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# URINARY TRACT INFECTION; COMMON BACTERIAL PATHOGENS AND THEIR ANTIBIOTIC SUSCEPTIBILITY PATTERN IN MANSHERA REGION PAKISTAN

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**Abstract**

*Bacterial UTIs are more prevalent in underdeveloped nations. Approximately 150 million people worldwide have been diagnosed with UTIs. UTIs are more common infections in people. The current study aimed to present fresh data about the role of bacteria in urinary tract infections. As a result, the current study was conducted in the Mansehra region on patients who visited the District Head-Quarter Hospital in Mansehra. From the suspected individuals in the Mansehra area, 150 samples were gathered. Samples were collected in a screw-capped, free of contaminants container. There are 49 instances in the 21–40 age group, 29 in the 41–60 age group, and 16 in the 61–80 age group. According to the results, Staphylococcus aureus was the most prevalent organism. Different kinds of bacteria were found in both females. Compared to other species, E. coli is more prevalent among gram-negative bacteria. Gram-negative organisms were primarily found in females. Table 4.15 shows the pattern of antibiotic susceptibility for the Gram-negative isolates. Cefataxime, Cefador, Cefixime, Ciprofloxacin, Amikacin, and Sulbactum were all 100% effective against Klebsiella, whereas Gentamycin and Imepenem were 100% effective against them. There was 100% resistance to Gentamycin and 100% susceptibility to Cefotaxime and Doxyfloxacin in Pseudomonas species. High resistance to Doxyfloxacin (79.48%) and high susceptibility to Novobiocin (82.05%) were observed in E. coli. High resistance to Sulbactum and Levofloxacin (83.33%) and high susceptibility to Amikacin (91.66%) were observed in Proteus species. High resistance to gentamicin (90.62%) and high sensitivity to cefixime (84.37) were demonstrated by Staphylococcus aureus. High ciprofloxacin resistance (83.33%) and high doxyfloxacin susceptibility (100%) were demonstrated by Staphylococcus saprophyticus. High resistance to gentamicin (100%), and high sensitivity to cefotaxime, cefador, cefixime, ciprofloxacin, and imepenem (100%) were*

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*demonstrated by Staphylococcus epidermidis. High (100%) sensitivity to Amoxacillin, Cefotaxime, Cefador, Levofloxacin, Gentamicin, Doxyfloxacin, Sulbactum, and Novobiocin was demonstrated by Enterococcus species, whereas 50% resistance to Cefixime, Ciprofloxacin, Amikacin, and Imepenem was observed. According to the current study, females had a higher prevalence of urinary tract infections than males. The frequency of UTIs is higher in men over 60 than in women, but it was higher in those between 20 and 40. According to this data, the frequency of UTIs in females is highest between the ages of 21 and 40, and Cefotaxime was the most effective medication used to treat all isolated uropathogens.*

## INTRODUCTION

Urinary tract infections (UTIs), or bacterial infections, are more common in humans and occur when germs are present or multiply in any part of the urinary system. UTIs, or urinary tract infections 150 million individuals are afflicted with this sickness annually. This bacterial illness is one of the most common. The illness is caused by bacteria that are developing in the urinary system. The kind of organism, the afflicted urinary tract segment, the stiffness of the infection, and the patient's immune response all impact the clinical symptoms (Hudson *et al.*, 2020). UTIs have a significant negative impact on a person's quality of life and cause significant financial and public health costs (El-Sahrigy *et al.*, 2019). UTIs affect approximately five percent of children and are most prevalent between the ages of 2 and 24 months. Compared to older infants, neonates (those under two months old) seem to have comparable or greater ratio of UTI with fever (4.6% to 7.5%), with rates as high as 20% in infants with low birth weights, who are primarily male (Medina and Castillo-Pino, 2019). Urinary tract infections (UTIs) are the most common outpatient ailment in the United States. With the exception of young women between the ages of 14 and 24, the frequency of UTIs increases with age. While the frequency is only around 11% in the overall population, it is above 20% among women over 65. Between 50% and 60% of adult women will get a UTI at some point in their lives, and almost 10% of postmenopausal women report getting one in the previous 12 months (Medina and Castillo-Pino, 2019).

Both Gram-positive and Gram-negative bacteria, as well as some fungi, can cause UTIs (Foxman, 2010). The most common causative agent for both uncomplicated and complicated UTIs is uropathogenic *Escherichia coli* (UPEC) (Lo *et al.*, 2014). When it comes to uncomplicated UTIs, the most prevalent agents are *Klebsiella pneumoniae, Staphylococcus saprophyticus, Enterococcus faecalis, group B streptococcus* (GBS), *Proteus mirabilis, Pseudomonas aeruginosa, Staphylococcus aureus, and Candida spp*. UPEC comes in second. After Enterococcus species, *K. pneumoniae*, Candida species, *S. aureus*, *P. mirabilis*, and *P. aeruginosa*, UPEC is the most common causative agent causing complex UTIs (Lo *et al.*, 2014). The symptoms of a urinary tract infection (UTI) include pain or discomfort in the suprapubic region, bladder spasms, trouble starting the urine stream (hesitancy), frequent urination (frequency), painful urination (dysuria), and blood in the urine (hematuria). Patients with pyelonephritis or renal involvement are more likely to have fever, chills, nausea, vomiting, and back/flank discomfort than those with mild UTIs (Lo *et al.*, 2014).

In past times, antibiotic treatments have lasted anything from three days to six weeks. "Mini-dose therapy," which only has to be administered for three days, offers exceptional cure rates. The degree of E. coli resistance to traditional antibiotics varies by area of the country. A different drug should be chosen if the rate of resistance to any particular antibiotic is more than 50%. Outside of the United States, pivmecillinam is also considered a first-line therapy (Foxman, 2014). These treatments may lead to the growth of multidrug-resistant bacteria and may alter the natural microbiota of the gastrointestinal tract and vagina over time. The emergence of niches that the altered microbiota no longer occupies may increase the likelihood of multidrug-resistant uropathogen colonization. Most importantly, the

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"golden era" of antibiotics is ending, which implies that demand for alternative and rationally designed medications is rising (Foxman, 2014).

## Materials and method

### Study Area

The current study was conducted in the Mansehra region on patients who were attending the District Head-Quarter Hospital Mansehra, which is located in the Mansehra district.

### Inclusion Criteria

The current study included all persons, male and female, of all ages who were hospitalized to the urology ward or who attended the outpatient department (OPD) at the District Head-Quarter Hospital in Mansehra because they had urinary tract infections. Urine samples were taken midstream from individuals ranging in age from 1 to 80. The study was carried out between April and December of 2018.

### Exclusion Criteria

Those patients who administered antibiotics within the previous 48 hours. Those were the pregnant women. Urinary tract infections in diabetic people. Patients who had genitourinary tract anatomical anomalies found by ultrasound testing were not allowed to participate in the study.

### Illustration Mass

150 samples of the patients who were part of the inclusion criteria were included in the study.

### Location of the study

The current study for my research work was designed at the department of Microbiology, Abbottabad University of Science and Technology, Abbottabad. This study was conducted at Al-Khidmat Diagnostic Centre situated at Mansehra city of the Khyber Pakhtunkhwa province (Pakistan).

### Methodology

The patient's whole medical history was recorded, including age, sex (male or female), family history, history of current or former diseases, history of antibiotic usage within the previous 48 hours, and genitourinary tract anatomical anomalies.

### Sample Collection

After taking a history, each patient was sent to the laboratory. Prior to sample collection, all patients provided instruction on how to collect samples aseptically in order to prevent contamination. Urine was collected in midstream early in the morning. Each patient's urine was collected and placed in a sterile bottle. The patient's name, serial number, case number, time and date of collection, and sex (male or female) were all written on the labels of each bottle. We processed the samples as quickly as we could. Samples were kept in the refrigerator if processing was delayed. The samples were analyzed in order to identify various urinary bacteria.

### Assessment of urine specimen

### Microscopy

Urine samples were collected in a tube and spun in a centrifuge equipment for five minutes at 3000 rpm. Following centrifugation, the supernatant was disposed away, and a drop of sediment was placed on a dry, clean slide for microscopic inspection at 10X and 40X magnification (Forbes *et al.*, 2007).

### Samples Processing

Sterilized, wide-mouthed glass vials were used to collect the samples from the patients. Urine was collected in the middle of the morning while it was clean. The semi-quantitative technique's standardized germ-free wire loop was used to streak with a 4.0-mm span in order to convey 0.01 ml. The loop containing the highly agitated urine was placed on either CLED (Cysteine Lactose Electrolyte Deficient) agar, MacConkey agar, or blood agar. All plates were incubated in an aerobic environment at 37°C for 24 hours following inoculation. The plates were inspected for bacterial growth under a microscope. If increase was observed after a day, a slide was created for additional analysis. To determine if the microorganisms were Gram positive or Gram negative, Gram staining was next carried out. A bacterial estimate of urine per milliliter was then extracted by calculating the colonies of the bacteria and multiplying the result by 100. Any computation that equals or exceeds 10,000 CFU/ml was

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considered a significant bacterial calculation (Forbes *et al.*, 2007).

**Media used for pathogenic bacteria isolation**

**CLED Agar**

Cystine-Lactose-Electrolyte-Deficient agar is known as CLED agar. Urinary bacteria are isolated and differentiated using this useful non-inhibitory growing medium. It is electrolyte poor and includes lactose and cystine, which stops proteus organisms from swarming. The development of cystine-dependent dwarf colonies is encouraged by cystine. The indicator employed in the agar, bromothymol blue, turns deep blue when alkalinization occurs or yellow when acid is produced during lactose fermentation. Colonies of lactose-positive bacteria are yellow. Deep blue colonies are produced by bacteria that decarboxylate L-cysteine, which results in an alkaline reaction (Parveen *et al.*, 2011).

**Blood Agar**

Blood agar contains general nutrients and 5% sheep blood. Hemolysis kinds are tested using blood agar. Red blood cells are lysed by hemolysins, which are enzymes that degrade hemoglobin. Bacteria create many forms of hemolysin. Beta-hemolysin totally breaks down red blood cells and hemoglobin. The bacterial development is surrounded by a clear zone. These kinds of outcomes are referred to as beta hemolysis, or β-hemolysis. Red blood cells are partially broken down by alpha-hemolysin, which results in a greenish tint. This is referred to as alpha hemolysis, or α-hemolysis. This greenish hue is caused by the presence of biliyerdin. The absence of a zone indicates the absence of hemolysis. This is known as gamma hemolysis, or γ-hemolysis. The streptococci's hemolysins functioned better in an anaerobic environment (Buxton, 2005).

**MacConkey Agar**

An indication called MacConkey agar is used to separate enteric and Gram-negative bacteria and distinguish them based on lactose fermentation. Bile salts and crystal violet impede the growth of Gram-positive organisms. Lactose, a carbohydrate, and the pH indicator neutral red can be used to identify enteric bacteria that can ferment lactose (Jung and Hoilat, 2022).

**Incubation process**

On the provided agars, samples were streaked or inoculated. Following inoculation, the plates were incubated for a full day.

**Purification of mixed culture**

Following the incubation period, the bacteria's growth and morphology were examined. Gram positive and gram negative microorganisms may be distinguished via Gram staining. Biochemical assays were used to further process the bacterial colonies on the plates. Different bacteria are identified using biochemical testing. The same plate was used for mixed culture, which was purified by separating the various bacteria. They were then subcultured on blood agar, MacConkey agar, and Cystine-Lactose-Electrolyte-Deficient (CLED) agar one at a time, and they were then incubated once more for 24 hours at 37°C (Palmeiro-Sánchez *et al.*, 2016).

**Identification of the organisms**

When the plates started to develop after incubation. Gram staining was first used to distinguish between gram-positive and gram-negative microorganisms. Consistency within the colony was then noted. In the last phase, biochemical tests were conducted for identification following gram staining.

**Gram Staining**

A popular method for separating two sizable groups of bacteria according to the components of their cell walls is Gram staining. By staining these cells red or violet, the Gram stain method separates Gram positive and Gram negative groupings. Bacteria that are Gram negative stain red, while those that are Gram positive stain violet (Moyes *et al.*, 2009). The cells were first stained with crystal violet dye. Gram iodine solution was added to the crystal violet and iodine to form a compound. This combination was larger than the original iodine and crystal violet stain and was insoluble in water. A decolorizer, such as acetone or ethyl alcohol, was applied to the sample to dehydrate the peptidoglycan layer. After adding safranin, the sample took on a crimson stain. Because safranin was less powerful than crystal violet, it did not interfere with the purple coloration of Gram-positive cells. However, the decolorized Gram-negative cells were stained red (Moyes *et al.*, 2009).

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**Biochemical Tests for Gram Positive Bacteria**
After Gram staining, identification of the Gram Positive Bacteria different biochemical tests were performed like Coagulase and Catalase tests.

**Catalase test**
The test indicates the presence of the catalase enzyme, which causes hydrogen peroxide (H2O2) to release more oxygen. It is employed to distinguish between different bacteria that produce the catalase enzyme. The *Staphylococcus aurous* strain catalase test was carried out by gently mixing one colony with hydrogen peroxide on a sterile slide. The appearance of gas bubbles on the surface of the culture material indicated that the test was effective (Reiner, 2010).

**Coagulase Test**
This test demonstrates the presence of coagulase, an enzyme that causes fibrinogen's peptide bonds to break and form fibrin clots. It's employed in the differentiation of coagulase-producing bacteria (Brown *et al.,* 2005). In order to perform coagulase test for *S. aureus* strains, one colony was carefully covered with either human or rabbit plasma on a sanitized slide. Human plasma was added to a bacterial culture in order to detect the presence of coagulase, which was then confirmed by clump formation or agglutination (Brown *et al.,* 2005).

**Biochemical Tests for Gram Naegative Bacteria**
Different biochemical tests like Oxidase test, Indole test, TSI and Citarte were performed for the identification Gram negative bacteria.

**Citrate Utilization Test**
This test is used to differentiate microorganisms based on their usage of citrate. It consumed one liter of distilled water. The provided distilled water was combined with around 24.2 g of medium. This suspension was placed in a conical flask and autoclaved for 15 minutes at 121°C. After autoclaving, the medium was transferred onto petri dishes and left to harden. A sterilized wire loop was then used to streak a colony in the agar. For a whole day, the plates were kept in the incubator. The plates were utilized for examination after a 24-hour period. The test was positive when the medium's color changed. The gas's production was the cause of this transformation. The presence of microorganisms such as Proteus, Pseudomonas, and Klebsiella was indicated by positive citrate. The medium's color did not change, indicating that the test was negative. In this case, the test organism, such as Escherichia coli, did not use citrate (MacWilliams, 2009).

**Triple Sugar Iron Agar Test**
Both sugar (fermentation) and hydrogen sulfide (production) are crucial for the bacteria's differentiation. The medium's yellow hue indicates the fermentation of carbohydrates. The medium turns red on the slope and yellow on the bump, indicating that the microbe can only ferment glucose. They took one liter of filtered water. To create a suspension, 60 g of the medium was added to the specified water. The suspension was placed in test tubes and autoclaved for 15 minutes at 12°C once it had completely dissolved. The solidification of the medium was permitted. Microorganisms were inoculated using a sterilized wire loop. Using a sterile wire loop, the colony was selected, injected into the tube's bottom medium, and then streaked back and forth. After removing the caps, the tubes were kept in the incubator at 37°C for a full day. Following incubation, the tubes were examined for the generation of hydrogen sulfide, gas, and carbohydrate fermentation. The presence of Klebsiella or *E. coli* was indicated by the color changing to yellow as a result of gas generation. The tube's red tint indicated no fermentation. It showed that Pseudomonas was present. The tubes' dark hue indicated that Proteus was present (Lehman, 2005).

**Indole Test**
The purpose of the indole test is to determine whether an organism can break down tryptophan to generate indole (MacWilliams, 2012). The crimson compound rosindole is created when indole and para-dimethylaminobenzaldehyde mix. When isoamyl alcohol and "rosindole" dye are combined, dye precipitates are created. The precipitate and remaining alcohol then ascended to the top of the medium. Tryptophan must be present in adequate amounts for an indole test medium tryptone broth to appear appropriate (KOMAL, 2019). A culture of the bacterial strains was injected into a tube filled with tryptophan broth and left at 37 °C for 24 to 48

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hours in order to conduct the Indole test. Add 0.5 ml (5 drops) of Kovac's reagent and mix gently. Look at the topmost layer of the liquid; if purple or red rings appear there, a positive result is shown; if yellow rings appear, a bad result is shown (KOMAL, 2019).

**Oxidase Test**

The cytochrome oxidase enzyme was used in the oxidase test to distinguish between Proteus and Pseudomonas. They took the filter paper. On the filter paper, two or three droplets were applied. Using a sterile wire loop, a colony was selected, and a smear was created on the filter paper. The positive oxidase was identified by the purple or blue hue. The test's positive result indicated that Pseudomonas was present (Shields and Cathcart, 2010).

**Novobiocin Sensitivity test**

When the coagulase test came out negative, the Novobiocin Sensitivity test was used to differentiate between *Staphylococcus epidermidis* and *Staphylococcus saprophyticus*. Mueller Hinton (MH) agar was used to test for antibiotic sensitivity. They autoclaved the media. The sterile petri plates were filled with media. The microbe was injected onto Mueller Hinton agar after the medium had cooled. Novobiocin, an antibiotic, was placed on the plate. The plate spent a whole day in the incubator. Zones of inhibition were examined after a 24-hour period. The sensitivity of the microbe was demonstrated by the clear zone surrounding the Novobiocin disc. *Staphylococcus epidermidis* was the organism that was susceptible to Novobiocin disc. There was no resistive zone surrounding the Novobiocin disc. Staph was an organism that was resistant to Novobiocin disc. Saprophyticus (Fulham *et al.,* 2011).

**Antibiotic susceptibility test**

The Disc Diffusion technique was proposed by Bauer-Kirby on Mueller Hinton (MH) to assess isolates' sensitivity to antibiotics. AMC, CTX, CE, CFM, AK, CN, DO, IPM, CIP, LEV, OFX, MFX, AZM, CLR, TZP, SCF, F, NV, and EN were among the several antibiotics utilized in this investigation. The antibiotics' zones of inhibition were based on references. Mueller Hinton (MH) agar was used to test for antibiotic sensitivity. They autoclaved the media. The sterile petri plates were filled with media. The microbe was injected onto Mueller Hinton agar after the medium had cooled. On the MH agar plates, several antibiotics (discussed above) were administered. For a whole day, the plates were in the incubator. Zones of inhibition were measured using a ruler after a 24-hour period. This result was identified as sensitive and resistant to the specific drugs based on the zones of inhibition (Dharmaraj *et al.*, 2021).

**Data Analysis**

The data was analyzed using Graph Pad Prism version 5 and SPSS version 12.0.1. Tables and graphs were used to display this data. For each test, the corresponding mean and standard error were calculated.

**Results**

150 samples were collected from the suspected people of Mansehra region. Samples were collected in a germs free screw-capped container. Samples were tested in Al-Khidmat Diagnostic Research Centre (Mansehra). In this study the minimum age of the participants was 9 years whereas maximum age was 78 years. The standard deviation value is 17.12 and mean age is 39.43 (shown in Table 4.1 and Figure 4.1).

**Table 4.1:** Column statistics of the age range of study participants

| | |
|---|---|
| Number of values | 150 |
| Minimum | 9 |
| 25% Percentile | 26 |
| Median | 34 |
| 75% Percentile | 52 |
| Maximum | 78 |
| Mean | 39.43 |
| Std. Deviation | 17.12 |
| Std. Error of Mean | 1.398 |
| Lower 95% CI of mean | 36.67 |
| Upper 95% CI of mean | 42.2 |
| Sum | 5915 |

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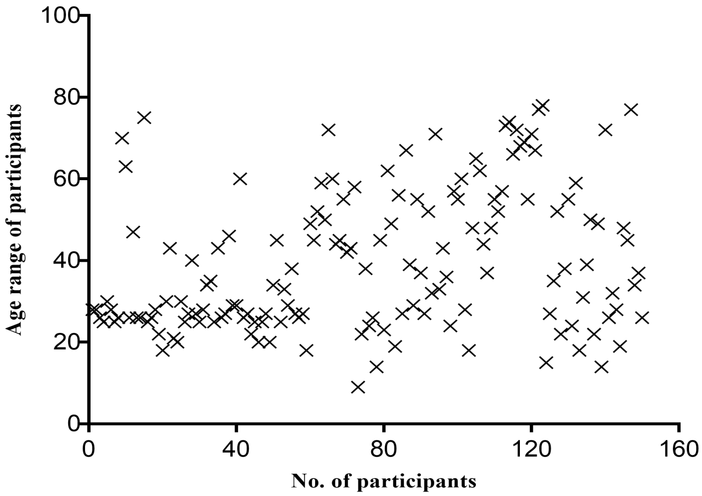


**Figure 4.1: Age range of the study Participants**

During this study the minimum age of female participants observed was 9 years while the maximum age of the female participants recoded was 75 years. The mean age is 35.39. The standard deviation of the female participants recorded during present study was 14.67 as shown in Table 4.2 and Figure 4.2.

**Table 4.2:** Age statistics of female participants of the study

| | |
|---|---|
| Number of values | 95 |
| Minimum | 9 |
| 25% Percentile | 26 |
| Median | 29 |
| 75% Percentile | 45 |
| Maximum | 75 |
| Mean | 35.39 |
| Std. Deviation | 14.67 |
| Std. Error of Mean | 1.505 |
| Lower 95% CI of mean | 32.4 |
| Upper 95% CI of mean | 38.38 |
| Sum | 3362 |

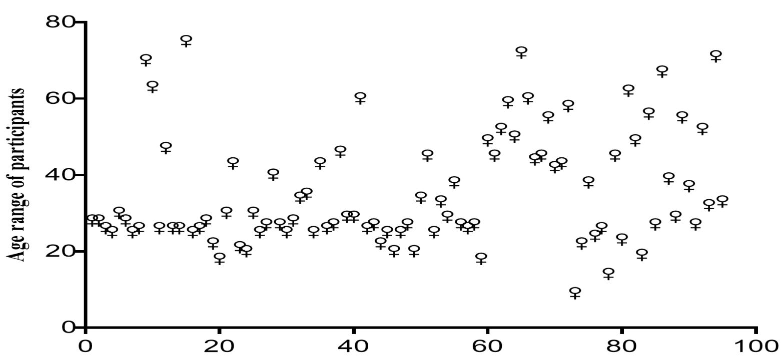


**Figure 4.2: Age statistics of Female Participants of the study**

14 years was the minimum age and 78 years was the maximum age recorded during current study. The mean age is 46.42 and the standard deviation is 18.87 as shown in the Table 4.3 and Figure 4.3.

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**Table 4.3:** Age statistics of male participants of the study

| | |
|---|---|
| Number of values | 55 |
| Minimum | 14 |
| 25% Percentile | 28 |
| Median | 48 |
| 75% Percentile | 62 |
| Maximum | 78 |
| Mean | 46.42 |
| Std. Deviation | 18.87 |
| Std. Error of Mean | 2.544 |
| Lower 95% CI of mean | 41.32 |
| Upper 95% CI of mean | 51.52 |
| Sum | 2553 |

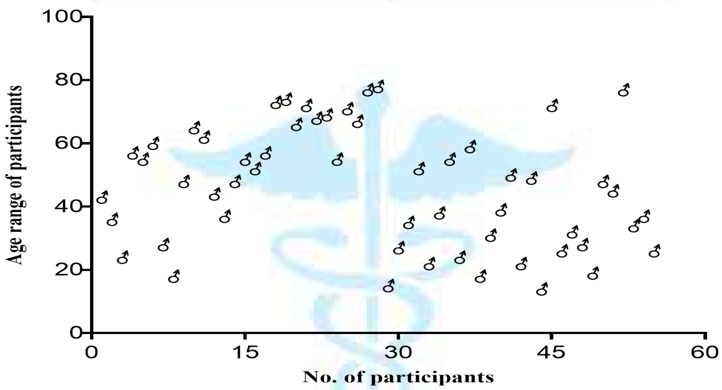


**Figure 4.3: Age statistics of male participants of the study**

For the isolation and identification for the bacterial susceptibility testing a total of 150 samples were analyzed during the current study. 50 (33.33%) samples found negative and did not show any bacterial growth out of 150 urine samples whose urine was cultured for bacterial growth. The minimum age of the positive patient study participants was recorded 18 years whereas the maximum age was recorded 78 years with the mean age of 40.65. The standard deviation in age of positive patients was found to be 17.29 as shown in Table 4.4 and Figure 4.4.

**Table 4.4:** Age statistics of the positive patients

| | |
|---|---|
| Number of values | 100 |
| Minimum | 18 |
| 25% Percentile | 26 |
| Median | 34.5 |
| 75% Percentile | 55 |
| Maximum | 78 |
| Mean | 40.65 |
| Std. Deviation | 17.29 |
| Std. Error of Mean | 1.729 |
| Lower 95% CI of mean | 37.22 |
| Upper 95% CI of mean | 44.08 |
| Sum | 4065 |

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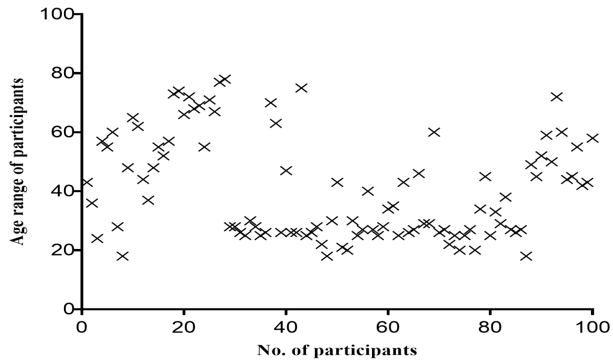


**Figure 4.4: Age range of positive patients**

18 years' age was recorded as minimum of the positive female participants while 75 years' age was recorded as maximum in the current study. The mean age is 34.81. The standard deviation of the positive female participants found to be 13.87 as shown in Table 4.5 and Figure 4.5

**Table 4.5:** Age statistics of positive Female participants of the stud

| | |
|---|---|
| Number of values | 72 |
| Minimum | 18 |
| 25% Percentile | 26 |
| Median | 28 |
| 75% Percentile | 43.75 |
| Maximum | 75 |
| Mean | 34.81 |
| Std. Deviation | 13.87 |
| Std. Error of Mean | 1.635 |
| Lower 95% CI of mean | 31.55 |
| Upper 95% CI of mean | 38.06 |
| | |
| Sum | 2506 |

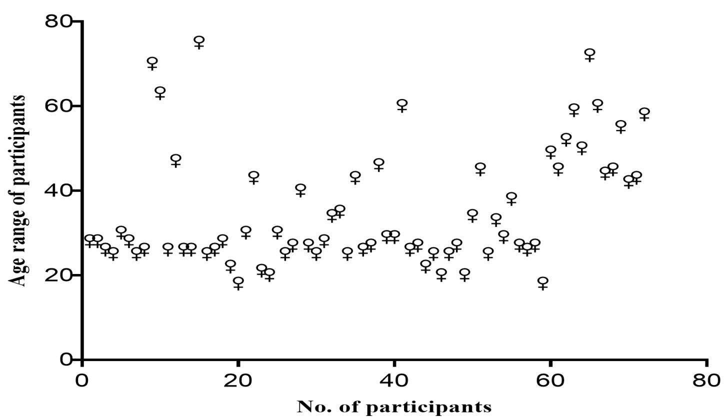


**Figure 4.5: Age statistics of positive female participants**

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18 years' age was recorded as minimum age of positive male participants while 78 years was recorded as maximum age of the positive male participants during current study. The mean age is 34.81. The standard deviation of the positive male participants found to be 16.28 as shown in Table 4.6 and Figure 4.6.

**Table 4.6:** Age statistics of positive male participants of the study

| | |
|---|---|
| Number of values | 28 |
| Minimum | 18 |
| 25% Percentile | 45 |
| Median | 57 |
| 75% Percentile | 68.75 |
| Maximum | 78 |
| Mean | 55.68 |
| Std. Deviation | 16.28 |
| Std. Error of Mean | 3.077 |
| Lower 95% CI of mean | 49.36 |
| Upper 95% CI of mean | 61.99 |
| Sum | 1559 |

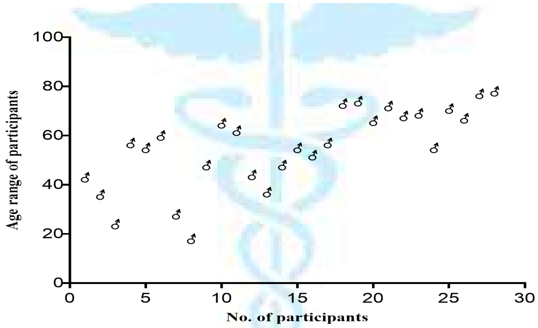


**Figure 4.6: Age statistics of positive male participants**

For the identification and isolation of antimicrobial sensitivity testing, a total of 150 urine samples from suspected UTIs were analyzed. 50 samples (33.34%) were negative and did not show any bacterial growth out of 150 patients whose urine was cultured for bacterial growth. 100 samples (66.66%) were positive and showed bacterial growth on the selected media as shown in Table 4.7 and Figure 4.7.

**Table 4.7 Negative and positive samples distribution**

| Total samples | 150 | Percentage |
|---|---|---|
| Positive samples | 100 | 66.66% |
| Negative samples | 50 | 33.34% |

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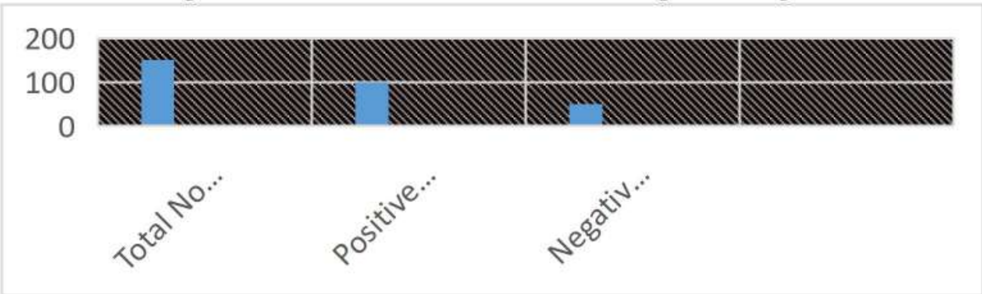
Figure 4.7 Distribution of Positive and negative samples




55 males and 95 female's samples were examined in the current study. Those male and female patients were excluded from this study who have diabetes mellitus, pregnant females, patients with urinary tract infections and patients with known anatomical abnormalities of genitourinary tract. Out of 150 samples, 100 (66.66 %) showed significant growth of bacteria of which 28 samples (50.90 %) were of males and 72 samples (75.78 %) were obtained from females as shown in table 4.8 and figure 4.8.

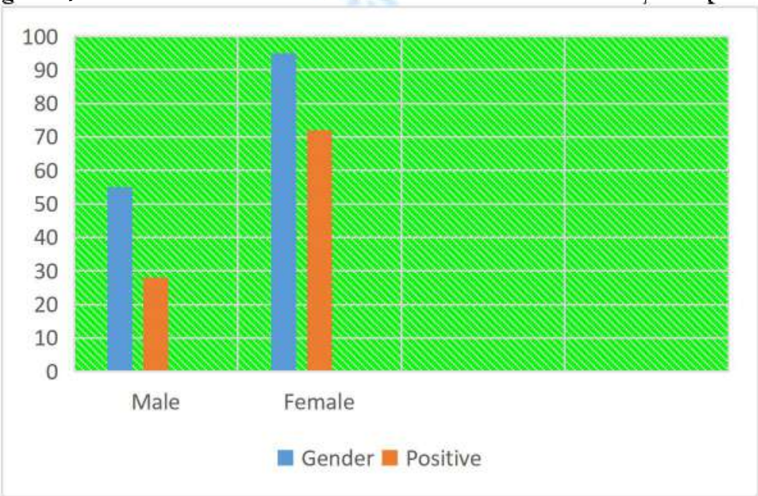
**Table 4.8 Gender wise distribution of UTIs in study sample set**

| Gender | No. of samples | Positive samples | Percentage |
|---|---|---|---|
| Male | 55 | 28 | 52.73% |
| Female | 95 | 72 | 74.73% |

**Table 4.8 Gender wise distribution of UTIs in study sample set**

| Gender | No. of samples | Positive samples | Percentage |
|---|---|---|---|
| Male | 55 | 28 | 52.73% |
| Female | 95 | 72 | 74.73% |

Figure 4.8 Gender wise distribution of UTIs in the study sample set




**Age wise distribution of UTIs patients in the study sample set**

Participants (samples of the patients) in this study were divided into four groups on the basis of age group. These groups ranging from 0-20, 21-40, 41-60 and 61-80. In the age group 0-20, 49 samples were cultured as maximum, followed by age group 41 to 60 years (29) and age group 61 to 80 years (16) as shown table 4.9 and figure 4.9.

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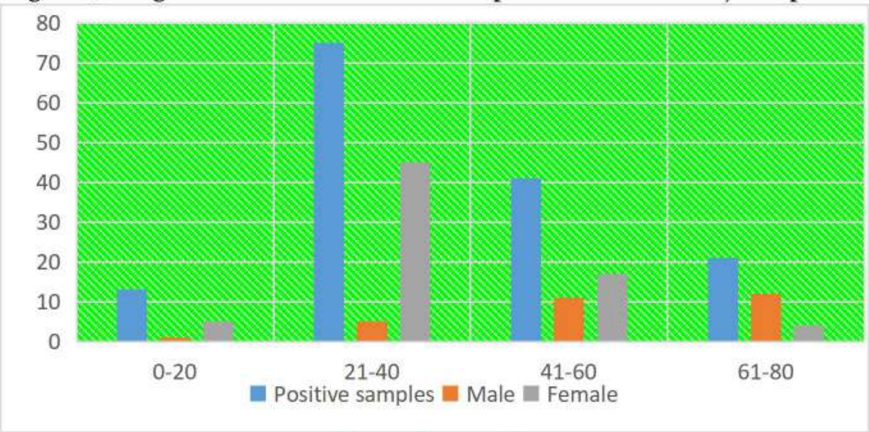
**Table 4.9 Age wise distribution of UTIs patients in the study sample set**

| Age Group (years) | Total No. of samples | Male | Female | Positive samples |
|---|---|---|---|---|
| 0-20 | 13 | 01 | 05 | 06 |
| 21-40 | 75 | 04 | 45 | 49 |
| 41-60 | 41 | 11 | 18 | 29 |
| 61-80 | 21 | 12 | 04 | 16 |
| Total | 150 | 28 | 72 | 100 |

**Figure 4.9 Age wise distribution of UTIs patients in the study sample set**




**Specie wise distribution of UTIs patients in the study sample set**

During current four were gram positive and four were gram negative amongst the total 150 bacteria isolation. Common gram positive uropathogens isolated from urine are *Staphylococcus aureus* 32(21.33%) followed by *Staphylococcus saprophyticus* 6(4%), *Staphylococcus epidermidis* 3 (2%) and *Enterococcus spp* 2(1.33%) whereas, the Gram-negative isolates were *Klebsiella spp* 2 (1.33%), *Escherichia coli* 39(66%), *Proteus spp* 12 (8%), *Pseudomonas spp* 4(2.66%). The distribution of the bacteria species ranges in the order *Escherichia coli* > *Staphylococcus aureus*> *Proteus spp* > *Staphylococcus saprophyticus*> *Pseudomonas spp* > *Staphylococcus epidermidis* >*Klebsiella spp* and *Enterococcus spp* as shown in Table 3.4 and figure 3.4.

**Table 4.10 Specie wise distribution of UTIs patients in the study sample set**

| Isolated organisms | No. of positive Samples | Percentage |
|---|---|---|
| *E. coli* | 39 | 26% |
| *S. aureus* | 32 | 21.33% |
| *Proteus spp.* | 12 | 08% |
| *S. saprophyticus* | 06 | 04% |
| *Pseudomonas spp.* | 04 | 2.66% |
| *S. epidermidis* | 03 | 02% |
| *Enterococcus spp.* | 02 | 1.33% |
| *Klebsiella spp.* | 02 | 1.33% |

**Figure 4.10 Specie wise distribution of UTIs patients in the study sample set**

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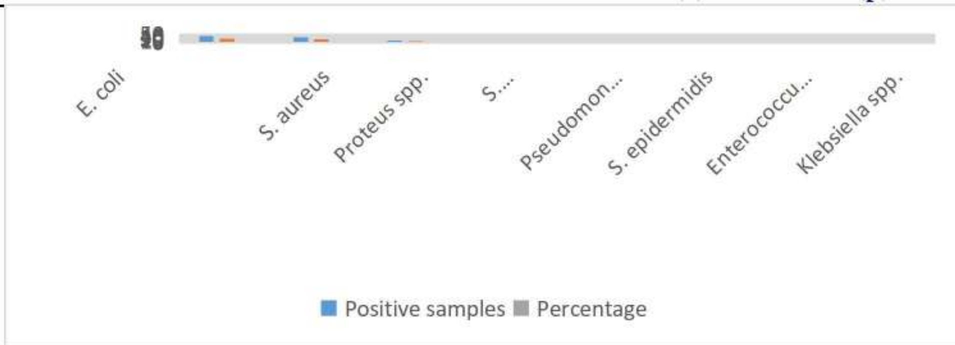


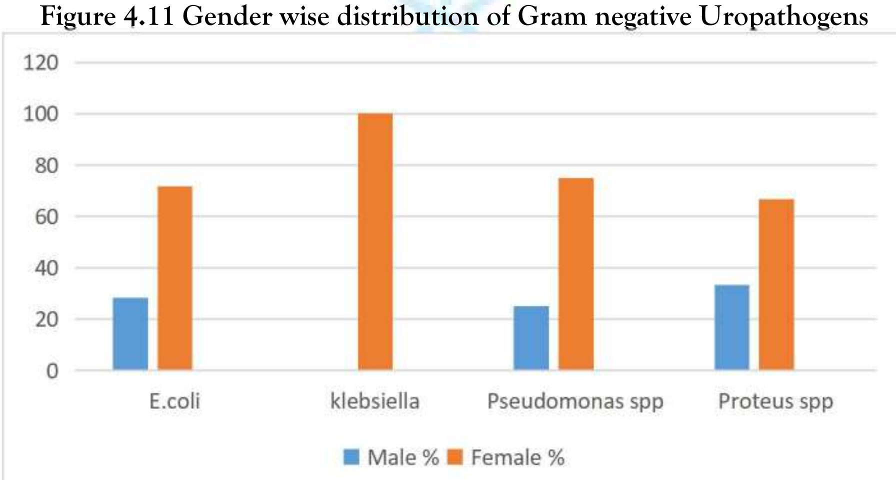

**Gender wise distribution of Gram negative uropathogens**

In both males and females different uropathogens showed different range of occurrence. E. coli gram negative bacteria showed high percentage 28 (71.79%) in female than in males 11 (28.20%), Klebsiella 0 (0 %) in males and 2 (100%) in females, Pseudomonas spp 1 (25%) in males and 3 (75%) in females and Proteus spp 4 (33.33%) in males and 8 (66.66%) in females. The high rate of occurrence of E. coli, Klebsiella, Proteus spp and Pseudomonas spp was in females shown in table 4.11 and figure 4.11.

**Table 4.11** Gender wise distribution of Gram negative uropathogens

| Gender | Uropathogens | | | |
|---|---|---|---|---|
| | *E.coli* | *klebsiella* | *Pseudomonas spp* | *Proteus spp* |
| Male (%) | 11 (28.20%) | 0 (0%) | 1 (25%) | 4 (33.33%) |
| Female (%) | 28 (71.79%) | 2 (100) | 3 (75%) | 8 (66.66%) |

**Figure 4.11 Gender wise distribution of Gram negative Uropathogens**




**Gender wise distribution of Gram positive Uropathogens**

*Staphylococcus aureus* showed high occurrence rate in females 26 (81.25%) than in males 6 (18.75%) in positive samples.as compared to this *Staphylococcus saprophyticus* was very high in males 4 (66.66%) than in females 2 (33.33%). *Staphylococcus epidermidis* showed 02 (66.66%) occurrence in females while 1 (33.33%) in males, and *Enterococcus spp* showed equal occurrence rate in females and males 1 (50%) as shown in table and figure 4.12.

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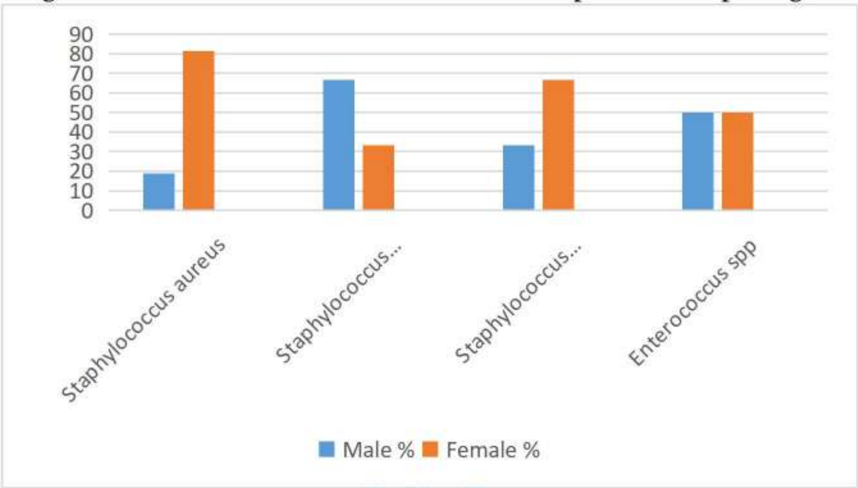
**Table 4.12** Gender wise distribution of Gram positive Uropathogens

| Gender | Uropathogens | | | |
|---|---|---|---|---|
| | *Staphylococcus aureus* | *Staphylococcus saprophyticus* | *Staphylococcus epidermidis* | *Enterococcus spp* |
| Male (%) | 6 (18.75%) | 4 (66.66%) | 1 (33.33%) | 1 (50%) |
| Female (%) | 26 (81.25%) | 2 (33.33%) | 2 (66.66%) | 1 (50%) |

**Figure 4.12 Gender wise distribution of Gram positive Uropathogens**




**Identification of gram negative Uropathogens by different biochemical tests**

Different biochemical tests were performed for the identification and confirmation of gram negative bacteria performed as shown in table 4.13. Indole positive for *E. coli* is shown in Figure 4.13(a), TSI positive for *E. coli* (4.13 b), Indole negative for *Klebsella* (fig 4.13 c) and positive citrate utilization test for *Klebsella* is shown in (figure 4.13 d) respectively.

**Table 4.13** Identification of gram negative Uropathogens by different biochemical tests

| **Biochemical Tests** | ***Escherichia coli*** | ***Klebseilla spp.*** | ***Pseudomonas ssp.*** | ***Proteus spp.*** |
|---|---|---|---|---|
| **Gram Staining** | Rods | Rods | Rods | Rods |
| **Citrate utilization Test** | - | + | + | + |
| **Oxidase Test** | - | - | + | - |
| **TSI** | AG | A or AG | NC | A |
| **Indole Production Test** | + | - | - | - |

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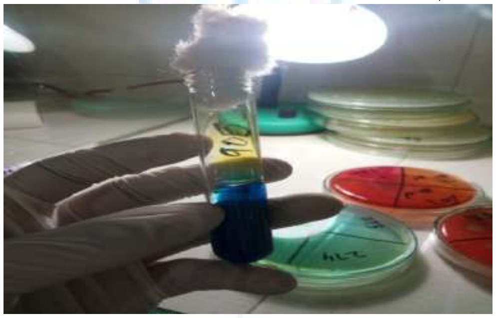
G= Gas Production, A= Acid, NC= No Change

A) Indole Positive for ***E. Coli*** B) TSI positive for ***E. coli***



B) Indole negative for ***Klebsella***
D) Citrate positive for ***Klebsella***

**Figure 4.13: Identification of Gram negative uropathogens by biochemical tests**

For the identification of Gram Positive bacteria different biochemical tests were performed as shown in table 4.14. Positive Catalase test for *Staphylococcus spp* is shown in figure (4.14 a), negative catalase test for *Enterococcus spp*, positive coagulase test for *Staphylococcus aureus* in figure (4.14 b) and Novobiocin Sensitivity Test Sensitive for *staph. Epidermidis* and resistant for *staph. Saprophyticus* as shown in figure (4.14 c and d) respectively.

**Table 4.14:** Biochemical Tests for the Identification of Gram Positive Uropathogens

| Biochemical Tests | *Staphylococcus aureus* | *Staphylococcus Saprophyticus* | *Staphylococcus epidermidis* | *Enterococcus spp* |
|---|---|---|---|---|
| Gram Staining | Cocci in Clusters | Cocci in Clusters | Cocci in Clusters | Cocci in Chains |
| Catalase Test | + | + | + | - |
| Coagulase Test | + | - | - | _ |
| Novobiocin Sensitivity Test | _ | NR | NS | _ |

NR= Novobiocin Resistant, NS= Novobiocin Sensitive

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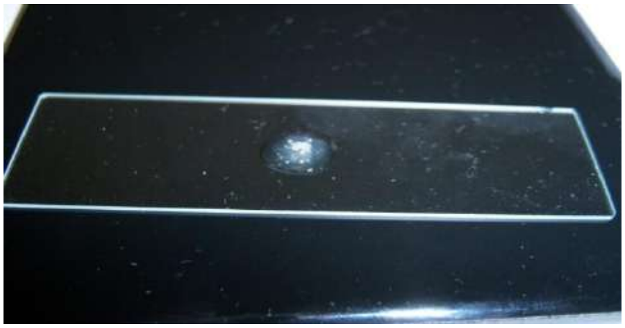
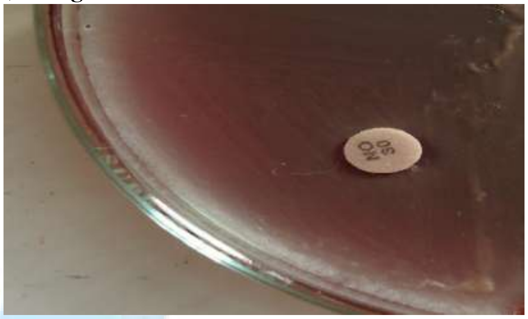


A) Catalase positive

B) Coagulase Positive



A) *Staphylococcus saprophyticus* D) *Staphylococcus epidemidis*

**Figure 4.14: Biochemical Tests for the Identification of Gram Positive Uropathogens**

The susceptibility pattern of the Gram negative isolates to tested antibiotics is shown in table 4.15. *Klebsiella* showed (100%) susceptibility to Cefataxime, Cefador, Cefixime, Ciprofloxacin, Amikacin and Sulbactum and (100%) resistance to Gentamycin and Imepenem. *Pseudomonas spp* showed (100%) susceptibility to Cefotaxime and Doxyfloxacin and high resistance to Gentamycin that is (100%). *E. coli* showed high susceptibility to Novobiocin (82.05%) and high resistance to Doxyfloxacin (79.48%). *Proteus spp* showed high susceptibility to Amikacin (91.66%) and high resistance to Sulbactum and Levofloxacin (83.33%).

**Table 4.15: Antibiotic Susceptibility Pattern of Gram Negative Isolates**

| Antibiotics | *Escherichia Coli* (n=39) | | *Proteus* (=12) | | *Pseudomonas* (n=04) | | *Klebsiella* (n=02) | |
|---|---|---|---|---|---|---|---|---|
| | S% | R% | S% | R% | S% | R% | S% | R% |
| Amoxacillin | 33.33 | 66.66 | 58.33 | 41.66 | 25 | 75 | 50 | 50 |
| Cefotaxime | 58.97 | 41.02 | 33.33 | 66.66 | 100 | 0 | 100 | 0 |
| Cefador | 48.7 | 51.28 | 50 | 50 | 50 | 50 | 100 | 0 |
| Cefixime | 53.84 | 46.15 | 58.33 | 41.66 | 25 | 75 | 100 | 0 |
| Ciprofloxacin | 23.07 | 76.92 | 75 | 25 | 25 | 75 | 100 | 0 |
| Levofloxacin | 82.05 | 17.94 | 16.66 | 83.33 | 25 | 75 | 50 | 50 |
| Amikacin | 28.20 | 71.79 | 91.66 | 8.33 | 50 | 50 | 100 | 0 |
| Gentamicin | 30.76 | 69.23 | 41.66 | 58.33 | 0 | 100 | 0 | 100 |
| Doxyfloxacin | 20.51 | 79.48 | 33.33 | 66.66 | 100 | 0 | 50 | 50 |
| Imepenem | 41.02 | 58.97 | 25 | 75 | 75 | 25 | 0 | 100 |
| Sulbactam | 53.84 | 46.15 | 16.66 | 83.33 | 50 | 50 | 100 | 0 |
| Novobiocin | 82.05 | 17.94 | 50 | 50 | 25 | 75 | 50 | 50 |

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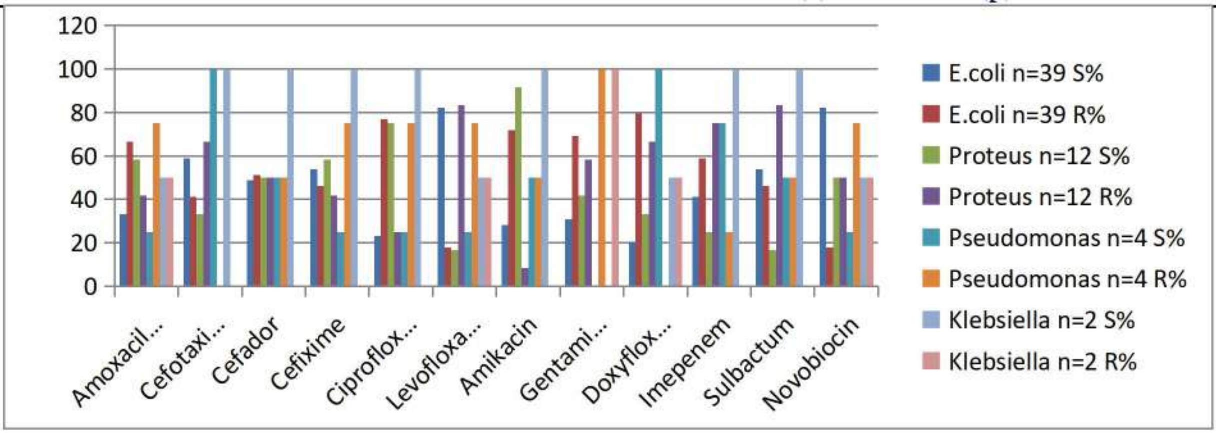


**Figure 4.15: Antibiotic Susceptibility Pattern of Gram Negative Isolates**

The susceptibility pattern of the gram positive isolates to tested antibiotics is shown in table 4.16 and figure 4.16. *Staphylococcus aureus* showed high susceptibility to cefixime (84.37) and high resistance to gentamicin (90.62%). *Staphylococcus saprophyticus* showed high susceptibility to doxyfloxacin (100%) and high resistance to ciprofloxacin (83.33%). *Staphylococcus epidermidis* showed high susceptibility to cefotaxime, cefador, cefixime, ciprofloxacin and imepenem that is (100%) and high resistance to gentamicin (100%). *Enterococcus spp* showed high susceptibility to Amoxacillin, Cefotaxime, Cefador, Levofloxacin, Gentamicin, Doxyfloxacin, Sulbactum and Novobiocin that is (100%) and showed (50%) resistance to Cefixime, Ciprofloxacin, Amikacin and Imepenem.

**Table 4.16: Antibiotic susceptibility Pattern of Gram Positive Isolates**

| Antibiotics | Staph. Aureus (n=32) | | Staph.Saprophyticus (n=06) | | Staph.Epidermidis (n=03) | | Enterococcus Spp (n=02) | |
|---|---|---|---|---|---|---|---|---|
| | S% | R% | S% | R% | S% | R% | S% | R% |
| Amoxacillin | 59.37 | 40.62 | 66.66 | 33.33 | 66.66 | 33.33 | 100 | 0 |
| Cefotaxime | 62.25 | 47.75 | 50 | 50 | 100 | 0 | 100 | 0 |
| Cefador | 34.37 | 65.62 | 83.33 | 15.62 | 100 | 0 | 100 | 0 |
| Cefixime | 84.37 | 15.62 | 33.33 | 66.66 | 100 | 0 | 50 | 50 |
| Ciprofloxacin | 65.62 | 34.37 | 15.62 | 83.33 | 100 | 0 | 50 | 50 |
| Levofloxacin | 56.25 | 43.75 | 33.33 | 66.66 | 66.66 | 33.33 | 100 | 0 |
| Amikacin | 25 | 75 | 50 | 50 | 33.33 | 66.66 | 50 | 50 |
| Gentamicin | 9.37 | 90.62 | 66.66 | 33.33 | 0 | 100 | 100 | 0 |
| Doxyfloxacin | 43.75 | 56.25 | 100 | 0 | 66.66 | 33.33 | 100 | 0 |
| Imepenem | 43.75 | 56.25 | 66.66 | 33.33 | 100 | 0 | 50 | 50 |
| Sulbactam | 37.5 | 62.35 | 33.33 | 66.66 | 66.66 | 33.33 | 100 | 0 |
| Novobiocin | 53.12 | 46.87 | 50 | 50 | 100 | 0 | 100 | 0 |

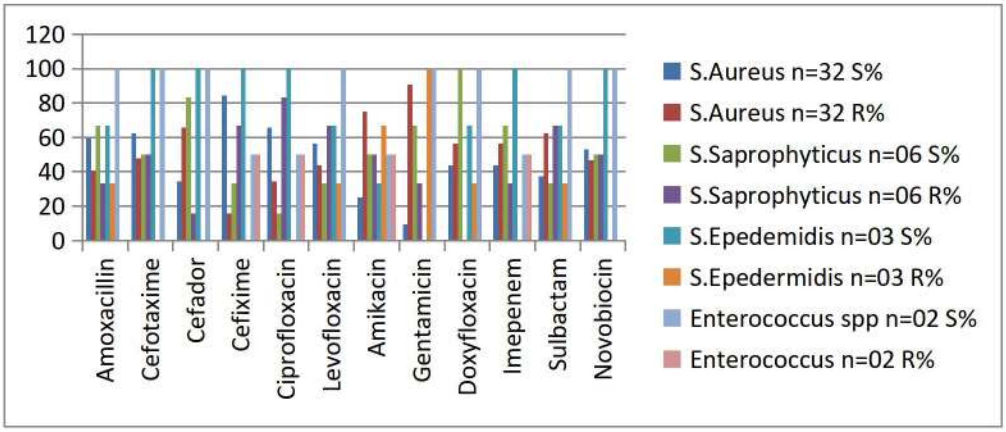


**Figure 4.16: Gram positive isolates to antibiotic susceptibility Pattern**

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Gram negative bacteria *E. coli* showed high susceptibility to Levofloxacin and Novobiocin (82.05%) followed by Cefotaxime (58.97%) and cefixime and sulbactum (53.84%). Susceptible range of other antibiotics to *E. coli* was Cefador > Amoxacillin > Gentamicin > Amikacin > Ciprofloxacin as shown in Table 4.17 and Figure 4.17.

**Table 4.17:** Different antibiotics susceptible to *E.coli*

| Antibiotics | *E.coli* S% |
|---|---|
| **Amoxacillin** | 33.33 |
| **Cefotaxime** | 58.97 |
| **Cefador** | 48.7 |
| **Cefixime** | 53.84 |
| **Ciprofloxacin** | 23.07 |
| **Levofloxacin** | 82.05 |
| **Amikacin** | 28.20 |
| **Gentamicin** | 30.76 |
| **Doxyfloxacin** | 20.51 |
| **Imepenem** | 41.02 |
| **Sulbactam** | 53.84 |
| **Novobiocin** | 82.05 |

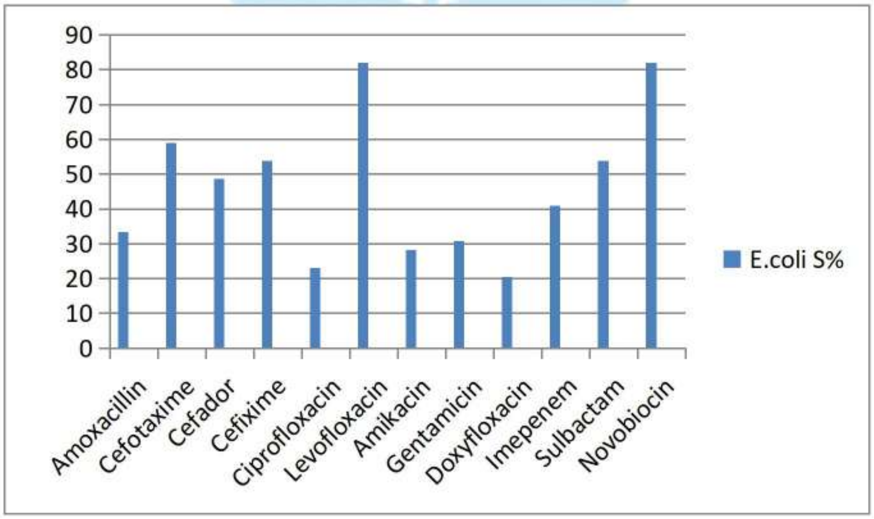


**Figure 4.17: Susceptibility of *E. coli* to different Antibiotics**

Amikacin was highly effective against *Proteus spp*. The effective range of antibiotics against *Proteus spp* was Ciprofloxacin > Amoxacillin and Cefixime > Cefador and Novobiocin > Gentamicin > Cefotaxime and Doxyfloxacin > Imepenem > Levofloxacin and sulbactum as shown in table and Figure 4.18.

**Table 4.18: Susceptibility of *Proteus spp* to different antibiotics**

| Antibiotics | ***Proteus*** S% |
|---|---|
| **Amoxacillin** | 58.33 |
| **Cefotaxime** | 33.33 |
| **Cefador** | 50 |
| **Cefixime** | 58.33 |
| **Ciprofloxacin** | 75 |

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| | |
|---|---|
| Levofloxacin | 16.66 |
| Amikacin | 91.66 |
| Gentamicin | 41.66 |
| Doxyfloxacin | 33.33 |
| Imepenem | 25 |
| Sulbactam | 16.66 |
| Novobiocin | 50 |

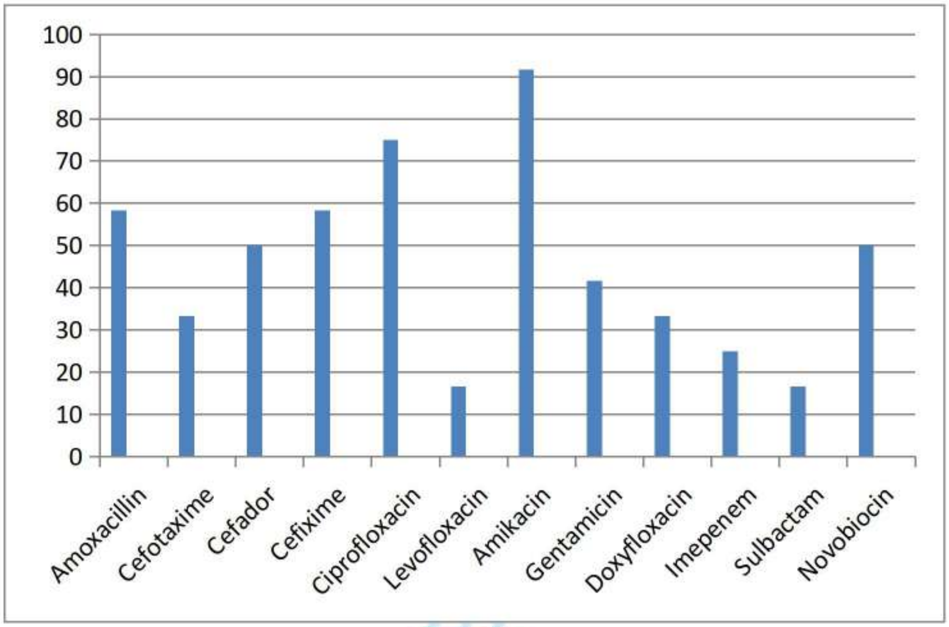


**Figure 4.18: Susceptibility of *Proteus spp* to different antibiotics**

Cefotaxime and Doxyfloxacin were highly effective against *Pseudomonas spp*. The effective range of other antibiotics against *Pseudomonas spp* were Imepenem > Cefador, Amikacin and Sulbactum > Amoxacillin, Cefixime, Ciprofloxacin, Levofloxacin and Novobiocin shown in Table and Figure 4.19.

**Table 4.19: Susceptibility of *Pseudomonas spp* to different antibiotics**

| Antibiotics | *Pseudomonas* S% |
|---|---|
| Amoxacillin | 25 |
| Cefotaxime | 100 |
| Cefador | 50 |
| Cefixime | 25 |
| Ciprofloxacin | 25 |
| Levofloxacin | 25 |
| Amikacin | 50 |
| Gentamicin | 0 |
| Doxyfloxacin | 100 |
| Imepenem | 75 |
| Sulbactam | 50 |
| Novobiocin | 25 |

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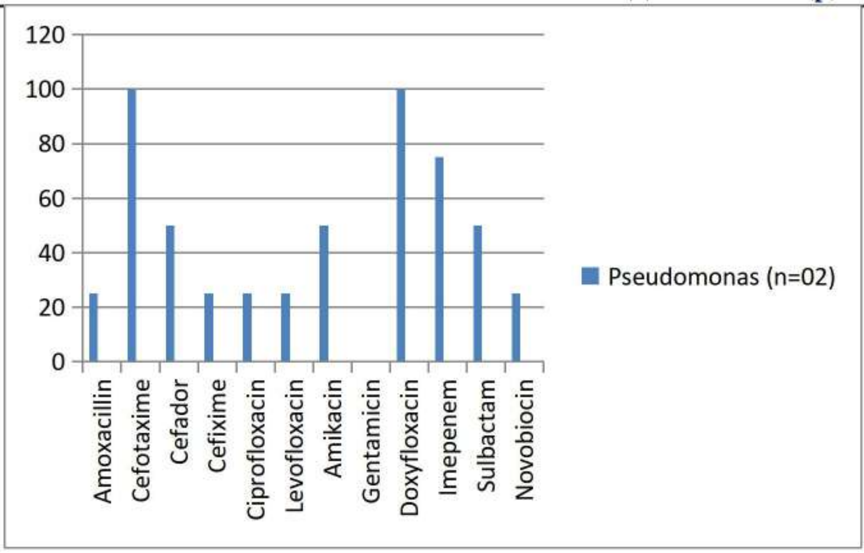


**Figure 4.19: Susceptibility of *Pseudomonas spp* to different antibiotics**

Cefotaxime, Cefador, Cefixime, Ciprofloxacin, Amikacin, Imepenem and Sulbactum were highly effective against *Klebsiella spp* followed by Amoxacillin, Levofloxacin and Doxyfloxacin > Gentamicin shown in Table and Figure 4.20.

**Table 4.20:** Susceptibility of *Klebsiella spp* to different antibiotics

| Antibiotics | ***Klebsiella*** S% |
|---|---|
| **Amoxacillin** | 50 |
| **Cefotaxime** | 100 |
| **Cefador** | 100 |
| **Cefixime** | 100 |
| **Ciprofloxacin** | 100 |
| **Levofloxacin** | 50 |
| **Amikacin** | 100 |
| **Gentamicin** | 0 |
| **Doxyfloxacin** | 50 |
| **Imepenem** | 100 |
| **Sulbactam** | 100 |
| **Novobiocin** | 50 |

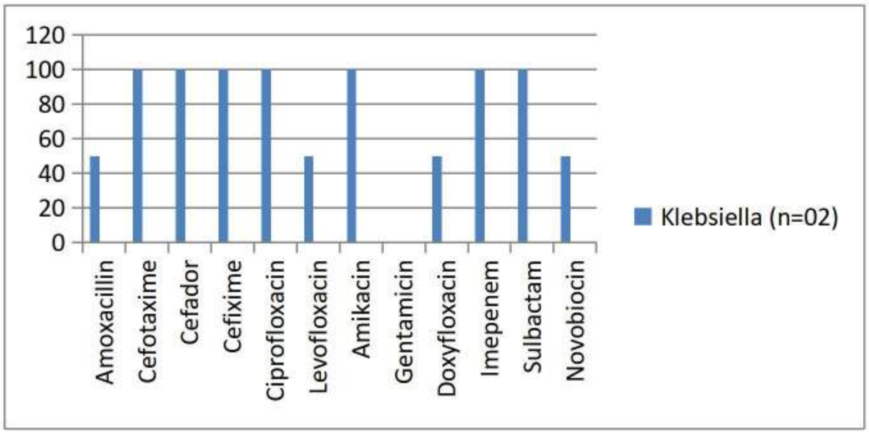


**Figure 4.20: Susceptibility of *Klebsiella spp* to different antibiotics**

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Cefixime was highly effective against *Staphylococcus aureus*. The effective range of other antibiotics against *Staphylococcus aureus* were Ciprofloxacin > Cefotaxime >Amoxacillin > Levofloxacin > Novobiocin > Doxyfloxacin and Imepenem > Sulbactum > Cefador > Amikacin> Gentamicin as shown in table and Figure 4.21.

**Table 4.21:** Susceptibility of *Staphylococcus aureus* to different Antibiotics

| Antibiotics | ***S.aureus*** S% |
|---|---|
| **Amoxacillin** | 59.37 |
| **Cefotaxime** | 62.25 |
| **Cefador** | 34.37 |
| **Cefixime** | 84.37 |
| **Ciprofloxacin** | 65.62 |
| **Levofloxacin** | 56.25 |
| **Amikacin** | 25 |
| **Gentamicin** | 9.37 |
| **Doxyfloxacin** | 43.75 |
| **Imepenem** | 43.75 |
| **Sulbactam** | 37.5 |
| **Novobiocin** | 53.12 |

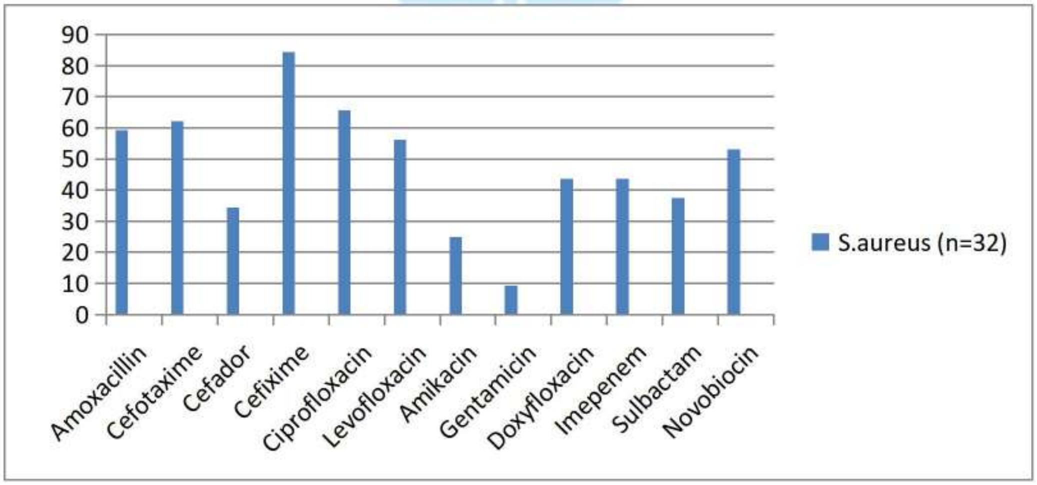


**Figure 4.21: Susceptibility of *Staphylococcus aureus* to different Antibiotics**

Doxyfloxacin was highly effective against *Staphylococcus saprophyticus.* The other antibiotics range against Staphylococcus aureus were Cefador > Amoxacillin, Gentamicin and Imepenem > Cefotaxime, Amikacin and Novobiocin > Cefixime, levofloxacin and Sulbactum > Ciprofloxacin as shown in table and figure 4.22.

**Table 4.22: Susceptibility of *Staphylococcus saprophyticus* to different Antibiotics**

| Antibiotics | ***S.saprophyticus*** S% |
|---|---|
| **Amoxacillin** | 66.66 |
| **Cefotaxime** | 50 |
| **Cefador** | 83.33 |
| **Cefixime** | 33.33 |
| **Ciprofloxacin** | 15.62 |

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| | |
|---|---|
| **Levofloxacin** | 33.33 |
| **Amikacin** | 50 |
| **Gentamicin** | 66.66 |
| **Doxyfloxacin** | 100 |
| **Imepenem** | 66.66 |
| **Sulbactam** | 33.33 |
| **Novobiocin** | 50 |

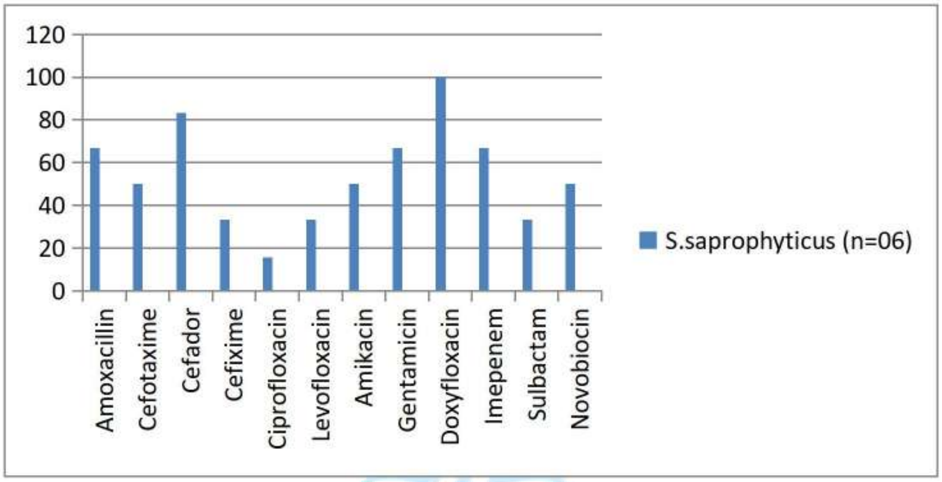


**Figure 4.22: Susceptibility of *Staphylococcus saprophyticus* to different Antibiotics**

Cefotaxime, Cefador, Cefixime, Ciprofloxacin, Imepenem and Novobiocin were Highly effective against *Staphylococcus epidermidis*. The other antibiotics range against *Staphylococcus epidermidis* were Amoxacillin, Levofloxacin, Doxyfloxacin and Sulbactum > Amikacin > Gentamicin as shown in Table and Figure 4.23.

**Table 4.23: Susceptibility of *Staphylococcus epidermidis* to different Antibiotics**

| Antibiotics | ***S. epidermidis*** S% |
|---|---|
| **Amoxacillin** | 66.66 |
| **Cefotaxime** | 100 |
| **Cefador** | 100 |
| **Cefixime** | 100 |
| **Ciprofloxacin** | 100 |
| **Levofloxacin** | 66.66 |
| **Amikacin** | 33.33 |
| **Gentamicin** | 0 |
| **Doxyfloxacin** | 66.66 |
| **Imepenem** | 100 |
| **Sulbactam** | 66.66 |
| **Novobiocin** | 100 |

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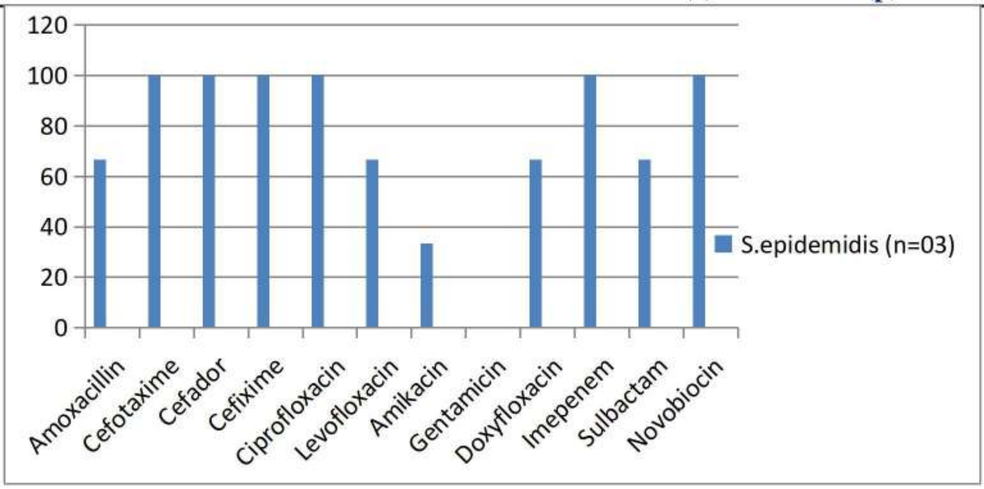


**Figure 4.23: Susceptibility of *Staphylococcus epidermidis* to different Antibiotics**

Amoxacillin, Cefataxime, Cefador, Levofloxacin, Gentamicin, Doxyfloxacin, Sulbactum and Novobiocin were highly effective against *Enterococcus spp*. The other antibiotics range against *Enterococcus spp* were Cefixime, Ciprofloxacin, Amikacin and Imepenem as shown in Table and Figure 3.24.

**Table 4.24: Susceptibility of *Enterococcus spp* to different Antibiotics**

| Antibiotics | *Enterococcus spp* S% |
|---|---|
| Amoxacillin | 100 |
| Cefotaxime | 100 |
| Cefador | 100 |
| Cefixime | 50 |
| Ciprofloxacin | 50 |
| Levofloxacin | 100 |
| Amikacin | 50 |
| Gentamicin | 100 |
| Doxyfloxacin | 100 |
| Imepenem | 50 |
| Sulbactam | 100 |
| Novobiocin | 100 |

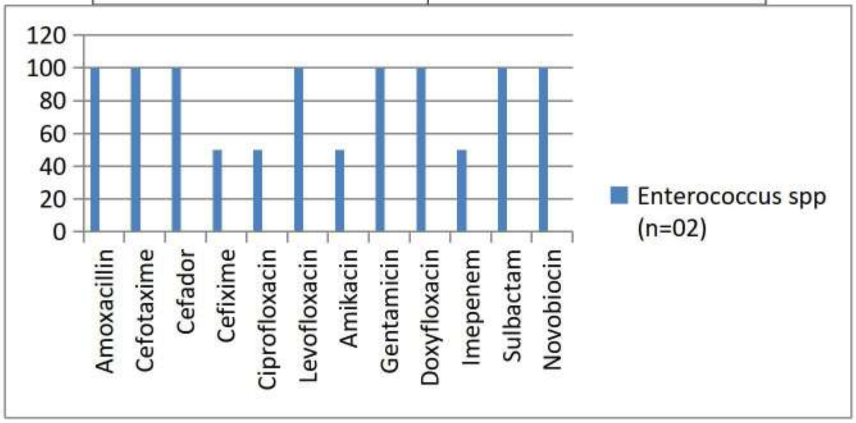


**Figure 4.24: Susceptibilty of *Enterococcus spp* to different Antibiotics**

**Discussion**

A UTI occurs when germs are present together with symptoms related to the urinary system. When the infectious causal agents are found in the bladder, prostate, urine, or urethra, it manifests. There are two types of urinary tract infections: simple

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(uncomplicated) and complex (complicated). It can affect either the inferior or both inferior and posterial regions of the infection. While complicated urinary tract infections are prevalent in women with disrupted urinary processes, simple urinary tract infections are mostly found in women. It is a major issue that individuals face because of the high cost and depression because it has the greatest degree of spending of any linked urological condition, surpassing even kidney transplantation and dialysis. It comes first after UTI (Ortega Martell *et al.,* 2019). It is a major public concern due to the morbidity it causes, with damages totaling $6 billion USD. Every day, hundreds of thousands of urine sensitivity test samples are tested. 95% of illnesses are caused by a single species of bacteria. Uropathogenic *E. coli* is the term used to describe the bacteria that causes infections because it offers the pool for the commencement of infections and increases the number of its serotypes. Up to 85% of urinary tract infections, both in and out of patients, are caused by *E. coli* (Jellheden *et al.*, 2016). Other organisms like as Proteus, Enterobacter, Klebsiella spp., Staphylococcus spp., and Pseudomonas are identified from inpatients, and OPD has seen an increase in Escherichia coli infections. The number of anaerobic UTI species is really small. Few studies have shown that Staph. saprophyticus is coagulase negative and causes infections in girls at young ages. Urinary tract infections were shown to be mostly caused by Staph (Dharmaraj *et al.,* 2021). A total of 150 urine samples were collected during the current study from the UTI patients who visited at Al-Khidmat laboratory Mansehra, a private sector, located in District Mansehra. Prevalence of UTI was recorded high in female during the present study on the basis of gender wise distribution i.e. female 74.73% (72/95) as compare to male's 50.90% (28/55). Those findings are same as were with that of the study Khan *et al.*, (2013) which showed the prevalence in female patients as 77.20% and in male patients 22.80%. A same report was generated by Iqra *et al.*, (2014) that the occurrence in females is 62.6% and in males 37.31%. both the studies expressed that an elevated level in female's patients and revealed that the reason can be the anatomical shape of the UTI, as they have a short length urethra which give to patient a relatively free chance to reach the bladder, due to poor personal hygiene or due to sexually active life.

The age group 21-40 were found at elevated occurrence patterns while the age group 0-20 were found at lower cases. The result of the current study was similar to that of Khan *et al.*, (2013) as they expressed the age group 21-40 was having high prevalence percentage of 38.63% and age group 0-20 years was having low prevalence of 22.72%. The elevated level of cases of urinary tract infection in that group might be due to bad cleanliness, improper use of antibiotics, obstruction in outlet of bladder, poor practice and due to stones problems. In another study done by Khalil *et al.*, (2013) the elevated level of cases were found in age group 41-60 (29.69%) succeeded by 21-40 years with (19.29%) and the age group below 20 years were (20.45%) and above 60 years (18.20%). The abundantly found organisms in current study were *Escherichia coli*, about 26%, *Staph. aureus* about 21.33%, *Proteus spp* were about 8% and *Staph. saprophyticus* was about 4%. This result showed most similarity with the work of Adedeji and Abdulkadir, (2009) which resulted *E. coli* 28.57% and *Staph. aureus* was 23.81% succeeded by *Proteus spp* with 23.81% and *Staph. saprophyticus* with 9.52% cases. The current work showed the gram negative as *Escherichia coli* (26%), *Proteus spp* (8%), *Pseudomonas* 2.65% and *Klebsiella* was reported in 1.3% cases. The gram positive was recorded as *Staph. aureus* (21.33%), *Staphylococcus saprophyticus* (4.00%), *Staphylococcus epidermidis* (2.00%) and *Enterococcus spp* (1.33%). Different studies conducted by Ramesh *et al.*, (2014); and Suzzane *et al.*, (2014) reported that *Proteus*, *Klebsiella*, *Pseudomonas* and *E. coli* were the major gram negative pathogens, while *Staph. aureus*, *Staph. saprophyticus*, *Staph. epidermidis* and *Enterococcus* were reported as most prevalent gram positive organisms. The current study resulted as the *Escherichia coli* is the abundantly found bacteria in the samples of urine, that agrees with the work of Mody *et al.*, (2007) ; Nirmaljit *et al.*, (2014); Gupta *et al.*, (2001); Borghi *et al.*, (2002) which also revealed that the *Escherichia coli* is the majorly responsible pathogen in the urinary tract infection is normally present in GIT and when reached to urinary tract it causes urinary tract infection.

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The current study revealed Cefotaxime as most effective drug to treat *Escherichia coli*, *Pseudomonas*, *Proteus* and *Klebsiella* related to the work done by Shafaq (2014). Gram negative bacteria found resistant to Amoxacillin, Gentamicin and Imepenem in current work which countersign the work done by Ramesh *et al*., (2008); Adedeji and Abdulkadir (2009); Shafaq Aizaz (2014). The present work proved that elevated level of gram positive bacteria was found resistant to Aamikacin and sensitive to Cefador, which is in line of the work done by Jhelliden *et al*., (2016); Ramesh *et al*., (2008).

**Conclusion**

Urinary tract infections are common all around the world. UTIs continue to be one of the main causes of morbidity. Addressing the problem of UTIs and identifying the harmful bacterial causes are critical. Urinary tract infections can occur in both sexes, but women are more prone to have them due to their physiology, which increases the likelihood of the infection. In the current study, the prevalence rate of UTI was higher in the female population than in the male population. The percentage of women aged 20 to 40 who had UTIs has increased. This proportion rises for men between the ages of 60 and 80. The study's findings indicate that the frequency of UTIs in females was highest in the age range of 21 to 40, and that Cefotaxime was a very efficient antibiotic against all uropathogens.

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