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INVESTIGATION OF UTIS CAUSING BACTERIA AND THEIR SENSITIVITY PROFILE AMONG THE POPULATION OF BAHRAIN SWAT

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ABSTRACT

Background: *In Pakistan, urinary tract infections (UTIs) are among the most prevalent bacterial infections. Antibiotics resistance is increasing quickly which has led to a shortage of accessible treatment choices.*

Objective: *The purpose of this study was investigation of UTIs causing bacteria and their antibiotics susceptibility pattern in the population of Bahrain swat*

Methodology: *The current cross sectional study was carried out at the department of Microbiology, GDC Madyan Swat for a period of six months from December 2023 to May 2024. Urine samples from the suspected patients were collected in sterile urine bottles. All the samples were cultures on CLED media. Bacterial species causing UTIs in population were identified based on microscopy and biochemical tests. Antimicrobial susceptibility tests were performed on bacterial isolates using Kirby-Bauer disc diffusion method. All the data was analyzed by using SPSS version 24.*

Results: *In our study, a total of 200 patients were enrolled. Amongst 200 patients, 50 (25%) urine samples were culture negative while 150 (75%) samples were culture positive. E.coli, staphylococcus saprophyticus, staphylococcus aureus, Enterococus faecalis, pseudomonas aeruginosa , proteus mirabilis and klebsiella pneumonia were the bacterial species isolated from the individuals studied. The most frequent bacterial specie responsible for UTI was Escherichia coli and the least frequent was Enterococus faecalis. Majority of the isolates showed resistant to the test antibiotics in the study however among the tested antibiotics imipenem was the most effective antibiotics.*

Conclusion: *Our study concludes that the prevalence of UTIs is high (75%) amongst people of Bahrain Swat. Our findings also showed that the isolates were resistant to majority of the antibiotic. As a result, management plans based on uropathogen susceptibility patterns must be developed. Furthermore, it is necessary to properly educate the public on the cause of disease spread and preventative measures.*

Keywords: *Urinary Tract infection, Isolation, Identification, Sensitivity profile.*

INTRODUCTION

Urinary tract infection includes both microbial colonisation of urine and tissue invasion of any urinary tract structure. Bacteria are typically responsible, however yeast and viruses may also be implicated (1,2). The urinary system is made up of the kidneys, ureters, bladder, and urethra, and it filters blood by removing waste and excess water. The urinary system is a key mechanism for eliminating metabolic waste products from circulation. Others The system's critical functions include managing blood pressure and volume as well as regulating ion and solute concentrations in the blood to normal levels (3, 4). Urinary tract infections, or UTIs, are among the world's most frequent infectious diseases, affecting 150 million individuals each year. UTIs are associated with significant morbidity and substantial medical expenditures, with estimates putting the yearly economic impact of recurrent UTIs in the United States at over $5 billion (5,6). Even if the symptoms vary depending on the site of the infections, UTIs have a negative impact on patients' relationships, affecting both personal and social aspects, which lead to a low quality of life (7-10). Gram-negative bacteria are the predominant cause of UTIs; however, Gram-positive bacteria may also play a role in UT infections (11,12). These infections can be separated into lower UTIs (cystitis) and upper UTIs (pyelonephritis), and as the clinical state of the patient grows more acute, the microorganism's invasion of the urinary system becomes higher (13). Many earlier investigations have demonstrated that E. coli is the most prevalent etiological agent of UTI in both hospitalised and community-acquired infections. Hospital-acquired UTI has also been generally associated with a greater incidence of enterococci and Coagulase-negative Staphylococci(14) viridins, Streptococcus agalactiae, Pseudomonas aeruginosa , klebsiella pneumoniae streptococci, Klebsiella oxytoca, , Proteus mirabilis , Citrobacter freundii, Enterobacter cloacae, and Staphylococcus aureus have also been identified as the causative agents of UTI (15-18). Under normal conditions, the UT is resistant to bacteria' long-term colonisation and growth (19). Bacteria are mostly responsible for UTIs, with fungi and viruses playing minor roles. Candida albicans is the most prevalent fungus responsible for urinary tract infections. Type 1 human Polyomavirus, Cytomegalovirus, and herpes simplex virus are the most common causes of viral UTIs (20). The majority of UTIs are asymptomatic, and patients can go about their daily lives unaware that they have an infection (21). However, in certain situations, the symptoms may become severe, making it difficult for the patient to carry out his or her everyday activities owing to discomfort and suffering (22). In such instances, it is recommended that you seek medical assistance as soon as possible so that the disease can be properly recognised and treated. Symptoms of a UTI include frequent urination, painful urination, and murky or red urine (23). Lower UTIs are typically characterised by pain during urination with or without frequency, pain in the suprapubic region, or visible haematuria. Upper urinary tract infections (UTIs) are characterised by fever (>100°F), flank pain, chills, vomiting, costovertebral angle soreness, nausea, and cystitis (24). Fever is not common in lower UTIs and is typically associated with more complicated UTIs (25). Because the number of UTI-causing organisms varies by region, antibiotic resistance and sensitivity patterns must be investigated. It is critical for public health to continuously and periodically evaluate the local prevalence of uropathogens and their susceptibility profile in order to support the appropriate use of traditional antibiotics (26).

MATERIALS AND METHODS

The current cross sectional study was carried out at the department of Microbiology government college madyan swat for a period of six months from December 2023 to May 2024. In this study urine samples from suspected patients of UTIs, were collected in sterile urine bottles. All the samples were cultures on CLED media bacterial species causing UTIs in a population were identified based on microscopy and biochemical tests. To check the antibiotic sensitivity we used Kirby Bauer disc diffusion method. We used commercially available antibiotics disks that includes; cefotaxime (30 µg), Amikacin (30 µg), tylosin (30 µg), imipenem (10 µg), colistin (10µg), trimethoprim – sulfamethoxazole (1.2µg-23.4 µg), and amoxcylin (30 µg) were used in antibiotic resistance tests. The CLSI recommendations were followed in measuring the inhibition zone diameter after 24 hours. All the data was analyzed by using SPSS version 24.

RESULT

The present study was conducted on the isolation, characterization and antibiotic sensitivity of UTI causing bacteria in the natives of Tehsil Bahrain district Swat. In our study, a total of 200 patients were enrolled. Amongst 200 patients, 50 (25%) urine samples were culture negative while 150 (75%) samples were culture positive. In our study 70 (35%) patients were male while female patients were 130 (65%). (Figure 1)

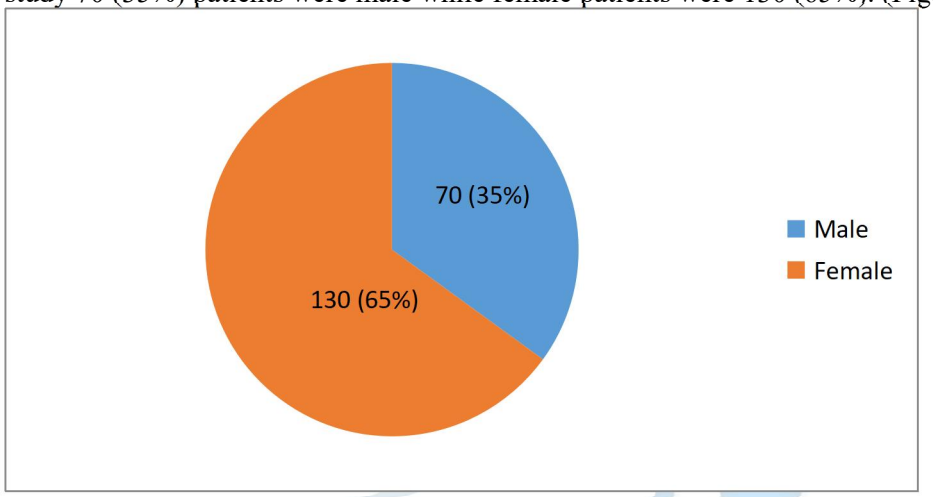

Figure 1: Gender wise distribution of patients

Identification of UTI Causing Bacterial Species

E.coli, staphylococcus saprophyticus, staphylococcus aureus, Enterococus faecalis , pseudomonas aeruginosa , proteus mirabilis and klebsiella pneumonia were the bacterial species isolated from the individuals studied. The most frequent bacterial specie responsible for UTI was Escherichia coli and the least frequent was Enterococus faecalis. (Table 1)

Table 1: Bacterial species identified from different samples

Specie identified	Frequency (%)
Staphylococcus saprophyticus	10(5%)
Echerichia coli	90(45%)
Staphylococcus aureus	10(5%)
Enterococus faecalis	10(5%)
Pseudomonas aeruginosa	30(15%)
Proteus mirabilis	10(5%)
Klebsiella pneumoniae	40(20%)

Antimicrobial susceptibility profiles of selected isolates

The resistant to different antibiotics in the isolated bacterial species were evaluated by using disk diffusion method. Majority of the isolates showed resistant to the test antibiotics in the study. Majority of antibiotics became ineffective due to resistance however among the tested antibiotics imipenem was the most active antibiotic. (Table 2, 3 and 4)

Table 2: Antibiotics susceptibility pattern of Echerichia coli in urine samples

Antibiotics	Resistant	susceptible
Amikacin	15(10%)	135(90%)
cefoxtime	15(10%)	135(90%)
imipenem	0(0%)	150(100%)
tylosin	30(20%)	120(80%)

trimethoprime	45(30%)	105 (70%)
colistin	38(25%)	112(75%)
amoxcilin	45(30%)	105(70%)

Table 3: Antibiotics susceptibility pattern of Klebsiella pneumoniae in urine samples

Antibiotics	Resistant	susceptible
Amikacin	45(30%)	105(70%)
cefoxtime	38(25%)	112(75%)
imipenem	15(10%)	135(90%)
tylosin	0	0
trimethoprime	60(40%)	90(60%)
colistin	75(50%)	75(50%)
amoxcilin	30(20%)	120(80%)

Table 4: Antibiotics susceptibility pattern of Pseudomonas aeruginosa in urine samples

Antibiotics	Resistant	susceptible
Amikacin	53(35%)	97(65%)
cefoxtime	75(50%)	120(80%)
imipenem	45(30%)	105(70%)
tylosin	0	0
Trimethoprime	83(55%)	67(45%)
colistin	83(55%)	67(45%)
Amoxcilin	0	0

DISCUSSION

Gram-negative bacteria accounted for the majority of uropathogens detected in the samples (76.9%) in the current investigation. These findings are in line with those of earlier research conducted in Ethiopia, Canada, Iran (27) and Pakistan (28). Escherichia coli was the most prevalent identified gram-negative uropathogen (45%). Studies conducted in other regions of Pakistan have likewise revealed a 59%–80% preponderance of E. coli isolates (29-33). These findings correspond with earlier research from West Ethiopia (33.3%), Iran (74.6%), Uganda (41.9%), Lebanon (79.4%), India (48.6%), Poland (73.0%), and Uganda (37.9%) (48). Our research findings are in accordance with findings of previous study that identified Klebsiella species as the second most significant isolate after Escherichia coli. Staphylococcus aureus was the most common isolate among gram-positive bacteria in our investigation, which is consistent with earlier research from Kohat, Pakistan (35), and China.(37). Pseudomonas aeruginosa, the third most prevalent gram-negative bacteria in our investigation, is in line with findings from Rawalpindi, Pakistan (26). There might be a number of reasons for this variation in the kind of bacterial isolates, including population hygiene habits, sampling techniques, location, and sample population.

Escherichia coli showed resistance to several antibiotics in our study. Additionally other microorganisms also showed resistance to antibiotics. This suggests that using antibiotics to treat UTIs is not appropriate. These findings concur with those of earlier research conducted in Ethiopia and Iran (34,27,38). The susceptibility of the gram negative bacterial isolates in this investigation to imipenem was consistent with a prior Pakistani research (26). Staphylococcus aureus was one of the gram-positive isolates that had resistance to more antibiotics. This is consistent with an earlier Ethiopian research (34). The current study's findings of the higher sensitivity of gram-positive isolates to linezolid are consistent with those of a prior Pakistani study (26). Antibiotics are widely accessible at pharmacies across our nation, with no discrimination. Thus, trends in self-medication behaviors and inappropriate and inefficient antibiotic treatment may be the main causes of antibiotic resistance. The study found that the older age group (>55 years) had a greater prevalence. The

findings of earlier research conducted in India (36,39), where the frequency was high among old patients, are consistent with this.

CONCLUSIONS

Our study concludes that the prevalence of UTIs is high (75%) amongst people of Bahrain Swat. Our findings also showed that the isolates were resistant to majority of the antibiotic. As a result, management plans based on uropathogen susceptibility patterns must be developed. Furthermore, it is necessary to properly educate the public on the cause of disease spread and preventative measures.

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