

An Observational Analysis on the pattern of the prescriptions in Urinary tract Infections**Ranjeet Kumar¹, Rahul Kewal Kumar^{2*}, Sweety Kumari³**¹*Associate Professor, Department of Pharmacology, Raipur Institute of Medical Sciences, Raipur, CG, India*²*Assistant Professor, Department of Community Medicine, Raipur Institute of Medical Sciences, Raipur CG, India*³*Tutor, Department of Microbiology, Raipur Institute of Medical Sciences, Raipur CG, India***Received: 19-11-2020 / Revised: 12-12-2020 / Accepted: 28-12-2020****Abstract**

Introduction : UTI can present as several syndromes associated with an inflammatory response to microbial invasion and can range from asymptomatic bacteriuria to pyelonephritis with bacteremia or sepsis. Excessive and inappropriate antibiotic prescribing only serves to increase unwanted side effects and the risk of antibiotic resistance both in individually treated patients and at the societal level. This study was conducted to determine the prevalence rate of urinary tract infection and assess the drug utilization pattern of antibiotics for the treatment of UTI. The study also compared the antibiotic prescribing in UTI with the standard treatment guideline. **Methods:** Retrospective Analytical study. The local hospital antibiotic policy was used as the standard for comparing the antibiotic prescription of UTI. Data were collected from the medication orders and relevant information was entered into the systematically prepared data collection form. Data collected included patient demographics, disease details, predisposing factors, microorganisms identified, clinical manifestations and present drug therapy. Antibiotic prescribed were recorded and classified according to their chemical class. **Results:** A total of 100 medication orders were collected and analyzed. The result showed that prevalence of UTI was higher among female than male. Most of the patients were presenting symptomatic UTI. The most consistent symptom to patient with UTI was fever. Hypertension and diabetes mellitus were the major predisposing factors observed. Out of the organisms isolated from the specimens collected *Escherichia coli* was the common microorganism. Cephalosporins were the most frequently prescribed class of antibiotic (50%) followed by fluoroquinolones (27.50%). **Conclusion:** Empirical treatment with antibiotic has shown increase in length of stay in hospital when compared to the antibiogram based prescribing. This shows that strict hospital guideline is mandatory to promote rational use of antibiotic which would not only prevent antibiotic resistance, but also reduce the treatment expenditure and hospital stay.

Keywords : UTI, Retrospective analysis, Antibiotics, prescription pattern.

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Introduction

Urinary tract infection (UTI) is one of the most common bacterial infection occurring in humans. It is caused by pathogenic invasion of the urinary tract which leads to an inflammatory response of the urothelium.[1] UTI can present as several syndromes associated with an inflammatory response to microbial invasion and can range from asymptomatic bacteriuria to pyelonephritis with bacteremia or sepsis.[2]

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Urinary tract infection account for the second most common cause of bacteremia in hospitalized patients, accounting for 34% of nosocomial infection.

It is reported that nearly 50% of women had at least one UTI in their lifetime.[2] UTI are classified as lower and upper tract infections. Lower tract infection corresponds to cystitis (bladder) and upper urinary tract infection refers to pyelonephritis. Uncomplicated infection occurs in individual who lack structural or functional abnormalities of the urinary tract that interfere with the normal flow of urine or voiding mechanism. Complicated UTI are the result of a predisposing lesion of the urinary tract, such as a congenital abnormality or distortion of the urinary tract, stone, indwelling catheter, prostatic hypertrophy, obstruction or neurologic deficit that interferes with the

normal flow of urine and urinary tract defenses.[2] Rational drug prescribing is defined as “the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable cost” [2-4]. Monitoring of prescription and drug utilization studies could identify the associated problems and provide feedback to the prescriber so as to create awareness about the irrational use of drugs [5-7]. It is necessary to define the prescribing pattern and to target the irrational prescribing habit for sending a remedial message [8]. Urinary tract infection (UTI) is defined as the presence of bacteria in urine along with symptoms of infection [9]. UTI is an extremely common condition that occurs in both male and female of all the ages. The prevalence and incidence of UTI is higher in women than in men due to several clinical factors including anatomic differences, hormonal effects, and behavioral pattern [10]. Etiology is influenced by factors such as age, diabetes, spinal cord injury, urinary catheterization, and other factors [11]. UTI is mostly caused by gram-negative aerobic bacilli found in the gastrointestinal tract. These are *Escherichia coli*, *Klebsiella*, *Enterobacter*, *Citrobacter*, and *Proteus*. Other common pathogens include *Staphylococcus epidermidis*, *Staphylococcus saprophyticus*, and *Enterococcus* species which presumably result in UTI following colonization of the vagina or perianal skin [12]. The goals of the management of UTI are: (i) Prompt diagnosis of concomitant bacteremia; (ii) prevention of progressive renal disease by prompt eradication of the bacterial pathogen, identification of abnormalities of the urinary tract and prevention of recurrent infections; and (iii) resolution of the acute symptoms of the infection. Delay in initiation of the antibacterial therapy is associated with an increased risk of renal scarring. The initial choice of antibacterial therapy is based on the knowledge of the predominant pathogens in the patient’s age group, antibacterial sensitivity patterns in the practice area, the clinical status of the patient, and the opportunity for close follow-up. The patients with significant urinary tract abnormalities and/or frequent symptomatic UTI may benefit from prophylactic antibacterial therapy. The main long-term consequence of UTI is renal scarring which may lead to hypertension and end-stage renal disease. Prevention of recurrent UTI focuses on detection and correction if possible, of urinary tract abnormalities [13]. Empirical treatment goals should be based on accurate and up-to-date antimicrobial susceptibility. In order to improve the use of antibiotics, the prescription of antibiotics for specific conditions must be continuously monitored to effectively implement antimicrobial stewardship programmes. Such antibiotic surveillance systems can provide important sources of information for healthcare professionals and policy makers monitoring progress towards a more prudent use of antibiotics, in turn ensuring adequate patient treatment, and limiting spread of antibiotic resistance. Drug utilization evaluation (DUE) is

an ongoing, authorized and systematic quality improvement process, which is designed to review drug use and prescribing pattern, develop criteria and standard describing optimal drug use and promote appropriate drug use.[12] Excessive and inappropriate antibiotic prescribing only serves to increase unwanted side effects and the risk of antibiotic resistance both in individually treated patients and at the societal level. This study was conducted to determine the pattern, magnitude of urinary tract infection and assess the drug utilization pattern of antibiotics for the treatment of UTI. The study also compared the antibiotic prescribing in UTI with the standard treatment guideline.

Methodology

This Retrospective, Non Interventional, Record based Comparative & Analytical study involved Prior Consent from Hospital Authorities / Medical Super-intendents of the Randomly selected Local Private Tertiary care hospitals to see the records of the patients from Medical Records Department (MRD) with the disclosure that we will use the data for study purpose only Identity (Names) were hidden & Medical record numbers were used to generate the data for analysis. The study was conducted within ethical standards & doesn’t involve any direct Intervention to any mentioned subjects nor any physical Examination was performed. Randomization was done using computer tables in selecting data. All Patients data had details of standard clinical examinations, routine biochemical and haematological investigations. This retrospective study was conducted from November 2019 to April 2020. The hospital antibiotic policy was used as the standard for comparing the antibiotic prescription of UTI. Data were collected from the medication orders and relevant information was entered into the systematically prepared data collection form. Data collected included patient demographics, disease details, predisposing factors, microorganisms identified, clinical manifestations and present drug therapy. Antibiotic prescribed were recorded and classified according to their chemical class. The proforma for collecting the data was designed. The demographic data and prescription pattern were evaluated in detail and data collected were subjected to descriptive statistical analysis using Microsoft excel. Anatomical therapeutic chemical (ATC) classification and defined daily dose (DDD) system was used for the quantification of drug utilization. Following formula of defined daily dose was used for calculation and results obtained were expressed in terms of defined daily dose per 1000 inhabitants per day (DDD/ 1000 inhabitants/day)[8]. Continuous data were expressed as mean \pm standard deviation (SD). The data were analysed by IBM SPSS Statistics 23. All quantitative data were coded and transformed into an excel master sheet for computer programming. A chi-square test was used to evaluate

categorical variables for analysis. Overall, $p < 0.05$ was proposed to represent statistical significance after correction.

Results

A total of 100 medication orders / Prescriptions were collected. Majority of patients were female (56%). The

data shows that highest number of male patients affected were in the age group of 41 – 65 years (15%) and females in the age group >65 (23%) as shown in Table 1. The higher prevalence of UTI in adult women than men might be due to their anatomical and physiological factors. Close proximity of female urethral orifice to anus, shorter urethra could be the major factors that influence the higher prevalence of UTI in females.

Table 1: Demographic Details

Age Group (in years(Male	Female	Total
< 18	04	02	06
18 – 30	01	06	07
31-40	12	12	24
41-65	15	13	28
>65	12	23	35
Total	44	56	100

Predisposing Factors

Out of 100 cases with UTI, hypertension (50%) was found to be the most common risk factor following diabetic patients and the least common risk factors were nephropathy and pregnancy.

Clinical Manifestation of UTI

The diagnosis of UTI were mostly based on the clinical presentations of the patient. Majority of the patient had

symptomatic UTI (Fever , Burning Micturition , burning pain in lower abdomen etc) followed by asymptomatic UTI . Fever was most presenting symptom in 41% patients. Other common symptoms included dysuria (13%), back pain (15%), urinary urgency (11%) and nocturia(04%) . The clinical manifestations are represented in the Table 2.

Table 2: Clinical Manifestations of UTI

Symptoms	No. of Patients
Fever	41
Backpain	15
Anuria	09
Nocturia	04
Cloudy And Unpleasant Urine	03
Hematuria	01
Urinary Urgency	11
Dysuria	13
Others	03

Discussion

Uropathogens Isolated

Out of 60 microorganisms isolated 57 (95%) organisms were bacterial species and rest 3 (5%) were fungal species. Majority of them were monoisolates. Gram negative organisms were frequently isolated than gram positive. Escherichia coli was the most common organism isolated , Klebsiella and Pseudomonas species were the least isolated bacterial species. The rest were Candida species. The gram negative aerobic bacteria colonize the urogenital mucosa with adhesion, pillia and fimbriae. The high incidence of the E coli may be due to the fact that it is a commensal of the bowel and that infection is mostly through faecal contamination due to poor hygiene. Antibiotics Utilization-Cephalosporins were the most frequently prescribed class of antibiotic (50%) followed by flouroquinolones 31%, because of good spectrum of activity. Cephalosporins in combination with β -lactamase

inhibitors 16% were the next major class of antibiotic prescribed. Rest were Nitrofurantoin, among newer were Fosfomycin.

Dosage Form

The mode of administration depends on the severity of the illness. Most of the patients received antibiotics parenterally (54%) followed by oral (34%) and both combination parenteral and oral route (12%).

Comparison with Hospital Antibigram-From the medication orders collected the prescribed antibiotics were compared with the hospital guideline. The relation between hospital guideline treatment and duration of hospital stay was observed . Among the 100 prescriptions, 30 prescriptions were in accordance with the hospital guideline and rest 70 prescriptions were following empirical therapy. Difference was Statistically significant

Conclusion

Empirical treatment with antibiotic has shown increase in length of stay in hospital when compared to the antibiogram based prescribing. This shows that strict hospital guideline is mandatory to promote rational use of antibiotic which would not only prevent antibiotic resistance, but also reduce the treatment expenditure and hospital stay. However, if more number of UTI cases are studied further a more definite and precise finding are possible. The present findings have shown the essentiality in conducting the antibiotic utilization study in UTI. Third generation cephalosporins were used most commonly as first line drug, irrespective of the causative organism. This group should be reserved for complicated UTIs. Periodic review of antimicrobial sensitivity should be done, so that change in empirical treatment can be updated. These results highlight the need for an education program for the health care system to improve the adherence toward the standard guidelines for treatment of UTI.

Study limitations

The main limitations of this study include its retrospective design(data of past admitted patients) with a limited number of participants (n=100). We have not studied the longterm outcomes, and it may be that although we are not seeing any difference in short-term outcomes, they may become apparent in the long term. The strengths of our study include presence of an adequate control group consisting of non-diabetic patients.

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