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Research Article

A PROSPECTIVE OBSERVATIONAL STUDY ON ANTIBIOTIC PROFILE IN URINARY TRACT INFECTIONS IN PATIENTS WITH CO-MORBID CONDITIONS

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ABSTRACT

The prevalence of urosepsis as a complication of UTI was the most among 120 patients with the percentage of (22.5%) in the patients of internal medicine department. Prevalence of male (52%) was found to be higher compared to the female (48%) patients along with greater prevalence of complicated UTI cases (47.5%). Most of the patients suffered from symptoms of Abdominal pain 90 (75%) followed by burning micturition 61 (50%) One of the most isolated bacteria during the study period was E.coli (47.3%) followed by Klebsiella pneumonia (28.07%).The highest probability of UTI occurrence in relation to the age is 0.25 showing that the most prone age group to get UTI is of 50-60 years of age group. The most common prescribed antibiotic were third generation cephalosporin's and meropenem. Nitrofurantoin were prescribed in treatment of Recurrent UTI cases to treat resistant bacteria.

INTRODUCTION

The phrase "urinary tract infection" (UTI) is a general term that refers to an infection, usually bacterial in aetiology, anywhere along the urinary tract from the urethral meatus to the perinephric fascia. Structures in this pathway include the urethra, bladder, ureters, and the renal pelvis and parenchyma. Associated structures that also become infected and that may serve as foci of recurrent UTI are the prostate, epididymis, and perinephric fascia. Specific types of urinary tract infection include urethritis, an infection limited to the urethra; cystitis, an infection of the bladder; and pyelonephritis, a more extensive infection involving the upper urinary tract structures. (Barnett, B. J., & Stephens, D. S.1997)

UTI is most commonly bacterial, but fungal, viral and parasitic infections can occur. Infection of the bladder causing cystitis is the most common UTI but infection can occur in other parts of the urinary tract, causing pyelonephritis, urethritis and prostatitis. Bacterial colonization of the urinary tract is not always symptomatic and asymptomatic bacteriuria is a common finding in women and the elderly. UTI can be classified as complicated or uncomplicated. Uncomplicated UTI occurs in the absence of any anatomical or functional abnormality within the urinary tract and is the commonest type of infection. Complicated UTI occurs in the presence of an abnormal urinary tract or other factor that increases susceptibility to infection. (Neil S. Sheerin 2011)

Urosepsis is defined as sepsis caused by an infection in the urogenital tract in urosepsis, as in other types of sepsis, the severity of sepsis depends mostly upon the host response. Patients who are more likely to develop urosepsis include elderly patients; diabetics; immunosuppressed patients, such as transplant recipients; cancer patients receiving chemotherapy or corticosteroids; and patients with acquired immunodeficiency syndromes. However, all patients can be affected by bacterial species capable of inducing inflammation within the urinary tract. Sepsis is a systemic response to infection. The signs and symptoms of systemic inflammatory response syndrome (SIRS), which were initially considered to be 'mandatory' for the diagnosis of sepsis, are now considered to be alerting symptoms. (Mulvey, Matthew A.; Klumpp, David J.; Stapleton, Ann E. (2017).

UTI is diagnosed using a combination of urinary symptoms and urine culture demonstrating numbers of a known uropathogen above a given threshold (usually defined as >1,000 cfu/ml of urine, but thresholds as low as 100 cfu/ml and as high as 100,000 cfu/ml are also used). However, urinary symptoms and bacteriuria frequently occur independently of each other: ~20% of women presenting with 'classic' UTI symptoms have

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negative urine cultures.3 significant numbers of bacteria are often found in the urine of otherwise healthy, asymptomatic individuals. The risk of asymptomatic bacteriuria increases following sexual activity and with advancing age. Although asymptomatic bacteriuria increases the risk of symptomatic UTI, it should not be treated except in those who are pregnant or undergoing invasive genitourinary procedures, as symptomatic UTI often follows in these patients. Furthermore, treatment of asymptomatic bacteriuria can potentially cause harm by adversely affecting the individual's microbiota and selecting for antibiotic resistant organisms (described below). Urinary symptoms, particularly increased frequency and urgency, are also very common, and often occur independently of infection. Asymptomatic microhematuria has been observed among otherwise healthy women and men in the absence of infection, with no apparent cause or long-term effects. (Foxman, B. 2010)

DM has been identified as an independent risk factor for UTI in women. Impaired local host defence mechanisms are thought to be the underlying cause. Not only are UTIs more prevalent in patients with DM, but the clinical manifestations and impact of infections are also more intense. Amongst the causative pathogens, the prevalence of E. coli is reported to be lower than in patients without DM, but the resistance profile does not differ from what is found in the general population of patients with UTI. Diagnosis of UTIs in patients with DM poses no additional challenges. However, there is a risk that the infection may progress to serious clinical vignettes for which the clinician should be vigilant for timely diagnosis. These include progression of the infection to more severe stages of UTI or the development of emphysematous cystitis and pyelonephritis. Other factors that further increase the risk of more severe UTI in patients with type 2 diabetes aged >45 yr. are: chronic antibiotic consumption, more than six physician contacts during the previous year, renal disease, urinary incontinence, and age >60 yr. Indeed, a recent study showed that DM acts as a complicating factor only in the presence of other comorbidities The underlying reasons for the higher risk of UTI in patients with chronic kidney disease are thought to be an altered host reaction and anatomic and functional disorders of the urinary tract. The alteration in host protective functions is thought to be due to: Loss of antibacterial properties of the urine; Mild immunosuppression in uraemia; and Inhibition of protective mucosa production in the urothelium. Evidence of a correlation between chronic kidney disease and higher UTI risk is most solid for autosomal dominant polycystic kidney disease (ADPKD) and chronic kidney disease associated with stone disease. Infectious complications in kidney transplant recipients are associated with higher morbidity and mortality. UTIs are the most common infections, with a reported rate of 45-72%. Varying definitions of UTI are the main reasons for the wide range of UTI rates reported for transplant patients. Ongoing improvements in kidney transplantation technique and immunosuppressive regimens also influence UTI rates, and frequent updates of surveillance studies are necessary. It is estimated that half of kidney transplant patients will develop a UTI within 3 yr. of transplantation. Age has been identified as an independent risk factor for late-term post-transplantation UTI. However, no such relationship was identified in a recent study. All published reports on adults demonstrated that females had a higher risk of both acute and recurrent UTI. In the paediatric population, the risk is higher among males. Other risk factors identified are a longer pre transplantation dialysis time and urinary tract obstruction (Tandogdu, Z., Cai, T., Koves, B., Wagenlehner, F., & Bjerklund-Johansen, T. E. 2016)

Fluoroquinolones are broad-spectrum antibiotics and can be used for both Gram-positive and Gram-negative bacteria. For example, fluoroquinolones are considered one of the first-line antibiotics for acute uncomplicated cystitis. In general, fluoroquinolones are well-tolerated. However, the use of fluoroquinolones in UTIs is not recommended in children because of potential adverse effects, such as arthralgia and arthropathy. Fluoroquinolones are also contraindicated during pregnancy because of potential damage to foetal development. More recently, the molecule configurations of fluoroquinolones have been modified to produce new generations of antibiotics. For example, sitafloxacin is the newest-generation fluoroquinolone. The most frequently used fluoroquinolones include ciprofloxacin, levofloxacin, norfloxacin, ofloxacin, and gatifloxacin. (Chao YS, Farrah K. 2019)

MATERIALS AND METHODS

Place of Study: Tertiary Hospital.
Study Design: Prospective Observational Study
Duration of Study: 6 months.
Inclusion Criteria: All Inpatients and outpatients diagnosed with Urinary Tract Infections and other comorbid conditions. Patients who are ready to give consent.
Exclusion Criteria
Paediatric patients
Patient less than 18 years are excluded.
Patients who are not willing to participate.
Source of Data: Patient data collection form and patient counselling form.
Method of Data collection: Patient profile form and patient counselling form.

RESULTS

DISTRIBUTIUION OF PATIENTS BASED ON GENDER

The distribution of patients according to their gender is illustrated in the pie chart given below.

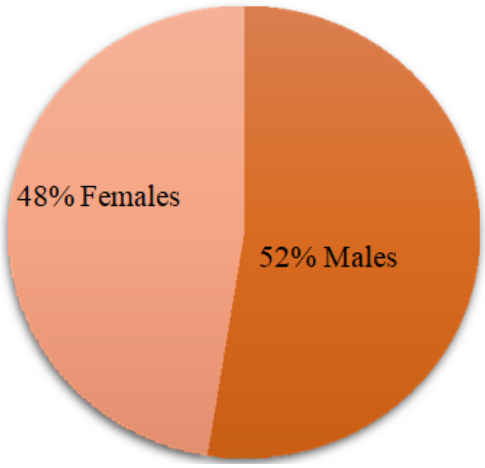

Fig.1

UTI was found to be common in male (52%) patients compare to female (48%) patients as most of the collected cases were complicated UTIs which occur to a greater extent in males than female

DISTRIBUTION OF PATEINTS BASED ON SIGNS AND SYMPTOMS

The patients were distributed based on their signs and symptoms. The data is represented graphically below.

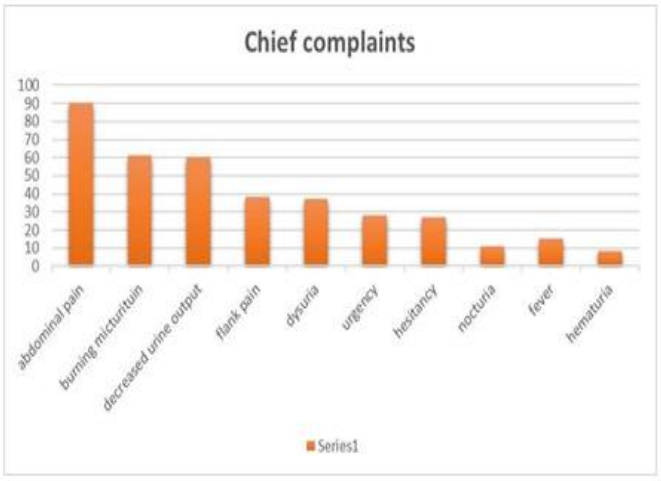

Fig.2

According to the study most of the patients suffered from symptoms of Abdominal pain 90(75%) followed by burning micturition 61 (50%) and others symptoms.

DISTRIBUTION OF PATIENTS BASED ON THE COMPLICATIONS

Patients were distributed based on the prevalence of complications illustrated in a pie chartbelow.

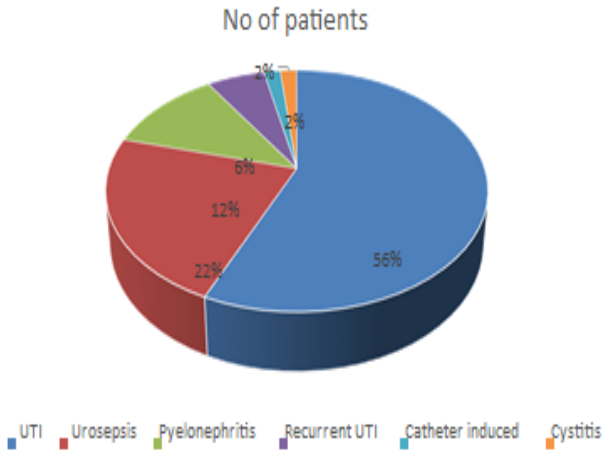

Fig.3

The prevalence of urosepsis as a complication of UTI was the most among 120 patients with the percentage of (22.5%) Following Pyelonephritis with the percentage of (11.6%)

DISTRIBUTION OF PATEINTS BASED ON DIFFERENT AGE GROUP.

Patients were distributed based on different age groups illustrated graphically below.

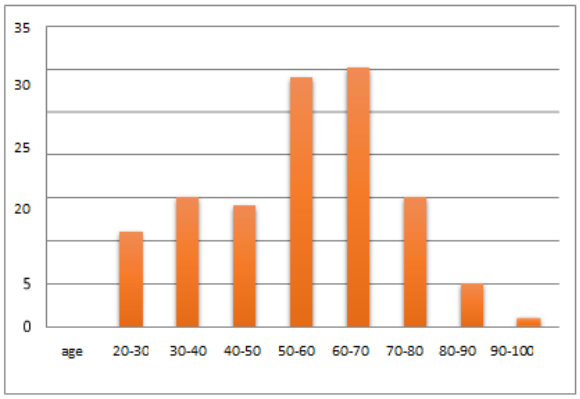

FIG.4

UTI was most prevalent in patient of age between 60-70 years i.e. out of 120 patients, 30 (25%) patients were of this age group while least age group being between 90-100 i.e. 1 patients (1%).

DISTRIBUTION OF PATEINTS BASED ON REGION

Patients were distributed based on various classification are illustrated in a pie chart below.

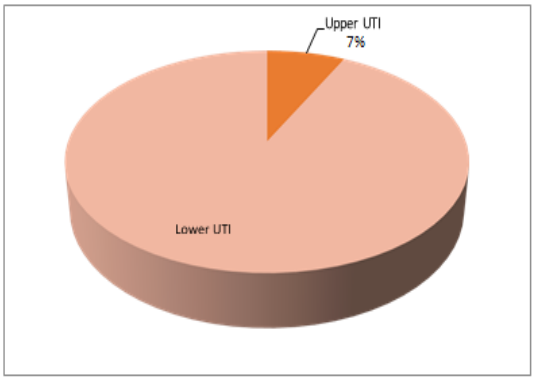

Fig. 5

According to the study most of the patients suffered from lower UTI symptoms suchas burning micturition, abdominal pain and urinary incontinence.

DISTRIBUTION OF PATIENTS BASED ON CAUSATIVE ORGANISMS

Patients were distributed based on their causative organisms and are illustrated in a pie chartbelow.

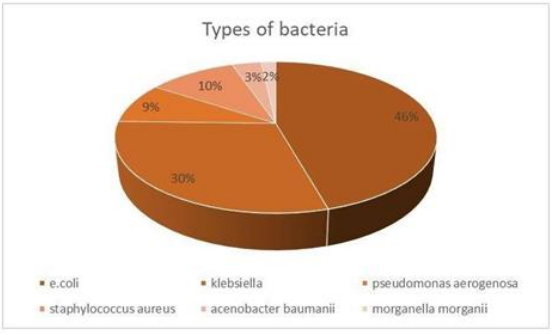

Fig. 6

Out of 57 isolates majority were E.coli (47.3%) followed by Klebsiella pneumonia (28.07%) with least of Morganella

morganii (1.75%).Most of the urine culture reports shows the presence of single type of bacterial infection.

DISTRIBUTION OF PATEINTS BASED ON TYPES

Patients were distributed based on the type of UTI they were suffering with and are illustrated in apie chart below:

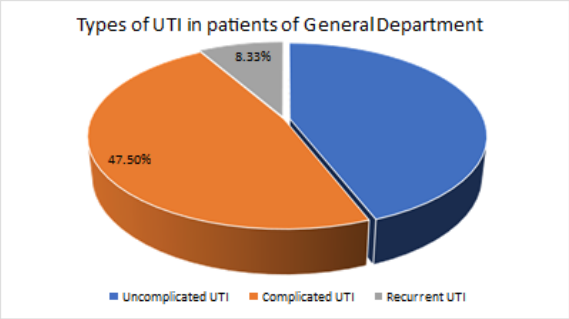

Fig.7

The highest number of cases i.e. 47.5% were complicated UTI suffering from predisposing factors, 44% cases were uncomplicated UTI but still admitted to avoid further worsening of condition and to avoid infections.

DISTRIBUTION OF PATIENTS BASED ON PHARMACOLOGICAL TREATMENT

All the classes of drugs used to treat UTI are illustrated graphically below

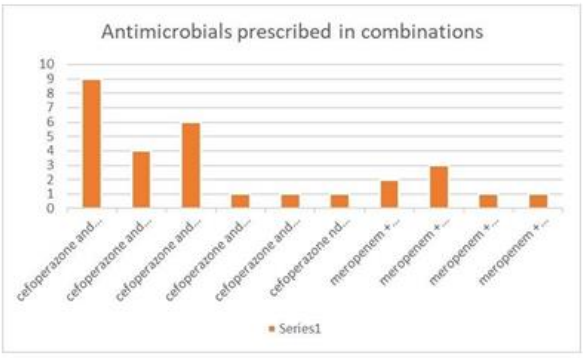

Fig. 8

The most common antibiotics prescribed were **Cefperazone** and **sulbactam +Meropenem.**

DISTRIBUTION OF PATIENTS BASED ON COMBINATION OFANTIMICROBIALS:

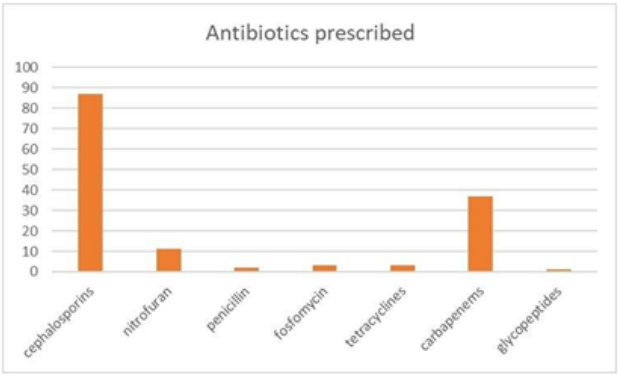

Fig.9

The commonly prescribed antibiotics were third generation cephalosporins (75%) (Cefpodoxime, Ceftriaxone, cefoperazone). Followed by Meropenem these two are the most common drugs prescribed during 6 months study.

Management of UTI in comorbid conditions

Table 1 Management of UTI in comorbid conditions

UTI with comorbid conditions	Comments
UTI with Diabetes Mellitus or HTN orCKD	Usually cephalosporins were preferred along with nitrofurantoin, carbapenems and other drugs.
Catheter related UTI	The catheters were removed and changed and suitable antibiotic treatment gets started.
UTI with respiratory tract infections	Doxycycline is the most preferred antibiotic as it is a broad spectrum antibiotic which treats pneumonia.
UTI along with pregnancy	To treat UTI in pregnancy mainly cefpodoxime were given.

DISCUSSION

In our study, we found that patients who were suffering with different co-morbid conditions along with UTI, were given respective medications according to their needs .The patients included in our study were of age between 20-90years. Urosepsis was the most common UTI consequence among 120 patients, with a proportion of 22.5% in the patients of the internal medicine department. Male patients were found to have a higher prevalence (52%) compared to female patients (48%) while complicated UTI cases were reported to have a higher frequency (47.5%). Abdominal discomfort 90 (75%) and burning urination 61 (50%) were the two most common complaints among the patients. Antibiotic treatment should begin after finding the presence of bacteria in the urine, urine culture sensitivity testing was performed on 57 patients to detect the presence of microbes after starting antibiotic treatment.

E. coli (47.3%) and Klebsiella pneumonia (28.07%) were two of the bacteria that were isolated the most throughout the duration of study. The highest probability of UTI occurrence in relation to age is 0.25, indicating that people between the ages of 50 and 60 are most at risk.

CONCLUSION

The study found that highly sensitive and prophylactic treatment for UTI was prescribed, with antibiotics like third-generation cephalosporins and carbapenem. Patients with Comorbid conditions were treated with third-generation cephalosporins and Meropenem, while recurrent cases required Nitrofurantoin for resistant bacteria.

References

Barnett, B. J., & Stephens, D. S. (1997). Urinary Tract Infection: An Overview. The American Journal of the Medical Sciences, 314(4), 245-249.

Neil S. Sheerin (2011). Urinary tract infection. , 39(7), 384-389.

Mulvey, Matthew A.; Klumpp, David J.; Stapleton, Ann E. (2017). Urinary Tract Infections (Molecular Pathogenesis

and Clinical Management) || Urosepsis: Overview of the Diagnostic and Treatment Challenges. , 10.1128/9781555817404(), 135-157.

Foxman, B. (2010). The epidemiology of urinary tract infection. Nature Reviews Urology, 7(12), 653-660.

Tandogdu, Z., Cai, T., Koves, B., Wagenlehner, F., & Bjerklund-Johansen, T. E. (2016). Urinary Tract Infections in Immunocompromised Patients with Diabetes, Chronic Kidney Disease, and Kidney Transplant. European Urology Focus, 2(4), 394-399.

Chao YS, Farrah K. Fluoroquinolones for the Treatment of Urinary Tract Infection: A Review of Clinical Effectiveness, Cost-Effectiveness, and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2019 Apr 26.

Saliba, W., Nitzan, O., Chazan, B., & Elias, M. (2015). Urinary tract infections in patients with type 2 diabetes mellitus: review of prevalence, diagnosis, and management. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 129.

Kumar Prajapati, A. (2019). Urinary Tract Infection in Diabetics. Microbiology of Urinary Tract Infections - Microbial Agents and Predisposing Factors.

Flores-Mireles, A. L., Walker, J. N., Caparon, M., & Hultgren, S. J. (2015). Urinary tract infections: epidemiology, mechanisms of infection and treatment options. Nature Reviews Microbiology, 13(5), 269-284.

Turck, M., Browder, A. A., Lindemeyer, R. I., Brown, N. K., Anderson, K. N., & Petersdorf, R. G. (1962). Failure of Prolonged Treatment of Chronic Urinary-Tract Infections with Antibiotics. New England Journal of Medicine, 267(20), 999-1005.

Puca, E. (2014). Urinary Tract Infection in Adults. Clinical Microbiology: Open Access, 03(06).

Al Yousef SA, Younis S, Farrag E, Moussa HSh, Bayoumi FS, Ali AM. Clinical and Laboratory Profile of Urinary Tract Infections Associated with Extended Spectrum β-Lactamase Producing Escherichia coli and Klebsiella pneumoniae. Ann Clin Lab Sci. 2016 Jul;46(4):393-400. PMID: 27466299.

Kemnic TR, Coleman M. Trimethoprim Sulfamethoxazole. [Updated 2022 Nov 28]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023

Killgore KM, March KL, Guglielmo BJ. Risk Factors for Community-Acquired Ciprofloxacin-Resistant Escherichia Coli Urinary Tract Infection. Annals of Pharmacotherapy. 2004;38(7-8):1148-1152.

Kang CY, Chaudhry OO, Halabi WJ, et al. Risk Factors for Postoperative Urinary Tract Infection and Urinary Retention in Patients Undergoing Surgery for Colorectal Cancer. The American Surgeon™. 2012;78(10):1100-1104

Desforges, J. F., Stamm, W. E., & Hooton, T. M. (1993). Management of Urinary Tract Infections in Adults. New England Journal of Medicine, 329(18), 1328-1334.

McLellan, L. K., & Hunstad, D. A. (2016). Urinary Tract Infection: Pathogenesis and Outlook. Trends in Molecular Medicine, 22(11), 946-957.

Schmiemann, G., Kniehl, E., Gebhardt, K., Matejczyk, M. M., & Hummers-Pradier, E. (2010). The Diagnosis of Urinary Tract Infection. Deutsches Aerzteblatt Online.

Mythri Shankar, Shashikala.N, Megal, M., Mythri.K.M, & Kowsalya R. (2020). Clinical and microbiological profile of urinary tract infection in chronic kidney disease population. International Journal of Medical Science And Diagnosis Research, 4(6)

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