectively). In between 51-60, 61-70 , 71-80 and 81-90 years age male infection (13.8%, 26.5%, 13.8% and 1.8% respectively) is higher than female (13.5%, 12.9%, 5.8 % and 1.5% respectively). Above 90 years age female infection (0.8%) is higher than male (0.7%) but here number of patients were very few. The most predominat age gorup was 21-20 years in female patients. Incidence of infection in females increases directly with sexual activity and child-bearing. In the women, 25-30% of women between 20-40 years of age will get UTIs. The anatomical relationship of the female urethra and the vagina makes it liable to trauma during sexual intercourse as well as bacteria been massaged up the urethra

into the bladder during pregnancy and child birth. It has been reported in several studies that women who are sexually active, and especially if they use contraceptives, foams, gels, diaphragm and spermicides which are known to promote greater colonization of the vagina are at higher risk of developing UTIs.[1,19] Furthermore, another mechanism that could explain the lower frequency of UTI in men would be the prostatic fluid, which has antibacterial substances.[20] We got 961 (77.8%) female and 275 (22.2%) male patients. However, there were found significant difference between the percentage of age groups and sex of urinary tract infection patients at 5% ($P<0.05$).

Table 2 showed that the most predominant organism *E. coli* 1037 (male 222 and female 815) found in UTI patients. According to number or percentage distribution, the second prevalent organism was *Klebsiella* spp. 83 (male 17 & female 66) followed by *Staphylococcus aureus* 32 (male 5 and female 27), *Pseudomonas* spp. 27 (male 15 and female 12), *Enterococcus* spp. 25 (male 8 and female 17), *Proteus* spp. 14 (male 6 and female 8) and *Enterobacter* spp. 10 (male 1 and female 9) respectively. In total bacteriologically positive cases, the most prone organism in male and female were *E. coli* (18.0% and 65.9 %) respectively. There is fecal contamination of periurethral area, then the bacteria spreads on ascending through the bladder and causes cystitis. These infections of the lower urinary tract, in some cases, can affect the kidneys and cause acute pyelonephritis, which consequently may result in bacteremia and sepsis.[21] Moreover, all the isolated organisms were found highest in female except *Pseudomonas* spp. in contrast male patients. On the other hand the study showed that the total 22.2% male patients and 77.8% female patients were found. Moreover, there were found significant difference between the isolated organism and sex of urinary tract infection patients at 5% ($P<0.05$).

In this study, the urinary tract infections of female patients (961) were more prone to male patients (275). In male, the most predominant uropathogen were *E. coli* (80.7%) followed by *Klebsiella* spp. (6.2%), *Pseudomonas* spp. (5.5%), *Enterococcus* spp. (2.9%), *Staphylococcus aureus* (1.8%). In female, the most prevalent uropathogen were *E. coli* (84.8%) followed by *Klebsiella* spp. (6.9%), *Staphylococcus aureus* (2.8%), *Enterococcus* spp. (1.8%), *Pseudomonas* spp. (1.2%).. Several studies have shown that *Escherichia coli* is the major bacterial species associated with UTIs, and *Klebsiella pneumoniae* is the second most important bacteria in this type of infection.[1] The study noted that female patients were more infected by all of the isolated organism (*E.coli, Klebsiella* spp.. *Staphylococcus aureus, Enterobacter* spp, *Serretia* spp., *Staphylococcus saprophyticus, Citrobacter* spp. and *Streptococcus* Group B) except some organisms (*Pseudomonas* spp. and *Enterococcus* spp., *Proteus* spp. and *Acinetobacter* spp.*)* but here the number were very few. However, there were found significant difference between the percentage and frequency of isolated organism and sex of urinary tract infection patients at 5% ($P<0.05$).

Treatment of urinary tract infections is becoming more complicated with an increase of the number of resistant strains to antibiotics and prevalence of antibiotic resistance mechanisms. Table-4 showed that Gentamicin sensitive against isolated uropathogenic bacteria in total male patients were 61.8% and rest of resistant 38.2%. All of them (100%) *Acinetobacter* spp. and *Enterobacter* spp. were sensitive to Gentamicin but here the numbers were very few. On the other hand the most prevalent resistant organism was *Enterococcus* spp. (62.5%). In contrast of frequency, *E. coli* was the most significant organism which was 62.6 % sensitive and 37.4 % resistant to Gentamicin. As Gentamicin very effective in most of the uropathogens, But it is very alarming subject to resistant a wide range of this drugs. It had observed that horizontal gene transfer is a factor in the emergence and spread of antimicrobial resistance in clinical isolates. Consequently, it has been suggested that the high prevalence of resistance to a particular antibiotic does not always reflect antibiotic consumption in a given environment.[1,22] However, the other isolated bacteria's sensitive pattern to Gentamicin followed by *Proteus* spp.(83.3%), *Pseudomonas* spp. (53.3%), *Klebsiella* spp. (64.7%), *Staphylococcus aureus* (40%) and *Enterococcus* spp. (37.5%) and resistant pattern followed by *Proteus* spp.(16.7%), *Pseudomonas* spp. (46.7%), *Klebsiella* spp. (35.3%) and *Staphylococcus aureus* (60%) respectively. There were no significant difference among the susceptibility pattern of Gentamicin, isolated organism and sex of the patients at 5% ($P>0.05$).

Gentamicin sensitive against isolated uropathogenic bacteria in total female patients were 66.8% and rest of resistant 33.2% found in table-5. All of them (100%) *Acinetobacter* spp., *Citrobacter* spp., *Streptococcus* Group B, *Serratia* spp. and *Staph. saprophyticus* were sensitive to Gentamicin but here the numbers were very few. On the other hand the most prevalent resistant organism was *Enterococcus* spp. (58.8%) but here the numbers were very few. By contrast of frequency, *E. coli* was the most significant organism which was 67.5% sensitive and 32.5 % resistant to Gentamicin. However, the other isolated bacteria's sensitive pattern to Gentamicin followed by *Proteus* spp.(75%), *Pseudomonas* spp. (41.7%), *Klebsiella* spp. (63.6%), *Enterobacter* spp. (88.9%), *Staph. aureus* (63%) and *Enterococcus* spp. (41.2%) and resistant pattern followed by *Proteus* spp.(25%), *Pseudomonas* spp. (58.3%), *Klebsiella* spp. (36.4%), *Enterobacter* spp. (11.1%) and *Staph. aureus* (37%), respectively. There were no significant difference among the susceptibility pattern of Gentamicin, isolated organism and sex of the patients at 5% ($P>0.05$).

The knowledge on the regional pattern of bacterial resistance is critical to guide the medical staff to choose an appropriate antibiotic for the treatment of UTI patients.[23] Bacterial resistance has become a public health issue and has increasingly been associated with risk factors that put life in danger.[1] Awareness is needed of both the

population and health professionals about the importance for the correct use of antibiotics, and it is mandatory to take into account the result of antibiotics susceptibility tests. The Gentamicin use should be performed only after the microbial susceptibility confirmation, and it is necessary to find other alternatives for the empirical treatment. The bacterial resistance prevention can be performed through control measures that limit the spread of resistant bacteria and the rational use of antimicrobial policy.

V. CONCLUSION

In a nutshell, the results showed that there is a alarming subject of resistance of Gentamicin against UTI patients among this areas (Badda, Gulshan, Baridhara, Rampura, Doyagonj, Gandaria,Jatrabari, Sayedabad, Dhaka, Bangladesh). Most of the bacteria were susceptible to Gentamicin. The prescribed Gentamicin antibiotic were still effective against the uropathogens, but should be reserved for only complicated UTIs and should use to follow the antibiotic guidelines in order to prevent emergence of multi drug resistant organisms.

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