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Ceftriaxone Resistance Patterns of Uropathogens Isolated From Urinary Tract Infection Patients in Selected Areas of Dhaka City, Bangladesh

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Abstract: *Antibiotic resistance is one of the biggest threats to global health, food security, and development today. Antibiotic resistance can affect anyone, of any age, in any country. Antibiotic resistance occurs naturally, but misuse of antibiotics in humans and animals is accelerating the process. A growing number of infections are becoming harder to treat as the antibiotics used to treat them become less effective. Antibiotic resistance leads to longer hospital stays, higher medical costs and increased mortality. Our aim was to assess the susceptible pattern of Ceftriaxone of 3rd generation cephalosporin antibiotic against uropathogens. A total of 12943 urine samples were collected in 2016 (Jan-Dec) and out of which 1236 (9.55%) were bacteriologically positive. Among the isolated uropathogens, 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 females 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 Ceftriaxone in both male & female patients and Enterococcus spp. in male (62.5%) & Streptococcus Group B in female (100%) were found resistant. Around (59.9%) males and (44.7%) females were found resistant to Ceftriaxone against E. coli.*

Keywords*: Ceftriaxone, Cephalosporin, 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 and nitrofurantoin [(1)].

However, Ceftriaxone is an antibiotic useful for the treatment of a number of bacterial infections. This includes middle ear infections, endocarditis, meningitis, pneumonia, bone and joint infections, intra-abdominal infections, skin infections, urinary tract infections, gonorrhea, and pelvic inflammatory disease. It is also sometimes used before surgery and following a bite wound to try to prevent infection. Ceftriaxone can be given by injection into a vein or into a muscle. It is a third-generation cephalosporin that works by preventing bacteria from making a cell wall [(9)]. It is on the WHO Model List of Essential Medicines, the most effective and safe medicines needed in a health system [(10)].

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

II. Materials and Methods

Materials

Study Design:

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) 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 using morphological, microscopy (Japan) and biochemical tests like TSI (HiMedia), MIU (HiMedia) and Simmons Citrate (HiMedia) agar following standard procedures [(11)].

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 Ceftriaxone (30µg, Oxoid). Interpretation of results was done using zone sizes. Zones of inhibition for Enterobacteriaceae ≥23 mm was considered sensitive, 20-22 mm intermediate and ≤19 mm resistant, for Staphylococcus spp., Pseudomonas spp. and Acinetobacter spp. ≥21 mm was considered sensitive, 14-20 mm intermediate and ≤13 mm resistant. and for Streptococcus spp. ≥27 mm was considered sensitive, 25-26 mm intermediate and ≤24 mm resistant. Isolates were classified as either sensitive or resistant based on the definition of the Clinical and Laboratory Standard Institute.[(12)] 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). The Trend chi square test for statistical comparisons between the groups.

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	**<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.

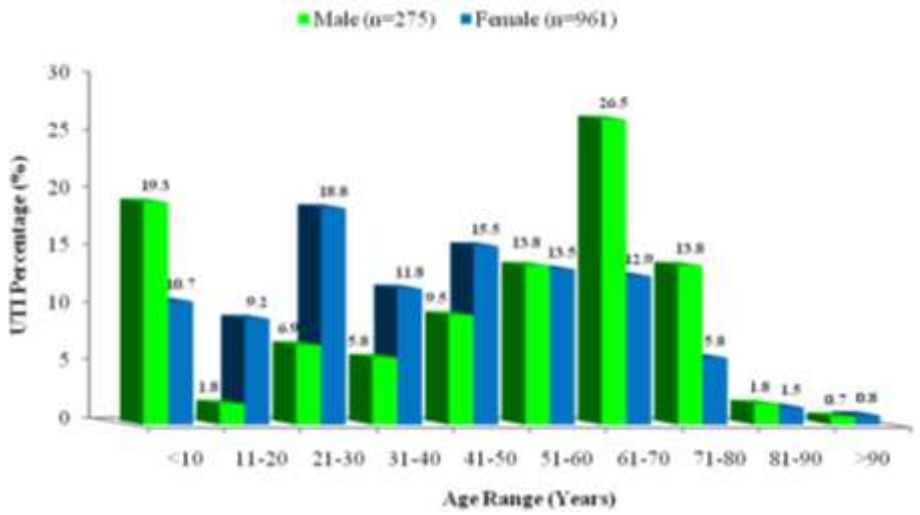

Figure-1: UTI percentage among different age groups of male (N=275) and female (N=961).

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 uropathogen 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 Ceftriaxone against uropathogens among male UTI patients (n=275)

Name of organisms	Sensitive		Resistant	
	Number	Percentage	Number	Percentage
E. coli	89	40.1%	133	59.9%
Proteus spp.	4	66.7%	2	33.3%
Pseudomonas spp.	8	53.3%	7	46.7%
Klebsiella spp.	8	47.1%	9	52.9%
Enterobacter spp.	1	100.0%	0	0.0%
Staphylococcus aureus	4	80.0%	1	20.0%
Enterococcus spp.	3	37.5%	5	62.5%
Acinetobacter spp.	1	100.0%	0	0.0%
Total	118	42.9%	157	57.1%

Table-4 showed that Ceftriaxone sensitive against isolated uropathogenic bacteria in total male patients were 42.9% and rest of resistant 57.1%. All of them (100%) *Acinetobacter* spp. and *Enterobacter* spp. were sensitive to ceftriaxone 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 40.1 % sensitive and 59.9 % resistant to ceftriaxone. However, the other isolated bacteria's sensitive pattern to ceftriaxone followed by *Proteus* spp. (66.7%), *Pseudomonas* spp. (53.3%), *Klebsiella* spp. (47.1%), *Staphylococcus aureus* (80%) and *Enterococcus* spp. (37.5%) and resistant pattern followed by *Proteus* spp.(33.3%), *Pseudomonas* spp. (46.7%), *Klebsiella* spp. (52.9%), *Staphylococcus aureus* (20%) and *Enterococcus* spp. (62.5%) respectively.

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

Name of organisms	Sensitive		Resistant	
	Number	Percentage	Number	Percentage
E. coli	451	55.3%	364	44.7%
Proteus spp.	3	37.5%	5	62.5%
Pseudomonas spp.	6	50.0%	6	50.0%
Klebsiella spp.	40	60.6%	26	39.4%
Enterobacter spp.	5	55.6%	4	44.4%
Staphylococcus aureus	21	77.8%	6	22.2%
Enterococcus spp.	12	70.6%	5	29.4%
Acinetobacter spp.	1	100.0%	0	0.0%
Citrobacter spp.	1	100.0%	0	0.0%
Streptococcus Group B	0	0.0%	1	100.0%
Serretia spp.	1	50.0%	1	50.0%
Staphylococcus saprophyticus	2	100.0%	0	0.0%
Total	543	56.5%	418	43.5%

In our study table-5 showed that Ceftriaxone sensitive against isolated uropathogenic bacteria in total female patients were 56.5% and rest of resistant 43.5%. All of them (100%) *Acinetobacter* spp., *Citrobacter* spp. and *Staphylococcus saprophyticus* were sensitive to ceftriaxone but here the numbers were very few. On the other hand the most prevalent resistant organism was *Streptococcus* Group B (100%) but here the numbers were very few. By contrast of frequency, E.coli was the most significant organism which was 55.3 % sensitive and 44.7 % resistant to ceftriaxone. However, the other isolated bacteria's sensitive pattern to ceftriaxone followed by *Proteus* spp.(37.5%), *Pseudomonas* spp. (50.0%), *Klebsiella* spp. (60.6%), *Enterobacter* spp. (55.6%), *Staphylococcus aureus* (77.8%), *Enterococcus* spp. (70.6%) and *Serretia* spp. (50.0%) and resistant pattern followed by *Proteus* spp.(62.5%), *Pseudomonas* spp. (50.0%), *Klebsiella* spp. (39.4%), *Enterobacter* spp. (44.4%), *Staphylococcus aureus* (22.2%), *Enterococcus* spp. (29.4%) and *Serretia* spp. (50.0%) respectively.

IV. Discussion

For misuse or abuse of antibiotics, followed by an increase in the bacterial resistance rates, 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 ceftriaxone. 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 [(13)]. 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 was 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 [(14)]. 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 [(1,15)]. Furthermore, another mechanism that could explain the lower frequency of UTI in men would be the prostatic fluid, which has antibacterial substances [(16)]. 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 65.0%) 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 [(17)]. 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, significant difference found between the percentage and frequency of isolated organisms 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 Ceftriaxone sensitive against isolated uropathogenic bacteria in total male patients were 42.9% and rest of resistant 57.1%. All of them (100%) *Acinetobacter* spp. and *Enterobacter* spp. were sensitive to ceftriaxone 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 40.1 % sensitive and 59.9 % resistant to ceftriaxone. As ceftriaxone is 3rd generation cephalosporin, It was 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.[(1,18)] However, the other isolated bacteria's sensitive pattern to ceftriaxone followed by *Proteus* spp.(66.7%), *Pseudomonas* spp. (53.3%), *Klebsiella* spp. (47.1%), *Staphylococcus aureus* (80%) and *Enterococcus* spp. (37.5%) and resistant pattern followed by Proteus spp.(33.3%), *Pseudomonas* spp. (46.7%), *Klebsiella* spp. (52.9%), *Staphylococcus aureus* (20%) and *Enterococcus* spp. (62.5%) respectively. There were no significant difference among the susceptibility pattern of ceftriaxone, isolated organism and sex of the patients at 5% ($P>0.05$).

In our study Table-5 showed that Ceftriaxone sensitive against isolated uropathogenic bacteria in total female patients were 56.5% and rest of resistant 43.5%. All of them (100%) *Acinetobacter* spp., *Citrobacter* spp. and *Staphylococcus saprophyticus* were sensitive to ceftriaxone but here the numbers were very few. On the other hand the most prevalent resistant organism was Streptococcus Group B (100%) but here the numbers were very few. By contrast of frequency, *E. coli* was the most significant organism which was 55.3 % sensitive and 44.7 % resistant to ceftriaxone. However, the other isolated bacteria's sensitive pattern to ceftriaxone followed by *Proteus* spp. (37.5%), *Pseudomonas* spp. (50.0%), *Klebsiella* spp. (60.6%), *Enterobacter* spp. (55.6%), *Staphylococcus aureus* (77.8%), *Enterococcus* spp. (70.6%) and *Serretia* spp. (50.0%) and resistant pattern followed by *Proteus* spp.(62.5%), *Pseudomonas* spp. (50.0%), *Klebsiella* spp. (39.4%), *Enterobacter* spp. (44.4%), *Staphylococcus aureus* (22.2%), *Enterococcus* spp. (29.4%) and *Serretia* spp. (50.0%) respectively. There were no significant difference among the susceptibility pattern of ceftriaxone, 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 [(19)]. 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 ceftriaxone 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

As a whole, the results showed that there was a high prevalence of occurrence of urinary tract infection among patients of areas (Badda, Gulshan, Baridhara, Rampura, Doyagonj, Gandaria, Jatrabari, Sayedabad, Dhaka, Bangladesh). Most of the bacteria were susceptible to ceftriaxone. The prescribed ceftriaxone antibiotic were still effective and safe 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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