

PREVALENCE OF UROPATHOGEN AND ANTIBIOTIC SUSCEPTIBILITY PROFILE OF UROPATHOGEN ISOLATED FROM URINE AT TERTIARY CARE HOSPITAL PESHAWAR

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Abstract

Urinary tract infection (UTI) is one of serious health problem and should be address on urgent basis. It is one of important cause of prolong stay of patients in hospitals and economic burden on society. UTI primarily affects the Urinary tract; along other parts of body. This was descriptive crosssectional study conducted at Khyber Teaching Hospital Peshawar, Pakistan design to determine the prevalence of Uropathogen in district Peshawar, Pakistan and to find out the antibiotic susceptibility profile of uropathogen. Total 131 Urine samples were collected from both male and females of all ages group who presents clinical sign and symptoms of urinary tract infection while antibiotic prophylaxis patients and patients who were unable to give sample excluded from the current study. Out of these 131 UTI patients there were 51 confirmed cases including 35 female and 21 males having mean age between 1-35 years were more effected as compared to other age group. AST profile showing that the most resistance antibiotic was Cefiod and most Sensitive antibiotic was amikacin against bacteria. From the current it was concluded the study showed that UTIs are the leading public-health problem mainly in women. In our study, the predominant isolated organisms responsible for UTI in Pakistan were *E. coli*, *Citrobacter* and *Morganella*. The majority of isolates were resistant to commonly prescribed antibiotics. Therefore, routine monitoring and surveillance are crucial for the better management of patients.

INTRODUCTION

Urinary Tract Infection (UTI)

When bacteria and viruses, among other microbial invaders, infiltrate the urinary tracts of people and animals, the result is a variety of urinary tract infections (UTIs). This word describes any location within the urinary system that harbors uropathogen, such as bacteria and viruses, which can cause infection (Klein and Hultgren, 2020).

Types of UTIS

The presence of pathogenic bacteria in the urine, bladder called cystitis is the most common lower urinary tract infection, urethra (infection of the urethra), kidney (pyelonephritis- infection of the kidneys) and vaginitis (infection of the vagina) and prostate is correlated with clinical indicators of urinary tract infection (UTI) (J.D. Sammon *et al*, 2022).

Prevalence of UTI in male and female

The UTI cases among females were commonly observed in the age group of 21-40 years and in males it was 41-60 years age group. (Bloukh SI,). were prevalent among females (82.1%) in the current study, with a female to male ratio of roughly 4:1. In females, UTI cases were typically seen in the age range of 21-40 years, whereas in men, the age range was 41-60 years. These outcomes agreed with the findings of another study (Razak SK). According to some studies, women are more likely than men to get UTIs (Prakash *et al*, 2022).

Prevalence of uropathogen through Worldwide

The current study looked at 300 urine samples and found E. Col in 167 of the study samples, meaning that 69.4% of individuals had the infection. In particular, ladies had significantly higher E. coli rates—50.2%—than males did (19.1%). Similar high prevalence rates of UTI in women have been reported in other research; rates in Turkey (82.30%), Iran (86.24%), Saudi Arabia (60.35%), Pakistan (69.80%), and Italy (60%) are only a few examples (Sabir *et al.*, 2014). UTIs are the second most common bacterial infection affecting individuals of different ages worldwide. (Najaf Abadi MP). (Sangsuwan *et al.*, 2021).

Pakistan

Studies were performed in the Pakistani states of Khyber Pakhtunkhwa and Punjab produced similar findings, showing that the incidence of UTIs was much greater in people 41 years of age and above (Ramzan *et al.*, 2004). The present study also revealed the age group 21-40 years as the most susceptible group to E. coli (69.4 %) among the uropathogen. Our findings based on age group are similar to the study conducted (Shabir *et al.* 2017) in Peshawar, Pakistan.

Khyber pakhtunkhwa(KPK)

According to our research, the prevalence of UTI in the Kohat region of Pakistan is 11.6% among symptomatic patients, 8.9% in men, and 13.8% in women. Similar studies have been conducted in different countries includes (Mando Khail *et al* 2022).

Most prevalent bacteria

The authors state that Gram-negative bacteria cause more than 80% of UTIs, with Grampositive bacteria responsible for the remaining 20%. With 60-90% of infections, *Escherichia coli* is the most common uropathogen. Staphylococcus species is the second most common, contributing 10-15% of UTIs. In addition, other bacterial species such as *Streptococcus*, *Proteus*, *Klebsiella*, *Neisseria*, *Corynebacterium*, and *Pseudomonas* are also isolated from patients with UTI also reported ((Ashur *et al* 2021).

Antibiotic Susceptibility

Augmentin, Amikacin, Ceftriaxone, Ciprofloxacin, Fosfomycin, Imipenem and Tazocin are persistently used for the treatment of UTIs in Pakistan. But among these antibiotic resistance and susceptibility profile differ in *E. coli*, *Klebsiella Pneumonia* and *Ps. aeruginosa*. Over 70% UTI associated *E. coli* have been found resistant to third generation cephalosporin (Farajniaet *al.*, 2009).

METHODOLOGY

Study Design

The current study was descriptive cross-sectional study was conducted at Khyber Teaching hospital Peshawar.

Study Place

The current study was conducted within the Microbiology department of Khyber Teaching hospital Peshawar.

Study Duration

The current study was completed with in duration of 5 months from 1st April to 30 August.

Sample Size

Total 131 urine sample were collected from UTI infected patients at Khyber Teaching Hospital Peshawar.

Sample Selection Criteria

Inclusion Criteria

Both male and female patients of all ages and who represent clinical sign and symptoms of UTI were included in the current study.

Exclusion Criteria

Antibiotic prophylaxis patients and those patients who were unable to give sample were excluded from the current study.

Sample Collection and Processing

Proper inform consent will be taken from the indoor UTI infected patients to give midstream urine sample in sterile container. This urine sample was processed for culture within 24 hours at microbiology laboratory. Samples containing bacteria were grown on Cystine Lactose Electrolyte Deficient Agar (CLED Agar) and incubate it over night after overnight incubation at 37°C the culture plat will observe for growth. After bacterial growth these bacterial colonies of *Morganella morganii* were re-culture on MacConkey agar for furthered differentiation of gram positive and gram-negative bacteria.

Antibiotic Susceptibility Testing

For antibiotic susceptibility testing Muller Hinton Agar (MHA) were used identify the antibiotic resistance profile as shown in figure 3. Accordingly same bacterial colonies were preserved for DNA extraction proper preservative media. Kirby Baur disc diffusion method was used to perform antibiotic susceptibility testing on colonies according to CLSI guidelines.

Statistical Analysis

All the statistical analysis of the current study was performed by using SPSS version 22.

RESULTS

Prevalence of Bacteria

Out of 131 patients there were total 51 positive cases of urinary tract infection and there were 80 negative cases of urinary tract infection. In the 51 positive case we found the prevalence of *Escherichia coli* 19.8 % (n=26) which is the most common among all uropathogen while the prevalence of *Citrobacter* was 13.7% (n=18) and *Morganella morganii* was 5.3%(n=7) as shown in table.1 showing the total prevalence of E coli 19 %, *Citrobacter* (13 %) and *Morgane morganii* 5%.

Tabel.1: Showing Prevalence of Uropathogen

| | Growth of Bacteria | |
|-------------------|--------------------|---------|
| | Frequency | Percent |
| <i>E-Coli</i> | 26 | 19.8 |
| <i>Citobacter</i> | 18 | 13.7 |

| | | |
|----------------------------|-----|-------|
| <i>Morganella Morganii</i> | 7 | 5.3 |
| No Growth | 80 | 61.1 |
| Total | 131 | 100.0 |

Gender wise Distribution of UTI

Out of 131 patient 41 patients were male and 90 patients were female as shown in table. In these 51 patients total male patients infected with UTI were 14(34%) while 90 female patients 37(41%) were infected with UTI. The prevalence of UTI was high in male.

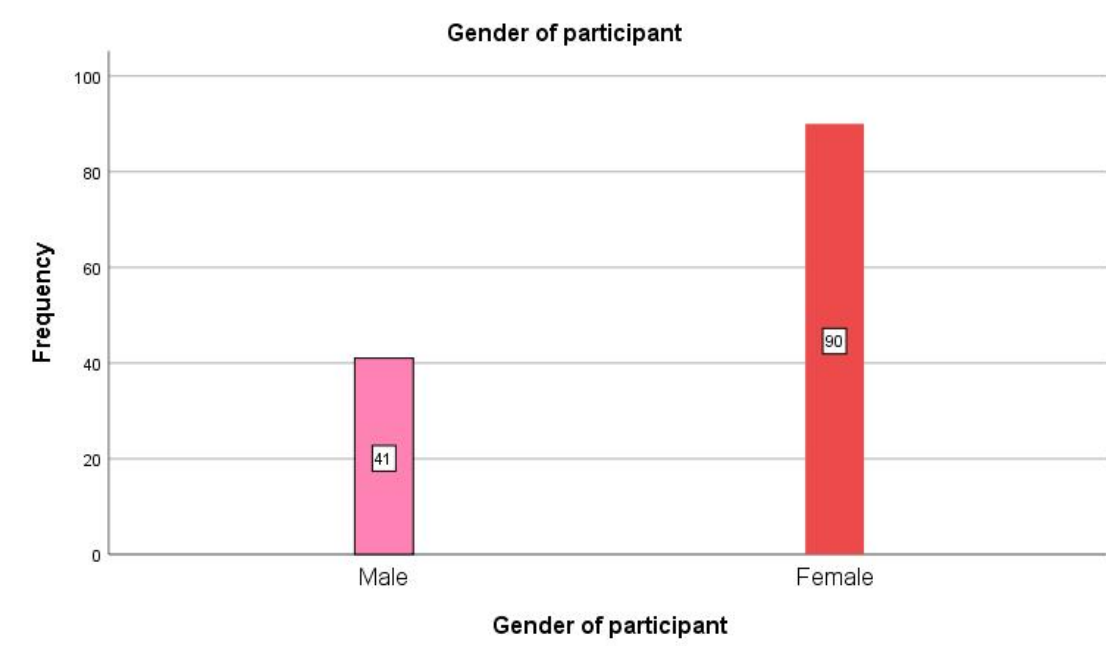


Fig.1. showing Gender of participants selected for the study

Age Wise Distribution of UTI

Out of 131 patients of UTI in the 1-30 years age between of UTI patients is 39- and 30-60years age between of UTI patients is 9- and 60-90years age between of UTI patients is 3. We conclude the UTI infects the 1-30 years individuals. Table show the age of participant.

Table 2: *Age Of Participants Selected For The Current Study*

| | | Age of Effected Participant | |
|-------------|----|-----------------------------|---------|
| | | Frequency | Percent |
| 1-30 years | 39 | 76.5 | |
| 30-60 years | 9 | 17.6 | |
| 60-90 years | 3 | 5.9 | |
| Total | 51 | | |

Antibiotic Resistance Profile

Nine different kinds of antibiotic were used against *E. coli*, *Morganella morganii*, *Citrobacter*. Which includes Amoxicillin, Amikacin, Moxifloxacin, Aztreonam, Cefotaxime, Norfloxacin, Cefixime, Cefpodoxime, and Ciprofloxacin. The zone of inhibition of these antibiotics were measured and compared with guidelines

provided by clinical and laboratories slandered institute is shown in table. Total 26 isolate *E. coli*, 18 *Citrobacter*, and 7 *Morganella Morganii*. Were tested against this antibiotic among these all-isolate bacteria were at least resistance to one of 9 antibiotics which were tested is shown in the table NO. The most frequently antibiotics to which *E. coli*, *Citrobacter* and *M. morganii*, were resistant include Cefpodoxime 90%, followed by Aztreonam 74%, Ceficxime 56%, Amoxicillin 56%, Norofloxacin 52%, Ciprofloxacin 49%, Aztreonam 47%, and Amikacin 13%. Isolate of *E. coli*, *Citrobacter*, *M. Morganii* were more susceptible to Amikacin 86%, Aztreonam 52%, Cefprofloxacin 51%, Norfloxacin 47%, Amoxicillin 43%, Ceficxime 43%, Cefotaxime 33%, moxifloxacin 25%, Cefpodoxime 9% is shown in the table. Among all these antibiotics the most resistant antibiotic was Cefpodoxime and the most Sensitive

Table 3: *Showing AST Profile of Selected Antibiotics against Uropathogen*

| | | AST Profile | | |
|------------------------|---------------|-------------|--------------|------------|
| | | Sensitive | Intermediate | Resistance |
| List of Antibiotics | Amoxicillin | 43% | 20 | 56% |
| | Amikacin | 86% | | 13% |
| | Moxifloxacin | 25% | | 74% |
| | Aztreonam | 52% | | 47% |
| | Cefotaxime | 33% | | 66% |
| | Norfloxacin | 47% | | 52% |
| | Ceficxime | 43% | | 56% |
| | Cefpodoxime | 9% | | 90% |
| | Ciprofloxacin | 51% | | 49% |

DISCUSSION

Urinary tract infection one of serious health problem and should be address on urgent basis. It is one of important cause of prolong stay of patients in hospitals and economic burden on society. UTI primarily affects the Urinary tract; along other parts of body. It was descriptive crosssectional study conducted at Khyber Teaching Hospital Peshawar, Pakistan design to determine the prevalence of Uropathogen in district Peshawar, Pakistan and to find out the antibiotic susceptibility profile of uropathogen. Total 131 Urine samples were collected from both male and females of all ages who presents clinical sign and symptoms of urinary tract infection while antibiotic prophylaxis patients and patients who were unable to give sample excluded from the current study. Out of these 131 UTI patients there were 51 confirmed cases including 35 female and 14 males having mean age between 1-35 years were more effected as compared to other age group. AST profile showing that the most resistance antibiotic was Cefiod and most Sensitive antibiotic was amikacin against bacteria.

A study conducted by (Wubalem Desta Seifuet *al* 2021) that the overall prevalence of UTI was 90.1%. In accordance with the prevalence of UTI is higher in females (63.3%) than males (26.8%) This might be due to the anatomical differences of urogenital organs between the two sexes. Prevalence difference has been also observed among various age groups. This difference suggests that age is one risk factor associated with UTI. The high incidence of UTI amongst the old age group could be due to genito-urinary atrophy and vaginal prolapse after menopause in female which in turn increases the risk of

bacteriuria by increasing vaginal pH and decreasing vaginal *Lactobacillus* thereby allowing gramnegative bacteria to grow and act as uropathogen. Moreover, it was indicated in another study that UTI is the most common infection in elderly populations. The high prevalence recorded amongst young age group could be due to increased sexual activity in the age group. Fever, dysuria, urgency, frequency, flank pain and suprapubic pain were the observed clinical symptoms in our study and is comparable with report of . In contrast, dysuria and flank pain were symptoms statistically not significant. Even though statistically not significant, flank pain was the symptom in which positive cases were noted in 200 (57.8%) patients, next to supra-pubic pain and urgency. Bacterial species were the more prevalent uropathogen compared to other groups of microbes. This result is in accordance with that reported by which indicated that among different microorganisms causing UTIs, bacteria accounts for more than 95% and the rest may also include fungal and viral infections.

CONCLUSION

The study showed that UTIs are the leading public-health problem mainly in women. In our study, the predominant isolated organisms responsible for UTI in Pakistan were *E. coli*, *Citrobacter* and *Morganella*. The majority of isolates were resistant to commonly prescribed antibiotics. Therefore, routine monitoring and surveillance are crucial for the better management of patients.

RECOMMENDATION

- Provide ongoing education and training for healthcare professionals on the importance of antibiotic resistance, appropriate antibiotic prescribing practices, and adherence to infection control policies.
- Encourage further research into novel treatments and alternative therapies for UTIs and foster collaboration between microbiologists, clinicians, and pharmacists to develop comprehensive strategies for managing antibiotic resistance.
- Incorporate resistance patterns into stewardship initiatives to promote judicious antibiotic use and prevent the emergence of resistance.

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