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Research Article

Isolation and characterization of Escherichia coli in UTI patients of District D.I. Khan and to probe their antibiotic resistance

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ABSTRACT:

Background: Globally urinary tract infections are present predominantly and mostly UTIs are present or noticed in the developing countries like Pakistan, Bangladesh etc. There are multiple factors in spread of UTIs like microbes, taking certain medicines, sexual activities, poor hygiene, not taking enough water etc. **Objectives:** The prevalence of UTIs and development of resistance against the antibiotics is due to unjustified use of antibiotics. **Methodology:** We performed a study in a remount area of Khyber Pakhtunkhwa i,e Dera Ismail Khan. We conducted a research study consist of a three months duration. Hundred (100) urine samples were collected from the patients who visited District Head Quarter (DHQ) teaching hospital Dera Ismail Khan. Patients having different age groups were included in study, **Results:** After processing samples, the number of samples having *E.coli* i,e positive samples were 73 in number, which were confirmed on the basis of different tests. The prevalence of UTIs due to *E. coli* organism was noticed increased in female patients (69 %) as compared to male patients and its prevalence was 31%.When the isolated *E. coli* strain were tested against different antibiotics, showed that those strains which were isolated from urine samples of the male patients of age group 61 to 80 years showed higher sensitivity against PTZ, NF, FOS, AK, IMP, and SCF, while in female high rate of sensitivity against PTZ, NF, FOS, AK, IMP, and SCF antibiotics was observed against *E. coli* strains which were isolated from the patients having age from 21 to 40 years Likewise E.coli isolates were sensitive against Imipenem, Peracillin + Tazobactam, Cefoperazone + sulbactam, Fosfomycin, Amikacin, Nitrofurantoin, Peracillin and Tambactam irrespective of age of the patients from which bacteria were isolated. Conclusion: Furthermore, present study also revealed, that the *E. coli* has developed resistance against commonly used antibiotics which is a serious concern to worry about and serious steps should be taken by the authorities to stop frequent use of antibiotics without proper prescription to avoid this issue.

KEYWORDS:

AMR, Antibiotics, E. coli, UTI,KPK

1 | INTRODUCTION

UTI is the nosocomial bacterial illness that is most widely known to occur in human communities worldwide. Pregnant women in Africa and Asia get urinary tract infections (UTIs) at a high rate. [1] UTIs are caused by the invasion of bacteria in the epithelial lining of urinary tract, which extends from the smaller calyx up to the prostatic urethra. Acute

inflammation may arise from mild or severe bacterial development in the urothelium, and a variety of symptoms, including fever, fatigue, anorexia, and vomiting, may be present in an indicative case. [2] All genders are, nevertheless, prone to infection; however, women are particularly vulnerable because of their physiological sensitivity and conceptual life system. According to Vasudevan. [3] when women reach to the age of 32 years half of them may have had a UTI. Antibiotics mostly used in countries of poor nations were noticed by the researchers that the uropathogens are resistant to them. The majority of the literature reviewed found that, despite of this high prevalence, there was no proper culturing for the pathogens and also no tests were performed for antibiotic susceptibility, which is a vital step for prenatal care, and treatment. Most of the time the patients were treated on the basis of on trial and error. Common pathogens in urinary tract infection comprise *Enterobacter*, *E.coli*, *Klebsiella pneumonia*, *Staphylococcus epidermium*, , *Proteus vulgaris* and *Pseudomonas aeruginosa* 75% to 80% of the urinary tract is dominated by *E. coli* with 10% to 15% being occupied by *S. saprophyticus* Exceptional types, on the other hand, lead to variations in the typical morphology of the urinary system and give rise to a variety of highly attractive microbiotas, including *Pseudomonas*, *Enterobacter*, *Enterobacter*, *Staphylococcus*, and *Klebsiella*. biological process of vagina—particularly the species of bacteria *Lactobacillus* all contribute to complexity of the urinary tract's causative agents.

Uropathogens would be more likely to infect and harm the urothelium due to the close proximity of features.[4] Those urinary tract infections which occur due to *E. coli* are mostly found in about 80% patients, according to many investigations. [5] The investigations show that *E. coli* recurs has multiple unique serotypes.*E. coli*, is a Gram-negative bacterium has been studied mostly in discipline of microbiology. Many animals, including human beings, have been linked to intestinal and extraintestinal infections caused by this species. There are six main groups of intestinal pathogen *E. coli* which are identified as enterotoxigenic *E. coli* (ETEC), enteropathogenic *E. coli* (EPEC), enteroaggregative *E. coli* (EAEC), Shiga toxin-producing *E. coli* (STEC), diffusely adherent *E. coli* (DAEC) and entero invasive *E. coli* (EIEC). Moreover, meningitis in newborns infections in multiple systems of the body, and infections of urinary tract (UTIs) have been linked with three separate forms of extraintestinal pathogenic *E. coli (ExPEC), E. coli* causing neonatal meningitis (NMEC), *E. coli* which produce sepsis (SEPEC), and uropathogenic *E. coli* (UPEC). Different studies reveal that up to 90% urinary tract infections which are aquired by the community and about 50% of hospital acquired UTIs are due to UPEC. [6] According to estimates, catheter-associated UTIs are among the most frequent nosocomial infection causes, and the annual cost of treatment in the US might reach $400 million.[7] There haven't been any thorough molecular epidemiological studies done to date that evaluate the makeup of population of UPEC isolates from hospital acquired infections (UTIs) or from the patients who have visited the hospital for some purpose. The majority of UTI instances have been associated with elderly individuals, women, children, and patients with impaired immune systems. [8] The most probable cause for this phenomenon is a combination of risk factors, such as age, an active sexual life, physiological and anatomical changes, and the closure to organs like urethra, vagina, and rectum in females.[9]

It has been generally acknowledged about the primary source of UPEC isolates is the patient's fecal flora. Moreover, in the settings of hospitals most of patients possess urinary catheters have low immunity due to which they are exposed to different antimicrobial compounds which may cause UTIs due to E. coli strains which are not considered typical uropathogens. The normal gut microflora contains UPEC and ExPEC in healthy people, where they are found together with commensal E. coli, they are frequently recognized on the basis of contents of virulent gene and their allocation to certain phylogenetic lineages.[10] Super infection has been linked to UTIs instead of bacterial persistence. In unclear situations, serotyping a comprehensive review of antimicrobial sensitivity characteristics—helps identify superinfection. Surgery may be used to treat the disease's underlying cause, which could include bacterial survival in abnormal conditions that lead to reinfection like fistulae One virulence factor present in *E. coli* is beta-lactamase. Through dissolving the four-atom beta-lactam ring of antibiotics belonging to the said group like cephamycin, penicillin, and carbapenem, it protects the bacteria from the action of antibiotics. The genes having names of CTX-M, TEM, OXA, and SHV produce beta-lactamase enzyme. Plasmids belonging to the Enterobacteriaceae family of bacteria contain these genes. An important enzyme naming bla-TEM, which is known to be produced by gram-negative bacteria, cause resistance against ampicillin up to 90% in *E.coli*. K. pneumoniae also has this enzyme. The structural similarity between the enzymes bla-TEM and bla-SHV is 68 percent. An important enzyme naming bla-SHV, which is produced by the bacteria Klebsiella pneumoniae, is up to 20% of the resistance to ampicillin. The enzyme bla-CTX-M plays a main role in the development of resistance to the antibiotic cefotaxime. *Salmonella typhimurium*, *E. coli*, *Salmonella enteric*, and other Enterobacteriaceae species all contain the enzyme bla-CTX-M. It is also present in Kluyvera species, an uncommon disease pathogen. Just 40% of the DNA of these enzymes is shared by bla-TEM or bla-SHV. As of right now, over 80 enzymes of CTX-M have been classified or determined. The most common kind of bacterial UTI affects the urinary system and may irritate the kidneys and bladder. The majority of doctors treat UTIs with antibiotics, which frequently leads to therapeutic failure because of bacterial drug resistance.

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Women experience UTIs far more frequently than men, with a considerably higher incidence. In the US, the 25–40% of women population between the ages of 20 and 40 years have got a UTI. Approximately one in five adult women will get UTI at some point of her life.In the US, UTIs cause more than 6 million patient visits to doctors annually, with 20% of those visits occurring in emergency rooms. Women's incidence of urinary tract infections (UTIs) tends to increase with age, with multiple peaks correlating with menopause, coitus, and pregnancy. 2-8% of pregnant women have asymptomatic bacteriuria, or the presence of bacteria in the urine without any associated symptoms. Men are less likely than women to get UTIs. Men between the ages of 21 and 50 have an incidence of 0.0006-0.0008 UTIs per person-year, while women in the same age range had an incidence of 0.5-0.7 infections per person-year. Men are less likely than women to get UTIs until the age of 60, but after that, the probability rises significantly, with men and women experiencing identical rates of UTIs by the age of 80. Men's UTIs are usually categorized as complicated infection Women are more susceptible to UTIs due to pregnancy, menopause, and certain medical disorders like diabetes. It is concluded that UTIs are extremely common in women, with about 25-40% experiencing in the age of 20-40. In men, particularly younger men, the incidence is substantially lower but infection rises with age. In order to prevent complications from UTIs in both sexes, it is essential to address modifiable risk factors and receive quick treatment. In District D.I. Khan, Khyber Pakhtunkhwa, Pakistan, the current research aims to investigate the prevalence of symptomatic urinary tract infections as well as the antibiotic resistance profile of the infectious agent (*E. coli* strains to identify and characteriz the strains of *E. coli* which will be isolated from UTI patients in D-I-Khan by using morphological biochemical and physical tests. To find out the antibiotic resistance profiles of *E. coli* strains isolated from UTI patients in D.I. Khan using disk diffusion method. To investigate the association between *E. coli* strains isolates from UTI patients in D.I. Khan and various risk factors such as age, gender and education etc.

2 | MATERIAL AND METHODS

This study was carried out in the Institute of Microbiology at the Faculty of veterinary and animal sciences (FVAS), Gomal University, Quaid-e-Azam campus, Dera Ismael Khan. The purpose of our current study was to determine the prevalence of UTIs and the patterns of pathogen antibiotic susceptibility.

2.1 | The Planned Workspace and the Facilities Available

Dera Ismail Khan was chosen as the proposed workplace for the purpose collecting samples. In the microbiology lab of IOM, FVAS, D.I. Khan, all laboratory tests were conducted on urine samples. Everything needed for the relevant study were available here. The D.I. Khan is the Pakistani district of Khyber Pakhtunkhwa. It is a plain, arid region on the west bank of the Indus River, rising 175 meters above sea level. As to the 2023 census, district D.I. Khan has 1,829,811 residents overall. It is 7,326 km³ in size (2,829 sq mi).

2.2 | Samples Collection

Over a duration of three months, urine samples from registered infected UTI patients who visited Dera Ismail Khan District Teaching Hospital were collected (September 2023 to November 2023). Clean capture midstream technique, which is more pleasant and safe than the catheter method, was used to collect the samples Considering that all that's required is some quickly sterilized plastic bottles, it's an inexpensive solution. Hundred (100) urine samples were collected from the patients of various age groups who were suffering from various infections. After collection, samples were processed in two to three hours.

2.3 | Sample Size

In sterile collection bottles, a minimum of 4 milliliters of midstream clean catch urine sample were obtained. There were 100 urine samples taken.

2.4 | Materials Required

1. Biochemical reagents.
2. Prepared media
3. Antibiotics Discs
4. Petri Plates
5. Test Tubes
6. Microscopic slides

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7. Applicator Sticks
8. Wire loops
9. Bottles for Collecting Samples

2.5 | Criteria for Sample Collection

Urine samples were collected randomly from UTI patients in district teaching hospital D.I. khan. During research duration 68 samples were obtained from female patients and 32 samples were collected from male patients belonging to different age groups.

2.6 | Culturing

On CLED-agar, 20µl of the specimen is injected using a hot wire loop. Within a flow hood, the inoculation was carried out using the streaking technique. Invert the plates and incubate them for 24 hours at 37°C after inoculation. If more than one kind of organism was isolated after the 24-hour incubation period, the data were labeled as "mixed culture," and they are not included in this analysis. A single possible microorganism's 10 5 CFU/ml is considered positive. [11]

2.7 | Direct Microscopy

For ten minutes, a urine sample was centrifuged at 300 revolutions per minute. A pellet drop was placed on a slide, then covered with a cover slip. The existence of puss cells in the sample was examined. A positive UTI was indicated by the presence of 10–20 pus cells.

2.8 | Gram Staining

To confirm and identify the pathogen, a gram stain was used, and bacteria were looked for in pus cells in urine. Gram staining was used to identify the Gram-negative rods, and these rods were subsequently streaked over MacConkey agar for subculturing. To isolate and identify the Gram-negative enteric bacilli, utilize MacConkey agar. [12]

2.9 | Biochemical Tests

Microscopy and culture characteristics, the marked colonies were identified and differentiated. For further confirmation, the IMViC tests can also be used for differentiation of E. coli from other bacilli of intestine. The IMViC series comprises 4 key tests for determination, which are as follows a) Indole test, b) Methyl red test, c) Voges-Proskauer test, and d) Citrate utilization. [13]

2.9.1 | Indole Test

A pure culture of E. coli was grown in a tryptophan-containing medium, such as tryptone broth, for 24-48 hours. After incubation, the culture was added to the Kovács reagent. A positive result for the indole test for E. coli is the formation of a red or reddish-violet color in the broth's surface layer, which is caused by the reaction between indole and the Kovács reagent, which forms a red compound called rosindole.

2.9.2 | Methyl Red Test

A culture of E.coli was introduced into the MRVP broth. The broth was incubated at temperature 35–37°C in ambient air for 2 days (48 hours). After incubation, added 5–6 drops of methyl red reagent per 5 milliliters of broth. A clear red color suggested that the fermentation of glucose produced stable acid end products, which was regarded as a positive test result. The presence of neutral chemicals like acetoin, which is regarded as a negative test, and the absence of stable acid end products were indicated by a yellow tint.[14]

2.9.3 | Voges-Proskauer Test

Introduced a pure culture of the organism into the MRVP broth, the broth was aerobically incubated for a full day at 37°C.Then Six 5% alpha-naphthol drops were added to the broth. Then added two drops of 40% potassium hydroxide. To aerate the medium, gently tube was shaken, and then tube was allowed for ten to fifteen minutes without any disturbance. A surface that was pink-red in color suggested the presence of acetylmethyl carbinol, which is regarded as

a positive test result. A negative test is one in which there is no color change, indicated the absence of acetylmethyl carbinol. A negative Voges-Proskauer test result often indicated that E. coli does not make acetylmethyl carbinol. [14].

2.9.4 | Citrate Utilization Test

Inoculated an E. coli culture into a Simmons citrate agar slant. The inoculated slant was incubated for 18 to 24 hours at 35 to 37°C, or up to 7 days for some species, examined the slant for growth and color change: growth that turns blue instead of green suggests that E. coli is capable of using citrate. A negative test is one in which there is no growth and no color change (the medium stays green), indicating that E. coli is unable to use citrate. Usually, E. Coli produces a negative response on the citrate utilization test, indicating that it is unable to use citrate as its only carbon source. [15]

2.10 | Antimicrobial Susceptibility Testing

The disk diffusion (Kirby Bauer's) method is used to conduct antimicrobial susceptibility tests on Mueller-Hinton agar.

2.10.1 | Disc diffusion technique

The process of testing for antibiotic susceptibility by disk diffusion technique involves placing antibiotic disks on Mueller-Hinton agar (MHA) plates. Bauer, Kirby, and Tuck recommend applying Mueller Hinton Agar (MHA) for conducting antibiotic susceptibility tests using a single high-concentration disk. The "Clinical and Laboratory Standard Institute" (CLSI) has nominated this media for a number of reasons.[16.]

2.10.2 | Transfer of Inoculums

Picked four or five MacConkey Agar plate culture colonies that were well-grown and had the same morphology. A wire loop was used to touch the top of each colony, and the growth was then placed into a Mueller-Hinton Agar plate. After that, spread the culture by streaking the sterile cotton swab three or four times over the agar's surface. After each streaking application, rotate the plate by around 60 degrees to make sure that the inoculums are distributed evenly. We gave the agar surface three to five minutes to dry before adding the antibiotic disks. Additionally, using forceps after placing the appropriate antimicrobial-impregnated disks on the MHA agar culture plate's surface, inverted it and let it there overnight at 37°C. Calculating the sizes of the zones of bacterial growth inhibition, as advised by the disc manufacturer, allowed for the determination of the disc's sensitivity

2.10.3 | Ethics Related Factors

Patients were fully satisfied with the sample collection process, and it was agreed upon with them that the data would not be released online with their names or any other personal information. Researchers conducted all of the tests, and the patients paid nothing for them.

3 | RESULTS AND DISCUSSION

Once 100 urine samples were cultured on CLED agar, a sample was considered positive if it contained 105 CFU/ml or more of a single susceptible pathogen. Ninety-two of these samples grew well on CLED agar. The other samples were categorized as "mixed culture" and were not included in this research. The gram stained 81 isolates were found to be gram-negative, and such types of culture were grown on selective media. Biochemical tests, such as the IMViC, were used to confirm the colonies grown on MacConkey agar. Of these, 73 out of 81 were gram-negative isolates that gave positive results for the methyl-red and indole tests and negative results for the Voges-Proskauer and Citrate Utilization tests, indicating that the organism according to test was E coli.

3.1 | Occurrence Rate

The occurrence of UTIs in both genders and different age groups is shown in table 1. Amongst females, the prevalence of UTI was higher than in males (31% as compared with 69%). The prevalence rate of UTI in the age group of 1-20 was higher in females (17%), while it was lower in men (02%) generally (19%), which was 11% lower than in the age groups of 21–40 (30%). Male UTI incidence in the age category of 21–40 was 02%, which was lower than female prevalence, which was 28%. Out of all the age groups' female isolates, this one revealed the highest prevalence rate of urinary tract infections. Within the age limit of 41–60 years 11% females and 8% males were found affected from urinary tract

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infections. Urinary tract infection incidence was noticed 11% lower in the age group of 41–60 as compared with age group of 21–40. Male patients in the age range of 61 to 80 years have a urinary tract infection rate of 14%, whereas females in the same age group have a higher rate of 11%. The prevalence rate for those over 80 years is 7%, which is lower than the rate for all age groups altogether. In this age range, the percentage of male prevalence is 5%, whereas the percentage of female prevalence is 2%, which is less than the percentage of male prevalence

Table 1 Occurrence rate of UTI due to *E. coli* percentage wise in male and female patients

Age (Years)	No of male Patients	No of female Patients	Age wise occurrence rate (%)
01-15	2% (02)	17% (13)	19%
16-25	2% (02)	28% (24)	30%
26-50	8 % (06)	11% (8)	19%
51-80	14 % (11)	11% (8)	25%
Above 81	5% (0 4)	2% (2)	7%
Total	31% (25)	69% (56)	100%

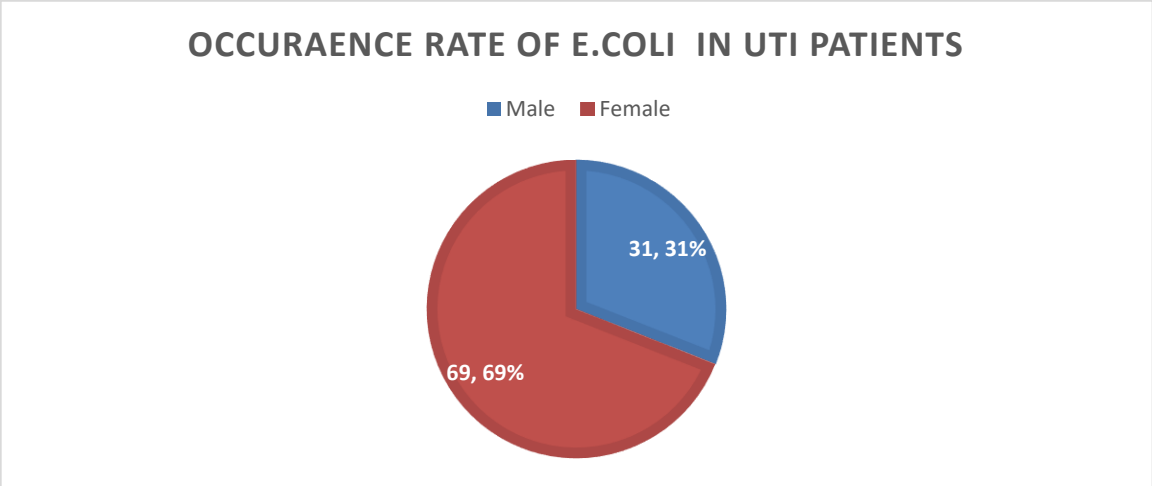

Fig 1: Graph showing gender wise distribution *of E.coli* infection.

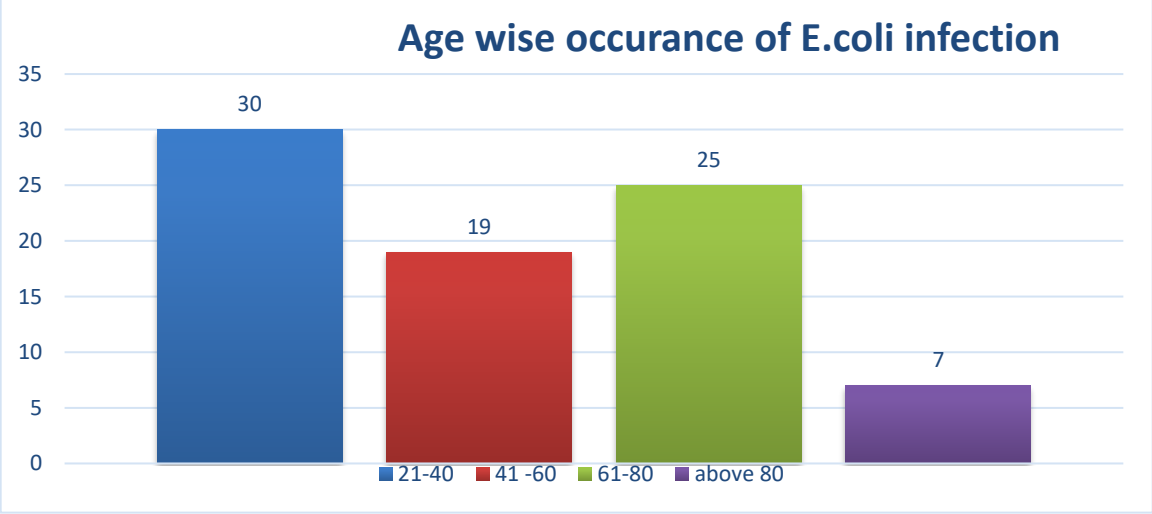

Fig 2: Graph showing age wise distribution of *E.coli* infection.

In light of this, an investigation of the antibiotic sensitivity of E. coli in the male population was carried out across a variety of age groups. There was the highest level of sensitivity among the age ranges of 51-80 (11 patients), followed by the age range of 26-50 (06 patients), and then the age range of 01-15 and 16-25 (two patients each) had the lowest sensitivity.

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Finally, the age range of above 81 (four patients) ranked worst among the groups (no patients involved (Table 2).

Table 2: *E. coli* sensitive to antibiotics in male patients of different age groups

Age (years)	No of male patients	Antibiotics
01-15	2	PTZ,NF,FOS,AK,IMP,SCF
16-25	2	PTZ,NF,FOS,AK,IMP,SCF
26-50	6	PTZ,NF,FOS,AK,IMP,SCF
51-80	11	PTZ,NF,FOS,AK,IMP,SCF
Above 81	4	PTZ,NF,FOS,AK,IMP,SCF
Total	25	

A number of different antibiotics, including PTZ, NF, FOS, AK, I MP, and SCF, were used to investigate the susceptibility of E. coli to a variety of female patients of diverse ages. The purpose of this was to ascertain whether or not these antibiotics were in fact effective. After the age group of 26–50 years old (13 patients), the age group of 16–25 years old (20 patients) showed the highest sensitivity when it came to detecting the disease. The age group of above 81 years old had the lowest sensitivity, with ten patients, followed by the age group of 51–80 years old with nine patients, and then the age group of 41–60 years old with eleven patients (Table 3).

Table 3: *E. coli* sensitive to antibiotics in female patients

Age (Years)	No of Female Patients	Antibiotics
01-15	13	PTZ,NF,FOS,AK,IMP,SCF
16-25	20	PTZ,NF,FOS,AK,IMP,SCF
26-50	11	PTZ,NF,FOS,AK,IMP,SCF
51-80	9	PTZ,NF,FOS,AK,IMP,SCF
Above 81	3	PTZ,NF,FOS,AK,IMP,SCF
Total	56	

However, *E. coli* showed resistance against the antibiotics (CRO, AMC, CIP, CFX, DO, SXT, AM, and CEF) found in urine samples of male patients of age group 61-80 years (11 patients), followed by 41-60 (06 patients), while less resistance shown in the age of 01-20 and 21-40 years (02 patients each), followed by above 80 (04 patients) (Table 4).

Table 4: *E. coli* resistant to antibiotics in male patients.

Age (years)	No of Male Patients	Antibiotics
01-15	2	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
16-25	2	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
26-50	6	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
51-80	11	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
Above 81s	4	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
Total	25	

As a result, from the age of 21 to 40 (20 female patients) were noted, followed by 01-20 (13 female patients) and 41-60 (11 female patients). Less resistance was identified in the age range of above 80 (03 female patients), followed by 61-80 (09 female patients) (Table 5).

Table 5: *E. coli* resistant to antibiotics in female patients

Age (Years)	No of female Patients	Antibiotics
01-15	13	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
16-25	20	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
26-50	11	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
51-80	9	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
Above 81	3	CRO,AMC,CIP,CFX,DO,SXT,AM,CEF
Total	56	

However, *E. coli* is resistant to antibiotics when found in female patients. The antibiotics like Amoxycillin+clavulanic acid,

Ampicillin, Ciprofloxacin, Cefixime, Cefuroxime, Ceftriaxone, Cotrimoxazole, and Doxycycline were those that *E. Coli* was resistant to in both male and female patients. Furthermore, the following antibiotics have different levels of sensitivity and resistance to *E. coli*: Antibiotics resistant to *E. coli* include AM, and CRO 8/14 (60%), while antibiotics that are sensitive to the pathogen are TZP, FOS, F, IMP, AK, and SCF 6/14 (40%).

Table 6: Overall resistant and sensitive antibiotics

Total antibiotics used	Resistant *E. coli* to antibiotics	Sensitive *E. coli* to antibiotics
CRO, AMC, CIP, CFX, DO, SXT, AM, CEF, PTZ, NF, FOS, AK, IMP, SCF	CRO, AMC, CIP, CFX, DO, SXT, AM, CEF	PTZ, NF, FOS, AK, IMP, SCF
14	8	6
100%	60%	40%

4 | DISCUSSION

We investigated the frequency of E. coli in UTIs and their pattern of antibiotic susceptibility based on the current investigation. In the current investigation, *E. Coli* accounted for 91% of the frequent causal agents of UTIs. While Khan *et al.* [17] identified uro-pathogens with a 45.6% prevalence of *E. coli*. Bashir *et al.* [18] reported at the 67% prevalence of *E. coli*. However, 91% of the E. coli cases in the current study were reported. Furthermore, the patients in the two research sites were comparatively similar to one another. However, Amin et al.[19] found that enteric bacilli account for 94.4% of all bacteria isolated from UTI infections, making them the most frequently isolated pathogen. According to the current investigation, *E. Coli* was the most common pathogen associated with UTIs. *E. coli* was investigated by Zhanel et al.[20] and Christensen et al. [21] in relation to host factor, age, gender, environmental factors, and socioeconomic factors. According to the current study, variations in the kind and distribution of UTI bacteria may arise from host and environmental factors, healthcare and educational programs, socioeconomic standards, and hygiene behaviors, among other influences. According to Gupta et al.[22,] a clinical suspicion of urinary tract infection (UTI) was present in sixty-five patients, which included both adults and children, as well as women. In fifty-three of these instances, the virus that caused the infection was E. coli. Although UTIs affect people of all ages and genders, many experts have demonstrated that UTIs are the most common bacterial infection in females [23] The current study, however, also offers credibility to this the probability: 69% of positive female patients were female, indicating that women are more prone than men to UTIs due to the shorter urethra and closure of the anus in women; 19% of positive patients were found to be under the age of 20, which may indicate that personal hygiene practices were lacking in these cases. Following the biochemical confirmation of *E. coli* isolation, we performed an antibiotic sensitivity test. As a result, we discovered that it exhibits resistance to several common antimicrobial drugs, including Ampicillin, Ciprofloxacin, Cefixime,Cefuroxime, Ceftriaxone, while demonstrating sensitivity to Peracillin+Tazobactam , Amikacin ,Fosfomycine,Nitrofurantoin,Impinem and Cefoperazone+sulbactam. Previous research has been done. When Amin et al.[19] isolated E. Coli from a UTI, they found that the bacteria was extremely resistant to tetracycline and ampicillin, but it was sensitive to ciprofloxacin, gentamicin, ceftriaxone, and amikacin. However, the following antibiotics were used in the current study: imipenem, Fosfomycin, nitrofurantoin, amikacin, cefoperazone+sulbactam, and peracillin+tazobactam. The same antibiotic was used in both studies, with positive outcomes. In modern medicine, antibiotic resistance is a serious and emerging issue that has emerged as one of the main public health problems of the twenty-first century. Uncontrolled use of these widely used antibiotics has contributed to an increase in resistance in the causative agents during the last ten years in our area. Abuse of drugs and improper antibacterial therapy also contribute to the evolution of microorganisms resistant to antibiotics. Antibiotic abuse includes using antibiotics without a prescription from a doctor. It is concerning that there is high resistance to these widely used antibacterials. As a result, these medications should no longer be prescribed as first-line empirical treatment; yet, developing countries continue to prescribe these worthless antibiotics as first-line treatments.

5 | CONCLUSION

It is determined that E. coli accounted for 91% of the germs that were identified from urinary tract infections (UTIs). Sixty-nine percent of females get UTIs as their most common bacterial infection. The age range of 20 to 40 years old had the highest prevalence rate of UTIs. The antimicrobial drugs that were helpful in treating them included Peracillin+Tazobactam, Cefoperazone+sulbactam, and Imipenem.

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