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Symptomatic Pathogen Frequency and Antibiogram Patterns of Bacterial Isolates in Urinary Tract Infections, Sirajganj Sadar, Bangladesh

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ABSTRACT

Urinary tract infections (UTIs) are broadly common in inpatient and outpatient males and females of different ages and comprise 40% of the nosocomial infections that collectively cause 150 million deaths per year. The right care is obligatory if the patients do not want to die, but this is hard to do because the things that make people sick are getting better at resisting antibiotics (AMR). Collected specimens were examined microscopically and cultured on Cystine Lactose Electrolyte Deficient (CLED) agar to isolate the pathogens. Isolated pathogens were identified through colony morphology, microscopic studies, and biochemical indications. Lastly, antimicrobial responsiveness patterns of the pathogens were determined by the disc diffusion method to find possible antibiotics that could treat the disease well. Among 17.67% of positive cultures, 73.58% were females, and 26.42% were males, dominated by the age group ≥ 37 years (49.06%). *E. coli* (56.6%), *Enterococcus faecalis* (26.4%), *Pseudomonas aeruginosa* (7.5%), *Staphylococcus aureus* (3.8%), *Acinetobacter baumannii* (3.8%). Moreover, *Serratia marcescens* (1.9%) were the isolated pathogens, with 69.8% Gram-negative and 30.2% Gram-positive. The most effective antibiotics were amikacin (88.68%), levofloxacin (88.68%), ciprofloxacin (86.79%), gentamicin (84.91%), and imipenem (84.91%). The least effective antibiotics were mecillinam (50.94%), cefuroxime (37.74%), ceftazidime (37.74%), meropenem (35.85%), and cefotaxime (33.96%). To treat and suggest antimicrobials, routine and emphatic research about urogenital pathogens and their antibiotic susceptibilities is required. Patients should be prescribed appropriate antimicrobial therapies after completing a standard test of pathogen identification and antibiotic resistance pattern determination. This study would be of extensive importance to patients and physicians in picking appropriate antimicrobial therapies for empiric treatment.

Keywords: Urinary tract infections (UTIs), CLED, Uropathogens, and Antibiotic susceptibility patterns.

INTRODUCTION:

The presence, growth, and settling of microorganisms that cause inflammation anywhere in the urogenital tract can be abstracted as "Urinary Tract Infections" (UTIs). Serious worldwide complaints of economic burden due to infection of urinary system affecting many populations are evident representing the second most prevalent infection and the major urological disease (Litwin *et al.*, 2005; McCann *et al.*, 2020). The outlet gateway of urine into the urethra accommodates the entry of pathogens into the urogenital tract. The large numbers of microorganisms that inhabit the regions around the urethral opening are the etiological agents associated with the diseases of urinary tract in both males and females, which are substantially prevalent in women on account of the shorter length of the urethra and the proximity of the urethral opening to the vaginal cavity & the rectum, which harbor huge microbial communities. Hospitalization is another common place where infections of urinary tract happen, as shown by the fact that there are 1 million UTI cases every year in the US and 80% of them are attributable to catheters, which are to blame for 40% of all nosocomial infections (Ahmed *et al*., 2021; Tambyah and Maki, 2000; Foxman, 2010).

Uropathogens are bacteria and fungi that cause urinary tract infections (UTIs). These pathogens include *E. coli, K. pneumoniae, S. agalactiae, P. mirabilis, S. saprophyticus, K. oxytoca, P. aeruginosa, E. faecalis, S. marcescens, A. baumannii, Candida spp. Gram*-negative, facultatively anaerobic *E. coli* strains are the commonest urogenital pathogens responsible for 80% of UTI development in women of 18–39 years of age. *E. coli*, significant part of normal flora in the digestive tract, but it grows and changes better in the urogenital tract (Mulvey *et al*., 2000; Hayle *et al*., 2020; Stamm, 2002).

Antimicrobial drugs resistance shown by etiological agents is a paramount confrontation with determining significantly effective antibiotics for empiric treatment around the world. ARM is a noticeable consequence of widespread irrational and inappropriate antimicrobial operation in diversified fields, including agriculture and animal husbandry. Various resistance mechanisms are progressively obtained by pathogens through changing the anti-microbial target site, decreasing permeability or increasing efflux, enzymatic inactivation, etc. that allow the resistant organisms to survive by natural selection (Cornelissen *et al.*, 2013; Ventola, 2015).

AMR development generates enormous difficulties during the selection of antibiotics to deal with microbial infections like UTIs. Regular research of great bulk is imperative to gather a substantial amount of knowledge about pathogens and their responsiveness patterns to antibiotics within a certain geographical area, and the outcomes should be followed during the application of antibiotic therapies. In view of the scary things, we've already talked about; the goal of our investigation was designed to find the pathogens that cause urogenital tract infections and antibiotic responsiveness patterns of the etiological agents in the target area. This would help doctors come up with antimicrobial treatments.

MATERIALS AND METHODS:

Field of inquiry

The investigation was implemented among UTI patients in the Health Aid Diagnostic Center, Sirajganj Sadar, and the Department of Microbiology, Khwaja Yunus Ali University, Sirajganj, Bangladesh.

Specimen collection

Urine samples were collected from 300 patients using a midstream technique for adults and urine bags for infants. In women, samples were taken after vulva swabbing with clear water. All samples were analyzed as soon as possible after they were taken.

Microscopic assessment of the sample

In the first step of microscopic evaluation of UTI, the supernatant was taken off after 5-10 minutes centrifugation of 10 ml urine sample at 2000-3000g. Sigle drop deposit was put on a microscope slide, protected with a cover-glass, and looked at with a light microscope using 10X and 40X objectives.

Microorganism isolation and identification

The collected patient's urine samples were inoculated on Cystine Lactose Electrolyte Deficient (CLED) agar (Hi-media) and observed to detect the microorganisms involved. 0.001 mL of urine sample was put on CLED agar with a sterile calibrated wire loop (Himedia, India). The culture plates were then incubated at 37º C for 24 hours. The overnight cultures with no growth were further incubated for up to 48 hours before declaring that as negative growth. The bacterial-quantities of isolated colonies were enumerated and multiplied by a dilution factor to estimate bacterial load per milliliter (ml) of a urine sample. Urine samples with a colony ≥105CFU/ml were taken as remarkable culture (Growth Positive Specimen = 105CFU/ml). Isolation of bacterial colonies of different morphological appearances within different media was performed, and preserved for identification and further utilization. Identification was executed by cultural, morphological, and biochemical characteristics. Standard procedures were expressly maintained during the implementation of identification processes. Kolawole *et al.* (2009) used the Catalase, Citrate, Oxidase, Coagulase, Oxidase, Triple Sugar Iron (TSI), Indole, Motility, Citrate, and Urease tests to authenticate the bacterial uropathogens that had already been isolated and named.

Determination of antibiotic responsiveness patterns

Disc diffusion method described by Cavaleri *et al.* (2005) was exploited to perceive the patterns of antibiotic responsiveness. In this technique, organisms were drawn in normal saline with the help of sterile wire loops. Briefly, colonies were taken from 24-hour culture plates into the nutrient broth. The turbidity formed was calibrated to an equivalent of 0.5 McFarland. The test organism was streaked on Muller-Hinton agar plates using sterile cotton swabs, then applied to different antibiotic discs and allowed over-night at 37ºC for growth. After incubation, the pathogens were judged to be resistant, sensitive, or intermediate to different antibiotics.

Data processing and analysis

Collected data were recorded and analyzed. The raw data were entered into excel spreadsheets (Excel, 2019) and later imported to the Statistical Package for Social Sciences (SPSS) version 20 for analysis. Diameters of the inhibition zones (mm) were taken into account to display anti-bacterial activity. Means of inhibition zones were compared using a student t-test since more than one variable was considered, and values of p 0.05 were regarded as significant. A chi-square test to analogize positive UTI cases according to individual characteristics was accomplished for the findings. Evaluations were carried out at a 95% confidence level and $P<0.05$ was judged as significant statistically.

RESULTS:

In our current study, 300 total collected samples from individuals with UTI symptoms were assayed, of which 53 (17.67%) specimens were found positive, and 247 (82.33%) were negative. Among those 53 positive cultures, 39 (73.58%) were female cases, and 14 (26.42%) were male cases (**Fig. 1**).

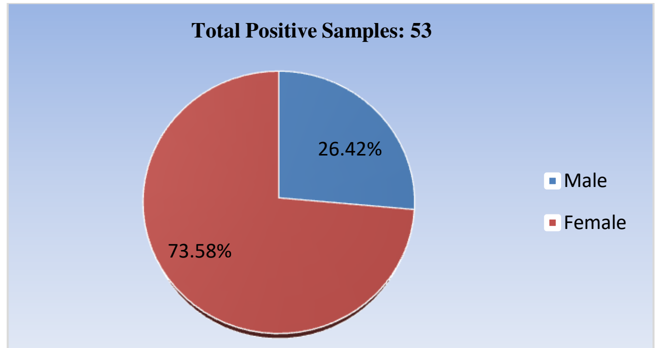

Fig. 1: Gender based distribution of positive UTI cases.

Regarding the distribution of positive cases among different age groups, the 37-year-old age group came in first with 26 (49.06%) cases, followed by the 13 – 24 years old age group with 11 (20.76%) cases. The age groups 0 – 12 years and 25 – 36 years had a similar number of cases (8 (15.09%) (**Fig. 2**). The uropathogens of those positive UTIs were identified following standard procedure. In our current study, different bacterial pathogens were found involved with UTIs in our current study, and the chart was led by *E. coli,* which was the most predominant pathogen for 30 (56.6%) cases, accompanied by *E. faecalis*, *Pseudomonas*, *S. aureus*, *Acinetobacter spp*, and *S. marcescens* with 14 (26.4%), 4 (7.5%), 2 (3.8%), 2 (3.8%), and 1 (1.9%) cases respectively (**Fig. 3**).

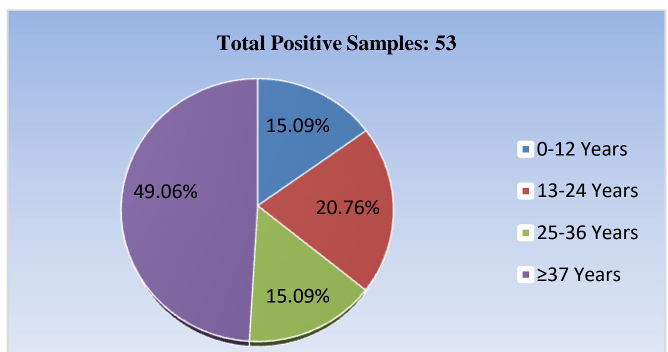

Fig. 2: Age based ordination of positive UTI cases.

Among the bacterial pathogens causing UTIs, Gram-negative isolates (69.8%) were more manifested than Gram-positive isolates (30.2%). *E. coli* (56.6%), *P. aeruginosa*. (7.5%), *A. baumannii* (3.8%), and *S. marcescens* (1.9%) constructed the gram-negative body, while *E. faecalis* (26.4%) and *S. aureus* (3.8%) were gram-positives (**Table 1**). *S. marcescens* was evident only in female infection in our current study. In contrast, the remainder of the pathogens were universal for both genders, where *E. coli, E. faecalis*, *P. aeruginosa* were more prevalent in females than in males. The density of *A. baumannii,* and *S. aureus* was similar in both males and females (**Fig. 4**).

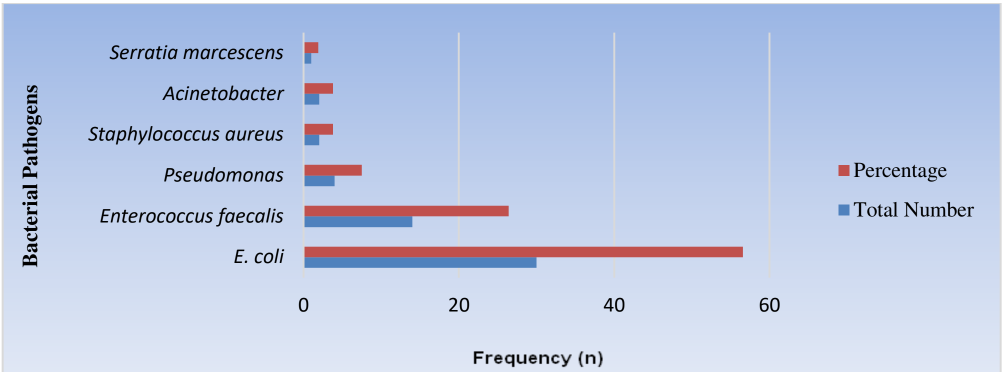

Fig. 3: Distribution of etiological agents of UTIs.

Table 1: Ordination of UTI pathogens formulated by Gram staining.

Organisms	Frequency (n)	Total (N)	Frequency (%)	Total (%)
Gram negative		37		69.8
E. coli	30		56.6	
P. aeruginosa	4		7.5	
A. baumannii	2		3.8	
S. marcescens	1		1.9	
Gram positive		16		30.2
E. faecalis	14		26.4	
S. aureus	2		3.8	

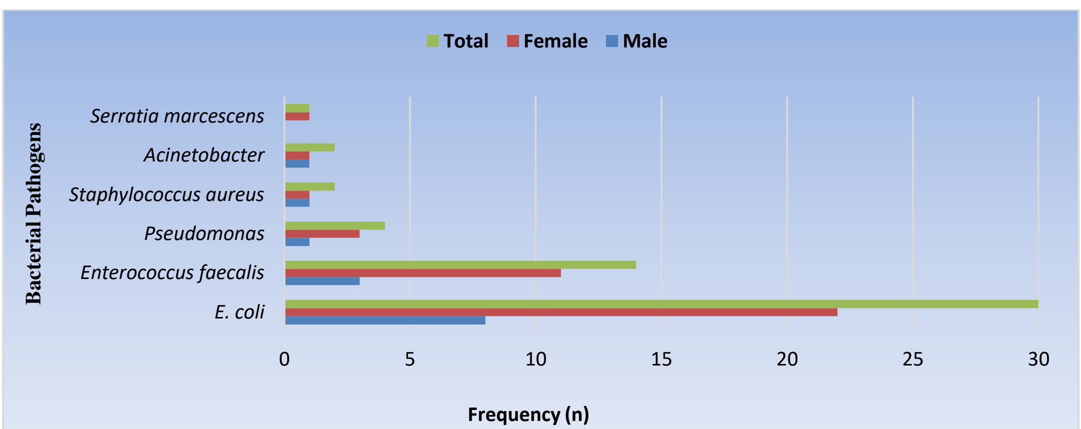

Fig. 4: Frequency of pathogens calculated according to gender of patients.

In our investigation, we tracked down a considerable distribution of diverse uropathogens among patients of various ages. The most vulnerable age group was 37 years (49.06%), followed by 13-24 years (20.76%), 0-12 years (15.09%), and 25 – 36 years (15.09%). Furthermore, all pathogens, *including E. coli, E. faecalis, P. aeruginosa, S. aureus, S. marcescens, and Acinetobacter* spp. infected in the 37-year-old age group, but *E. coli* was appeared to be the sole UTI causal agent in the 0-12 years old age group. Furthermore, *E. faecalis* and *E. coli* were ascertained in the UTIs of people aged 13-24, whereas *S. aureus* and *A. baumannii* were found in those aged 25 – 36. *E. coli* was diagnosed as the highest contributing uropathogen to develop diseases in people of all age groups, whereas *S. marcescens* was traced to infect only ≥37 years of age group (**Fig. 5**).

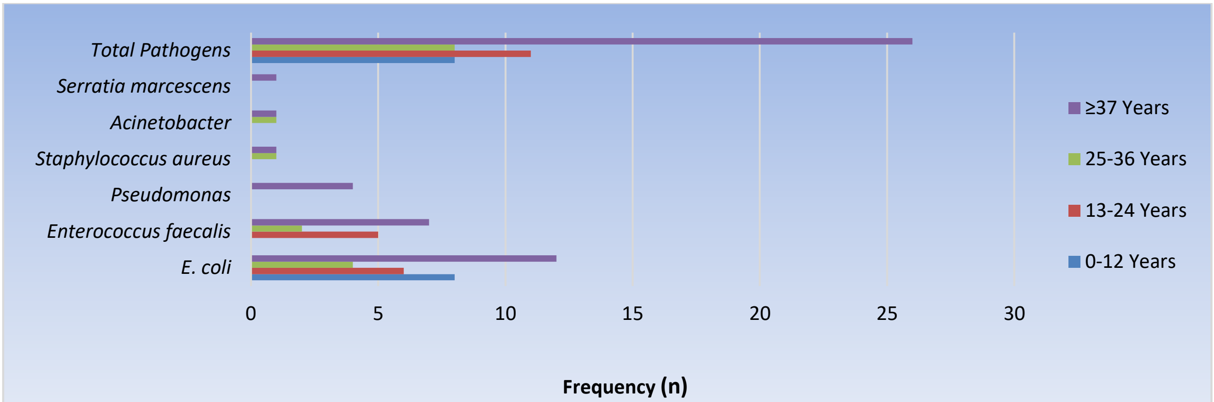

Fig. 5: Pervasiveness of uropathogens based on different age categories.

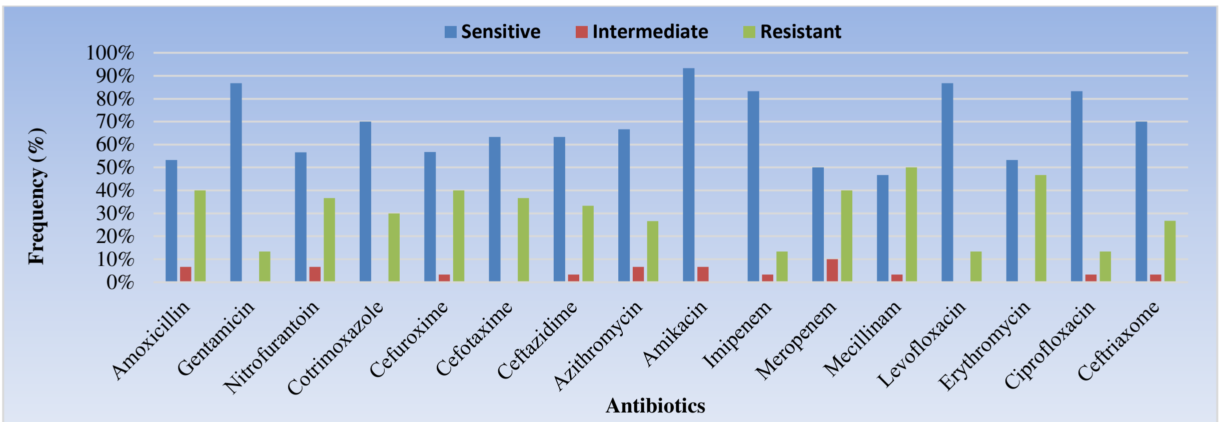

Fig. 6: Pattern of antibiotic responsiveness exhibited by *E. coli.*

This study also revealed the patterns of antibiotic responsiveness of the uropathogens to amoxicillin, gentamicin, nitrofurantoin, cotrimoxazole, cefuroxime, cefotaxime, ceftazidime, azithromycin, amikacin, imipenem, meropenem, mecillinam, levofloxacin, erythromycin, ciprofloxacin, and ceftriaxone. *E. coli*, the most pervasive uropathogen, showed the highest level of sensitivity to amikacin (93.3%), followed by gentamicin (86.7%), levofloxacin (86.7%), ciprofloxacin (83.3%), and imipenem (83.3%). The highest resistance by *E. coli* was discovered against mecillinam (50%), whereas no resistance was found against amikacin. Meropenem (10%) was the antibiotic that had the most intermediate activity against *E. coli.* Gentamicin, cotrimoxazole, cefotaxime, levofloxacin, and erythromycin displayed no intermediate activity (**Fig. 6**).

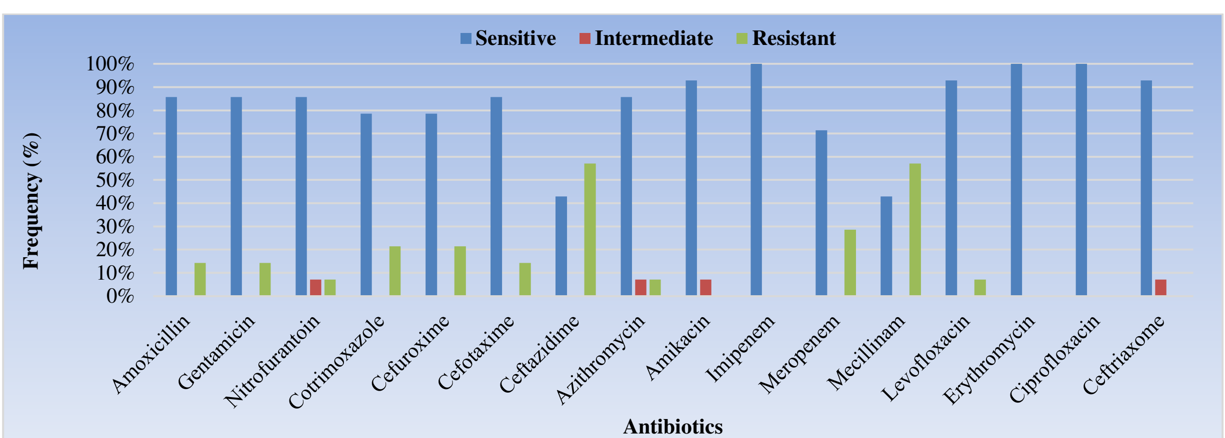

Fig. 7: Pattern of antibiotic responsiveness exhibited by *E. faecalis.*

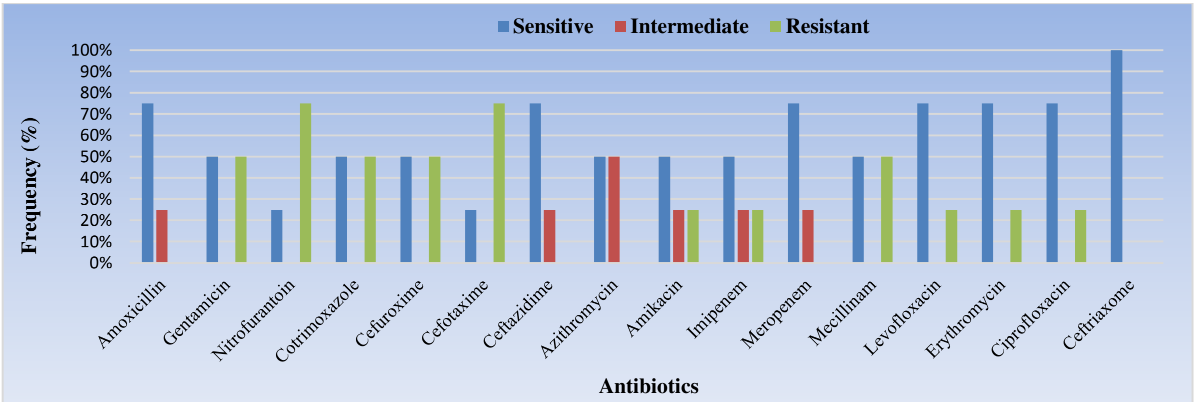

Fig. 8: Pattern of antibiotic responsiveness exhibited by *P. aeruginosa*.

Antibiotics manifested the highest sensitivity of 100% against *E. faecalis* were ciprofloxacin, erythromycin, and Imipenem, be subsequent by amikacin, ceftriaxone, and levofloxacin, all of which had a sensitivity frequency of 92.85%. *E. faecalis* was also significantly sensitive against amoxicillin, azithromycin, cefotaxime, nitrofurantoin, and gentamicin; those shared a similar sensitivity frequency of 85.7%. The apex resistance by the pathogen was possessed against ceftazidime and mecillinam, which shared a similar frequency of 57.15%, whereas no resistance was developed against amikacin, ceftriaxone, ciprofloxacin, erythromycin, and Imipenem. *E. faecalis* only shows intermediate activity against amikacin, azithromycin, ceftriaxone, and nitrofurantoin, with a maximum intermediate response of 7.15 percent (**Fig. 7**). It did not show any intermediate response towards other antibiotics.

P. aeruginosa exhibited the maximum sensitivity to ceftriaxone (100%), accompanied by amoxicillin, ceftazidime, ciprofloxacin, erythromycin, levofloxacin, and meropenem with a similar frequency of 75%. The supreme resistance (75%) was found against cefotaxime and nitrofurantoin, whereas no resistance was displayed against amoxicillin, azithromycin, ceftazidime, ceftriaxone, and meropenem by the uropathogen *Pseudomonas*. Azithromycin was the biggest intermediately active antibiotic, while cefotaxime, ceftriaxone, cefuroxime, ciprofloxacin, cotrimoxazole, erythromycin, gentamicin, levofloxacin, mecillinam, and nitrofurantoin did not produce any intermediate response against *P. aeruginosa* (**Fig. 8**). *Staphylococcus aureus* showed maximum sensitivity of 100% to amikacin, ciprofloxacin, gentamicin, and levofloxacin, followed by 50% sensitivity to cotrimoxazole, erythromycin, and imipenem, whereas no sensitivity was displayed against the rest of the antibiotics. 100% resistance against azithromycin, cefotaxime, ceftazidime, ceftriaxone, cefuroxime, mecillinam, and meropenem was exhibited by the pathogen, whereas no resistance was noticed against amikacin, ciprofloxacin, gentamicin, levofloxacin, and nitrofurantoin. Nitrofurantoin showed the most intermediate activity (100%), with subsequent amoxicillin (50%). None of the tests showed any intermediate activities (**Fig. 9**).

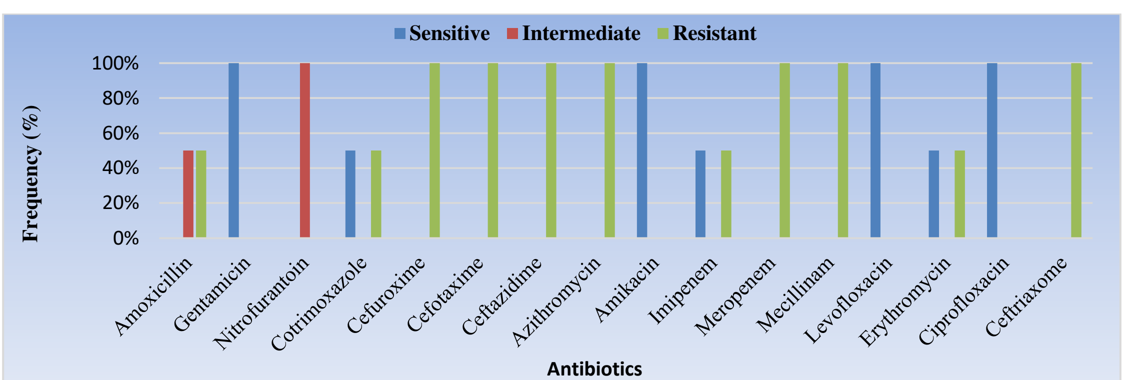

Fig. 9: Pattern of antibiotic responsiveness exhibited by *S. aureus*.

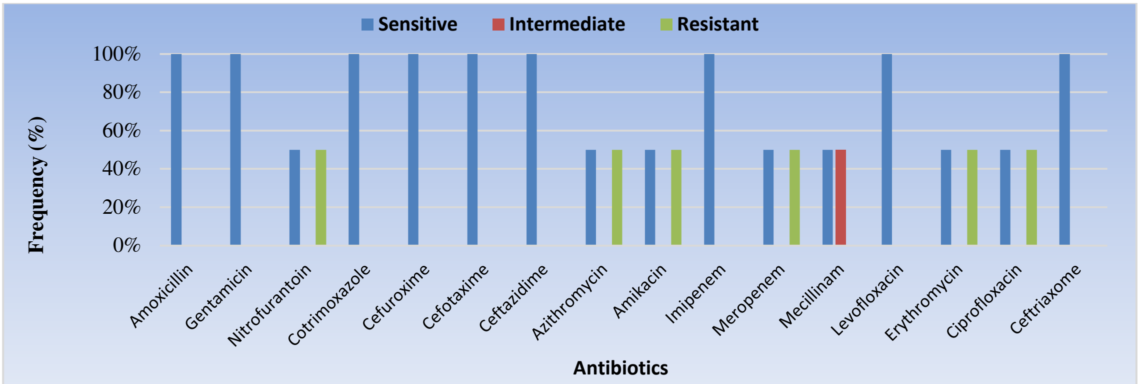

Fig. 10: Pattern of antibiotic responsiveness exhibited by *A. baumannii*

A maximum sensitivity of 100% was exhibited by the *A. baumannii* isolates to amoxicillin, cefotaxime, ceftazidime, cotrimoxazole, ceftriaxone, cefuroxime, gentamicin, imipenem, and levofloxacin. On the contrary, the highest resistance of 50% frequency was remarked against amikacin, azithromycin, ciprofloxacin, erythromycin, meropenem, and nitrofurantoin, whereas no resistance was found against the rest of the antibiotics by *A. baumannii.* Moreover, mecillinam (50%) showed the most intermediate activity, whereas other antibiotics had no intermediate response (**Fig. 10**). *S. marcescens* exhibited 100% sensitivity to whole antibiotic structures applied in the investigation, except amoxicillin, cefuroxime, and nitrofurantoin, which possessed 100% resistance and none of the antibiotics, was intermediately active against *S. marcescens* (**Fig. 11**).

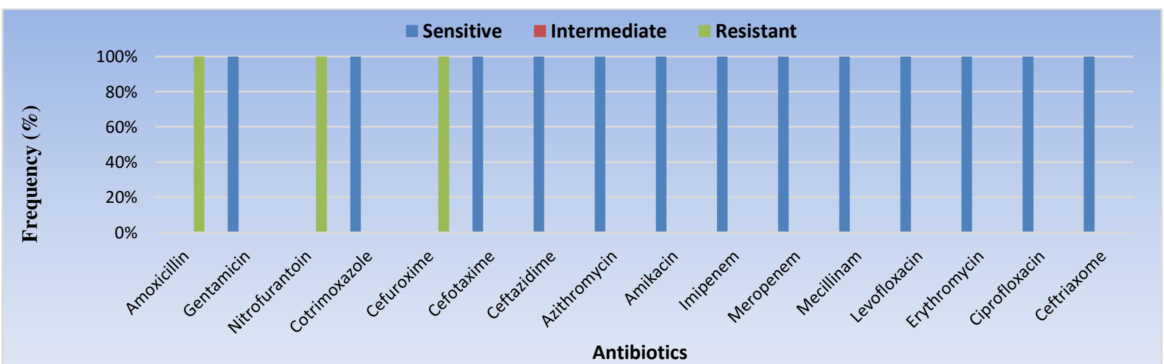

Fig. 11: Pattern of antibiotic responsiveness exhibited by *Serratia marcescens*.

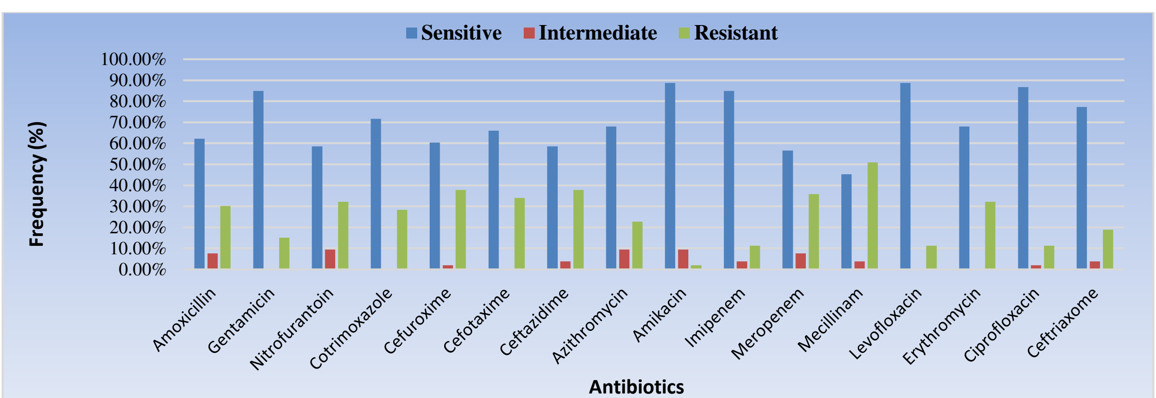

Fig. 12: Over all Pattern of antibiotic responsiveness exhibited by uropathogens.

The collective potential of the antibiotics against all the uropathogens was also determined. Amikacin and levofloxacin were the best potential antibiotics with 88.68% sensitivity frequency, followed by ciprofloxacin (86.79%), gentamicin (84.91%), imipenem (84. 91%), & ceftriaxone (77.36%), whereas the maxi-mum resistance was possessed by mecillinam (50. 94%). Amikacin, azithromycin, and nitrofurantoin showed the most intermediate activity (9.43%), while cefotaxime, cotrimoxazole, erythromycin, gentamicin, and levofloxacin did not show any intermediate activity (**Fig. 12**).

DISCUSSION:

Very few worldwide disease phenomena are as common as UTI that has statistically secured second position as the most ubiquitous infectious disease caused by bacteria and very rarely by fungi, affecting individuals of different genders in both inpatient and outpatient conditions, especially in third world countries like Bangladesh, India, Pakistan, etc., which may cost the communities in different ways, including otiose days, hospital stay, treatment cost, and even mortality in untreated cases. Treatment of such diseases has been a job of extensive obstacle in view of the continuous development of resistance by the pathogens towards antimicrobials as an effect of inappropriate prescription and application of drugs without empirical evidence about etiological agents and antibiotic responsiveness patterns in a certain geographical region. To resolve the complications of the selection of appropriate antimicrobial drugs, extensive study to detect the uropathogens and to reveal their antibiotic susceptibility patterns in particular areas is extensively required. This project was constructed to help the physicians of the region where our study was taking place to choose the right antibiotics to treat infectious diseases in a way that makes sense from a scientific point of view 300 specimens in total from both male and female patients with UTI symptoms of different ages were sampled and investigated further in our current study. Among that large sample of 300, only 17.67% of specimens were found positive for UTIs. A similar kind of frequency (19.4%) of positive aggregate was reported earlier by Abedin *et al.* (2020a). Another study by Abedin *et al.* (2020b) reported a higher frequency (35.8%) of positive results for UTIs. Among the positive specimens, UTIs were substantially predominant in females (73.58%) than in males (26.42%), which agreed with the recent studies by Abedin *et al.* (2020a) and Abedin *et al.* (2020b) that stated the UTI prevalence in females with positive percentages of 94.2% and 78.9%, respectively. Latest research by Alzahrani *et al.* (2021) showed higher cases in females (68.64%) than in males (31.36%). Luty *et al.* (2020) also described a similar case with reference to the distribution of UTIs based on sex: 62.7% in females and 37.3% in males. Jawetz and Melninick, (1995) found that UTIs are more common in women in view of the fact that the urethra is shorter, urethral opening is close to the vaginal cavity, and the rectum is there. The patient's age is another substantial physical factor considered in the distribution of UTIs, and people ≥37 years (49.06%) of age were the dominant group to obtain UTIs in our current study, followed by 13-24 years (20.76%), 25-36 years (15.09%), and 0-12 years (15.09%), which somewhat resembled Abedin *et al.* (2020b), who described 57.8% of positive occurrence in the older group of 21-60 years of age. In a recent study by Alamri *et al.* (2021), 53% of UTI-victims were of an older age, ranging from 60 to 90 years. In another study, Abedin *et al.* (2020a) found the age group of 13-24 years of age as the mass susceptible (36.5%) group regarding the age. The catalogue of etiological agents of UTI development in our current study was led by *E. coli* (56.6%) in both males-females of diverse ages, followed by *E. faecalis* (26.4%), *Pseudomonas* (7.5%), *S. aureus* (3.8%), *A. baumannii*, (3. 8%), and *S. marcescens* (1.9%) collectively, where 69.8% of the pathogens were Gram negative formed by *E. coli*, *P. aeruginosa.*, *A. baumannii*, and *S. marcescens*, and 30.2% were Gram positive structured by *Staphylococcus aureus* and *E. faecalis*. The bacterial communities found in our investigation, along with the imperium *E. coli* dominance, were consentaneous to Johnson *et al.* (2021), where 76.43% of pathogens were Gram-negative. Zwane *et al*. (2021) and Nana *et al*. (2021) unearthed *E. coli* predominance alongside *S. aureus*, *E. faecalis*, Bhola *et al.* (2020) described *E. coli* involvement of 54.2% as uropathogens alongside others such as *E. faecalis* and Because *E. coli* strains inhabit the gastrointestinal tract and are well adapted to populate the urogenital tract to evade the host immune system via biofilm emergence and urothelial cell invasion, *E. coli* UTIs are significantly increased (Mulvey *et al*., 2000). *E. faecalis* was the second most dominant etiological agent, which was according to Nana *et al.* (2021) with 23.1% *E. faecalis* and Zwane *et al.* (2021) with 17% *E. faecalis* as the causative agent, whereas *K. pneumoniae* was portrayed in that position by Bhola *et al.* (2020), Lee *et al.* (2020), and Das *et al*. (2017) with 12.9%, 12%, and 15%, respectively. Other uropathogens found in our study, such as *P. aeruginosa*, *S. aureus*, *A. baumannii*, *and S. marcescens*, were also found in majority of the previous studies. Appropriate antimicrobial drugs are the only possible solution to UTIs, which has been a vigorous challenge owing to frequent resistance emergence against available antibiotics through limitless irrational prescription and inappropriate antibiotic consumption, which leads to resistance to antimicrobial drugs by pathogens through natural selection. Consistent knowledge about the pathogen's antibiotic responsiveness pattern is of extreme need that can resolutely be offered by the continuous research about UTIs within a certain area. In our current study, amikacin (93.3%), followed by gentamicin (86.7%), levofloxacin (86. 7%), ciprofloxacin (83.3%), and imipenem (83.3%), were the foremost-operative antibiotics to encounter the principal uropathogen *E. coli,* which somewhat resembled Abedin *et al.* (2020b), who stated amikacin (86.1%) as the most workable, followed by imipenem (83.3%), and Lee *et al.* (2020) who pictured gentamicin (82.9%) as useful. In our current study, Nitrofurantoin was described as the most (99.2%) and second most (83.3%) efficient antibiotic by Lee *et al.* (2020) and Abedin *et al.* (2020b), respectively, which showed only 56.67% effectiveness against E. coli in our current study. Mecillinam (50%), erythromycin (46.7%), amoxicillin (40%), cefuroxime (40%), meropenem (40%), cefotaxime (36.7%), and nitrofurantoin (36.7%) exhibited resistant in *E. coli* treatment*,* stated by Islam *et al.* (2022), who found *E. coli* resistance against get-at-able first- and second-line antibiotics. The uropathogen positioned second in our isolation list, *E. faecalis,* possessed the apex sensitivity to ciprofloxacin, erythromycin, and imipenem by 100%, succeeded by amikacin, ceftriaxone, and levofloxacin with a similar sensitivity frequency of 92.85%. The pathogen developed resistance against ceftazidime and mecillinam, both sharing a similar frequency of 57. 15%. *P. aeruginosa,* displayed sensitivity to ceftriaxone (100%) and resistance to cefotaxime (75%), nitrofurantoin (75%), gentamicin (50%), cotrimoxazole (50%), cefuroxime (50%), and mecillinam (50%).

In our current study, conclusive evidence was available to conclude the significant diversity of antimicrobial resistance patterns of various uropathogens in our current study, where amikacin (93.3%) was unearthed to be highly effectual against *E. coli*, ciprofloxacin, erythromycin, and imipenem (100%) against *E. faecalis*, ceftriaxone (100%) against *P. aeruginosa*, amikacin, ciprofloxacin, gentamicin, and levofloxacin (100%) against *Staphylococcus aureus,* which was in harmony with Abedin *et al* (2020b). *S. marcescens* was 100% resistant to amoxicillin, cefuroxime, and nitrofurantoin. *A. baumannii* was 50% resistant to amikacin, azithromycin, ciprofloxacin, erythromycin, meropenem, and nitrofurantoin. Amikacin (88.68%), levofloxacin (88.68%), ciprofloxacin (86.79%), gentamicin (84. 91%), imipenem (84.91%), and ceftriaxone (77.36%) revealed considerable feasibility against overall isolated uropathogens in current study, whereas the highest resistance was possessed against mecillinam (50.94%), cefuroxime (37.74%), ceftazidime (33.96%), erythromycin (32.08%), nitrofurantoin (32. 08%), and amoxicillin (30.19%). Abedin *et al.* (2020b) rated amoxicillin and ceftazidime as unavailing and amikacin and imipenem as operative against the uropathogens, which supports our current study. They also explained meropenem and nitrofurantoin as useful, and ciprofloxacin as inefficient for treating UTIs, which contradicted our findings. The comparison of new findings with the existing knowledge significantly corroborates the ever-changing nature of the pathogenic bacterial strains and their antibiotic responsiveness patterns, attention to which needs to be paid extensively and seriously during the ministrations of diseases like UTIs. Consistent scrutinization is an obligation to find out about the diverse changes, and physicians should use what they learn to get rid of bad ideas about antibiotics, prescribe the right anti-microbial drugs for treatment, and avoid helping pat-hogens become more resistant to antibiotics.

CONCLUSION:

To inspect the uropathogens and antibiotic responsiveness patterns of the isolates, 300 specimens were employed in our current study, where 17.67% were found positive for UTIs, led by the female patients (73.58%) than the males (26.42%). Among the four different age groups, UTIs were most prevalent in group of ≥37 years of age (49.06%), followed by 13-24 years (20. 76%), 25-36 years (15.09), and 0-12 years (15.09%). *E. coli* (56.6%) was the commonest of pathogens found in UTIs, succeeded by *Enterococcus faecalis* (26.4%), *P. aeruginosa*. (7.5%), *S. aureus* (3.8%), *A. baumannii* (3.8%), and *S. marcescens* (1. 9%). Among the isolated uropathogens, 69.8% were Gram stained negative and 30.2% were Gram stained positive. Amikacin, levofloxacin, ciprofloxacin, gentamicin, imipenem, and ceftriaxone were obtained to be conspicuously efficacious antibiotics, whereas mecillinam, cefuroxime, ceftazidime, meropenem, cefotaxime, erythromycin, nitrofurantoin, and amoxicillin were ineffective. That expressly indicates the emphatic requirement of determining the etiological agent and its pattern of antimicrobial responsiveness prior to pres cribing antibiotics against uropathogens. Very recent research about UTIs within a certain geographical area can also potentially guide the physician to treat patients of different sexes and ages in that area with antimicrobial drug therapies.

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CONFLICTS OF INTEREST:

The authors declare there are no conflicts regarding publication of this article.

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