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A Prospective, Open Label, Observational Study to Evaluate Management of Urinary Tract Infections- Appropriateness of Antibiotics

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Abstract

Background: Urinary tract infections are the second most common form of bacterial infections characterised by dysuria and urinary frequency. Most of the UTIs are caused by bacteria and in few cases by fungi and virus. UTIs usually occur due to poor personal hygiene or other predisposing factors. Accordingly, treatment of bacteriuria depending upon individuals and bacterial sensitivity should be followed.

Objective: To evaluate the prevalence, the common bacterial infections, the patient's socio-economic status, the evaluation of management, prescribing pattern and patient counselling of urinary tract infections in the nephrology and urology department patients.

Methodology: An observational study involving analysis of prescriptions of nephrology and urology patients diagnosed and treated for urinary tract infections using patient data collection form and patient interview for a study period of 6 months.

Results: Of the total 201 patients, prevalence of male (61%) was found to be higher compared to female (39%) patients along with greater prevalence of complicated UTI cases (54.2%). The prevalence of UTI was the second (17.47%) most common disease in patients of nephrology and urology departments. The majority of bacterial isolates were Escherichia coli (58.09%) and the highest numbers of patients were of poor socio-economic status (30%). The most commonly prescribed antibiotic were third generation Cephalosporins (55.42%, cefoperazone and ceftriaxone).

Conclusion: The study demonstrates that for the management of UTI highly sensitive and prophylactic regimen of antibiotics was prescribed keeping in consideration of the patient's state, severity and extent of disease. Patient counselling and information leaflets distribution about the disease can help to prevent and improve the knowledge of patients so as to minimize the risk and recurrence of the infection.

Keywords: Urinary tract infections; Escherichia coli; Prevalence; Management; Prophylactic regimen; Antibiotics; Cefoperazone; Ceftriaxone; Patient counselling

Introduction

A Urinary Tract Infection or UTI is an infection which is likely in any part of the urinary system-urethra, ureters, bladder, and kidneys. It is the presence of bacteria in urine in quantities of 105 colony forming units per millilitre (cfu/ml) or more. Urinary tract infection is one of the most common bacterial infections, it can be defined as the presence of pathogenic microorganisms in the urinary tract [1-3]. UTI is a common complication of critical illness that is associated with increased patient morbidity but not mortality. Most UTIs are caused by bacteria, but some are caused by fungi and in rare cases by viruses. The most common causal agent for both complicated and uncomplicated Urinary Tract Infection is uropathogenic *E. coli*. A UTI can happen anywhere in the urinary tract-kidneys, urethra, bladder and ureters. Uncomplicated UTIs are not related with structural or neurological defects that may affect with normal flow of urine or voiding mechanism. Complicated UTIs are maybe a result of lesion of urinary tract, stone, catheter induced, prostatic hypertrophy, obstruction or neurological cause. Recurrent UTIs are due to reinfection or relapse occurring within 6 months or 3 or more within 1 year. Women are at higher risk of developing a UTI than men [1,2]. Urinary Tract Infections (UTIs) are the most common bacterial infection. Urinary tract infections are the second most common type of infection. UTIs were accounted for nearly 7 million hospital visits and approximately 1 million emergency department visits, which resulted in 100,000 hospitalizations [4]. Approximately 6.5% of cases are known to be due to hospital–acquired-UTI [5].

It has been found that, regular physical activity has significantly increased the consumption of oxygen and decreased the number of patients with a positive urine culture [6]. An evidence suggests, the use of hydrophilic catheters is effective in reducing occurrence of UTI and hematuria than non–coated catheters [6,7].

Microbiological Factors in Urine Infections

Approximately ninety percent of UTIs are caused by single organism. Uncomplicated UTIs are usually caused by *E.coli*, *Staphylococcus saprophyticus*, a negative *staphylococcus*, accounts 10–15% of Uncomplicated UTI mainly during summers. Complicated UTIs are caused by more diverse group of organisms which are more difficult to treat [8]. Gram Positive bacteria are the most common cause of UTI. It is most common cause of UTI particularly among pregnant, elderly, patients with catheters or who have risk factors for UTI. The gram-positive pathogens are:

Staphylococcus aureus it is second most common pathogen after E. coli. A round-shaped, member of the Firmicutes family, found in upper respiratory tract and on skin [9].

Enterococcus faecalis It is a gram-positive bacterium found in chains of various lengths belong to the lactic acid bacteria group. It can cause serious health issues including endocarditis, UTIs and wound infections [10].

Streptococcus agalactiae it is a gram-positive, round shaped bacteria that forms chains, known to spread through airborne droplets and causes strep throats, UTIs, etc. [11].

Staphylococcus epidermidis It is gram positive, found on skin and less likely found on mucosal flora [9,12,13]. The infections caused are generally hospital –acquired and a cause for catheter based UTIs [14,15].

Staphylococcus saprophyticus it is a Gram-positive coccus, a common cause of community-acquired urinary tract infections [14,16,17].

Some of the under–reported Gram Positive pathogens are *Aero–occus*, *Corynebacterium*, *Actino–baculum* and *Gardnerella.* Some UTIs are polymicrobial in nature, often having one or more than one Gram-positive bacteria. Gram-positive bacteria may either reside in or be regularly exposed to the urinary tract. Their presence is widespread among women, as well as men [8]. Gram-positive bacteria are capable of causing serious and fatal infection in new born infants.

Gram negative bacteria

Gram negative bacteria do not retain crystal violet dye [18]. The cell envelope contains an additional outer membrane made of lipopolysaccharides and phospholipids. Some of the common Gram–Negative bacilli known to cause UTIs are: *Escherichia coli* It is a gram negative bacilli, belongs to genus–*Escherichia* found in intestines of warm blooded organisms [15,19]. *Klebsiella pneumonia* It is a gram negative, rod shaped bacteria found on flora of skin and mouth. It is known to cause respiratory diseases and urine infections. *Pseudomonas* species a gram-negative bacterium, rod shaped with sporulating species, which was later proved to be incorrect due to some granules of reserve materials [20]. Proteus vulgaris It is a rod-shaped bacterium that inhibits intestinal tracts of living beings.

Fungi causing UTI

Aspergillus species It is in the shape of holy water sprinkler and are found in abundance in pillows [20]. *Candida albicans* is part of natural flora, microorganisms that generally live in or on our bodies. It can be found in the Gastrointestinal tract, the mouth, also the vagina. It can cause infection if there is an abnormal growth of the bacteria [21].

Stages of urinary tract infection

The pathogenesis of urinary tract infection can be classified into the following stages:
Stage 1: Colonization of the causative pathogens.
Stage 2: Uroepithelium penetration.
Stage 3: Ascension.
Stage 4: Pylonephritis.
Stage 5: Acute kidney injury.

Causes of UTI

Bacteria usually, UTIs occurs because bacteria may enter the urethra and go up to the bladder, where they multiply [22]. Bladder infections are usually caused by *E. coli*, which are bacteria in the usual human gut. By sexually transmitted infections, such as herpes or *chlamydia* [23]. Bacteria in the bladder can also move up to the kidneys and cause a kidney infection (known as pyelonephritis), which can cause permanent kidney damage. An untreated urinary tract infection of the bladder can lead to such infections [2]. Other commonly known bacteria are *Staphylococcus saprophytes*, *Klebsiella* species, *Pseudomonas aeruginosa*, *Enterococcus faecalis* and *Candida albicans*.

Pregnancy UTI

Are common during pregnancy due to changes in urinary tract. As uterus grows, the weight increased can block damage of urine from bladder which leads to an infection. The risk is increased during pregnancy starting at 6 to 24 weeks [24].

Poor personal hygiene

Improper personal hygiene such as not washing genitals properly, wearing too tight clothes or wearing unwashed clothes can lead to UTI [25].

Urinary catheters

It occurs due to inoculation of the bacilli in the bladder causing bacterial adhesion leading to mucosal irritation. The incidence of bacteria after insertion of catheter is 3–10% [26].

Renal calculi

Calculi are solid stones that are formed in urinary tract leading to pain, infection or even bleeding. It also blocks the urine flow which may cause UTI [27,28].

Suppressed immune system

Due to suppressed immune system, UTI can be caused.

Diagnosis

The patient is provided with a container, a fresh urine sample is collected in a small container and it is made sure that the sample is sterile. The urine sample should be filled up to the mark that indicates the amount of urine sample. An antiseptic cleansing pad is also given to clean the genital area before providing with the sample. This process is called "Clean Catch Method."
The sample collected is used to perform the following diagnostic tests, which includes:
Urinalysis.
Urine culture.
Imaging Cystoscopy [28].

Evolution of anti–microbial therapy

In acute stages of UTI, use of intravenous aminoglycosides can be expected to give a clinical response. Less effective antibiotics are amoxicillin, cephalosporins and Aminoquinolines. In severe stages, the therapy can be continued for 5–10 days.

Fosfomycin

It is resistant to gram–positive bacteria like *Staphylococcus*, *Streptococcus* and *Pneumococcus*; Gram–negative Bacteria like Escherichia coli, Shigella, Pseudomonas aeruginosa and Klebsiella pneumonia. It also has anti-bacterial effects on Proteus and someanaerobes and is weaker than Cephalosporins and Penicillin [33,34].

Fluoroquinolones

Almost all the fluoroquinolones are found to give an equal effect with short term therapy. Appropriate dosage should be chosen for treatment. Work against both gram positive and gram-negative bacteria. Ciprofloxacin, levofloxacin and norfloxacin are proven to be highly effective [28-32].

Cephalosporins

This class of drugs doesn't allow the synthesis of peptidoglycan, which is a strong molecule specific to bacterial cell wall, the end being death of the cell. As human cells doesn't have peptidoglycan making it easy for the drug molecules to target the bacteria [35]. Some

of the new drugs of this class are known to cause risk of bleeding. Some drugs like Ceftriaxone and Cefaperazone are excreted through kidneys and bile which leads to high biliary concentration, which increases risk of diarrhoea. Eosinophilia and Thrombocytosis are reported commonly [36]. Slight reduction in renal function is also seen in some drugs.

Trimethoprim sulfamethoxazole

This drug is a combination of two agents: One part of Trimethoprim and five parts of Sulfamethoxazole. The food and drug administration approved its use for urinary tract infections, traveller's diarrhoea, respiratory tract Infections, cholera, and skin infections [37,38].

Aminoglycosides

These are potent bactericidal antibiotics that are active against gram negative bacteria. Most common used drugs for treatment of urine infections include Gentamycin, Streptomycin, Amikacin, Neomycin, etc. These drugs are safe as there is an exceedingly rare chance of resistance. Single daily dosing of these drugs are found to be effective but multiple dosing in paediatric patients may also be recommended. This group of drugs are cost effective and efficacious [39].

Carbapenems

Carbapenems are beta–lactam antibiotics effective against Gram–positive and Gram–negative bacteria. These are the first line agents for the treatment of Urinary tract infections by infectious disease society of America. Imipenem, Meropenem, etc. are the drugs commonly used in this class.

Colistin

Colistin is effective against Gram–Negative *bacilli*, produced by certain strains of bacteria–*Paenibacillus* Polymyxa, is a mixture of Colistin A and B. Also, called as polymyxins.

Alkalinizing agents

These are the agents that are prescribed or taken over the counter to reduce the acidity of urine which treats the symptoms of UTI [40]. Di Sodium Hydrogen Citrate is used to relieve discomfort due to UTI; it also reduces the chance of developing uric acid stones. The common side effect includes Stomach cramps and flatulence. Overdosing of the drug can result in renal impairment [41]. Sodium Bicarbonate is an alkalinizing agent that neutralizes hydrogen ion concentration and raises urinary pH [42].

Antispasmodics

This class of drugs act by relaxing the smooth muscles in bladder resulting in decreased bladder contractions [43]. Flavoxate Hydrochloride effects directly on muscles of urinary tract and acts on smooth muscle spasm. It is used to relieve dysuria, pain, urinary urgency, frequency and incontinence which may occur in cystitis, prostatitis and urethritis. It can be given in combination with other drugs used for treating UTI [44]. Darifenacin, Fesoterodine, Flavoxate, Oxybutynin are the drugs which are given for the treatment of UTI along with other antibiotics [43].

Non–Pharmacological treatment

Drinking plenty of water clears the bladder frequently which lowers the chances of the bacteriuria to multiply. Avoiding of fluids like alcohol, caffeine, citrus fruit juices that irritates bladder. Urine should not be held for too long. Wiping from front to back when going to the toilet can lower the risk of UTI. The genital area should be cleaned regularly. Use of perfumes or perfumed soaps near the genitals should be avoided and using of soaps preferably made for genitals should be encouraged. Intimate area or urethra should be kept dried.

Sanitary pads should be used over tampons as long term insertion of tampons may lead to severe UTI infections. Showers can be preferred over bath tubs. If the patients are on catheters, frequent cleaning of catheters should be done. Good hands wash before and after catheter care is essential. Intake of fruits like watermelon, pine-apple, kiwi and vegetables like cabbage, garlic, lady's finger, kale are found to decrease the infection. All kinds of berries such as cranberry, blueberry, etc. decreased the infection by an active ingredient especially in case of *E. coli* [45]. Intake of yogurt and probiotics are also found to be very useful in eradication of the infection. Some clinicians suggest the use of Urinary Analgesics like Potassium or Sodium Citrate can be used in combination with Antibiotics but not with Nitrofurantoin [28-30].

Materials and methods

This is a prospective, open label, observational study carried out in various wards of a multi-speciality hospital, (300 bedded hospital) that receives patients with urinary tract infections that frequently use a wide variety of antibiotics.

Inclusion criteria

Patients of age group between 18-80 years of both the genders, diagnosed with UTI (based on symptoms and positive test results). The study included both inpatients and outpatients.

Exclusion criteria

Patients who have other diseases or conditions apart from UTI were excluded from the study. Pregnant and lactating women, and patients below the age of 18 years were also excluded. The planning is brought about by initially screening all the UTI admitted patients in the hospital for symptoms of UTI along with urinalysis and urine culture tests. Enrolment of the patients is then done for the study after acquisition of consent form and categorising or grouping them according to gender and classification of UTI. After the patients approval, all the relevant and necessary data of the patients including the demographic data, laboratory parameters and drug therapy details were collected from the patient case notes. The demographic details consists of age, gender, reason for admission, past medical history, medication history, co-morbidities and any history of allergic reactions. All the collected data was documented in a suitably designed data collection form which was designed as per the need of the study. Patient data collection form has all the criteria related to renal problems viz., patient details, symptoms, part of urinary tract affected, cause of infection, causative organism, physical examination details, complete urine evaluation, urine culture test details and medication chart. This form will be validated by the doctor/ doctor's signature. Interviewing of the patients is specifically done for fulfilment of the purpose of the objectives of the study. Later patient counselling will be managed accompanied by leaflets distribution in an approved manner. After acquiring all these details and collection of all data, results were interpreted by generating analysis on the collected data. Finally, the research's results were concluded, and impression was highlighted.

Results

The prevalence of UTI was the second (17.47%) most common disease in patients of nephrology and urology departments which was after Kidney stones (39.21%) whereas the least common disease was Diabetic nephropathy (3.13%) (Table 1). The frequency of UTI in patients was more in the month of November (49 out of 201) i.e. during the winter season which probably indicates that during this season people usually drink less water there by reducing the amount of urination which helps in bacterial clearance and infections like respiratory tract infections also increases thus the occurrence of UTI might increase. UTI was found to be common in male (61%) patients compared to female (39%) patients as most of the collected cases were complicated UTIs which occur to a greater extent in males than females. UTI was most prevalent in patients of age between 50 to 60 years i.e. out of 201 patients, 45 (22.38%) patients were of this age group while least age group being between 20 to 30 years i.e. 17 patients (8.45%) (Table 2) (Where the probability of disease occurrence is: Certain=1 and Impossible=0. ($0 \leq$ probability ≤ 1) The highest probability of UTI occurrence in relation to age is 0.228 which means it is more likely to occur in age group of 50-60 years of age.

It was found that most of the patients suffered from symptoms of burning micturition (104) followed by abdominal pain (78), fever (62) and other less frequent symptoms of problem. The lower UTI (186, 92.53%) mainly had the common symptoms like burning micturition, abdominal pain, frequent urination and urinary incontinence (Table 3). The upper UTI (15, 7.46%) had the common symptoms like fever, vomiting's and loose stools. The highest number of cases i.e. 54.2% were complicated UTI suffering from predisposing factors, 37.8% cases were uncomplicated UTI but still hospitalized to avoid severe infection and 7.9% cases were recurrent UTI (Table 4).

Out of 105 isolates the majority were Escherichia coli isolates (61; 58.09%) followed by Enterococcus species (20; 19.04%), Klebsiella pneumonia (18; 17.14%), Pseudomonas aeruginosa (9; 8.57%), Staphylococcus aureus (5; 4.76%) and the least Enterobacter species (3; 2.85%) (Table 5 and Figure 1). Most of the urine culture sensitivity test showed the presence of single type of bacteria whereas in few urine culture sensitivity tests two different types of bacteria were found.

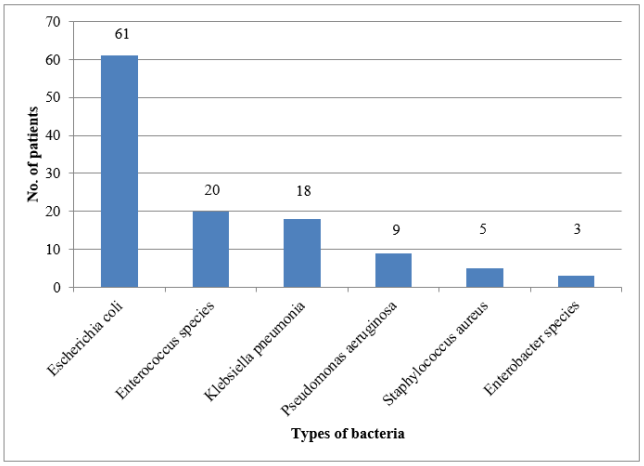

Figure 1: The common types of bacteria during the study period of 6 months.

The treatment given to the patients suffering from UTI to manage their conditions involved drugs like antimicrobials, alkalinizing agents, and antispasmodics according to their severity and conditions. The most prescribed antibiotics were third generation Cephalosporins (55.42%) (Cefoperazone and ceftriaxone). Other antibiotics Penicillin (11.64%) ((Piperacillin+tazobactum) and amoxicillin), Fluoroquinolones (9.23%) (Levofloxacin, Ofloxacin and Norfloxacin), Carbapenems like meropenem (7.22%), Aminoglycosides like amikacin (4.41%), Tetracyclines like doxycycline (4.41%), Nitrofuran like nitrofurantoin (4.01%), Polymyxin like colistin (2.40%) and Glycopeptide like teicoplanin (1.20%) were prescribed. Treatment with combinations of antibiotics was also prescribed, the most common being cefoperazone in combination with meropenem and the maximum number of antibiotics prescribed were four antibiotics usually for complicated UTI cases. Most of antibiotics prescribed to the patients were only one antibiotic (172, 85.57%), followed by two antibiotics (19, 9.45%), then four antibiotics (9, 4.47%) and the least prescribed antibiotics were three antibiotics (1, 0.49%) (Table 6, 7, 8 and Figure 2).

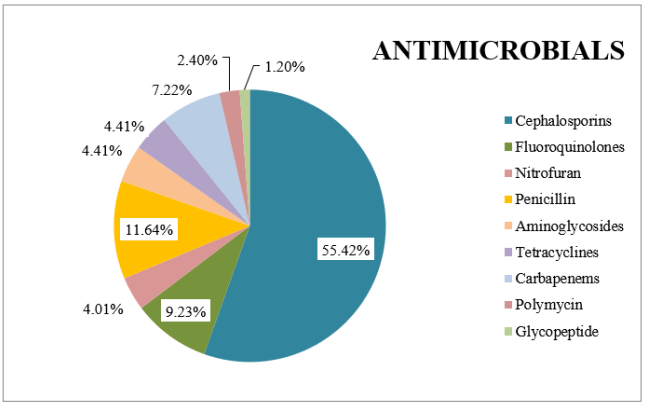

Figure 2: Antimicrobials prescribed according to sensitivity of the bacteria.

UTI with comorbid conditions like DM or HTN or CKD, the preferred antibiotic were Fluoroquinolones as they are lipophilic drugs. UTI with Respiratory tract infections, tetracyclines was preferred. Catheter related UTI, catheters were first removed and changed conjugated with appropriate antibiotics treatment (Table 9).

Treatment of recurrent UTI was mainly by nitrofurantoin (62.5%) which is highly used to treat resistant bacteria thus having higher susceptibility rates. The normal water intake of such patients was about 4-5 glasses per day which may be a cause of recurrent UTI (Table 10)

Adjuvant therapies like alkalinizing agents (Syrup K. Cit, syrup Cital and syrup Citralka) (47.26%) were prescribed to the patients who were observed having acidic urine pH known through CUE; these agents make the urine less acidic or neutralize excess acid. Patients with no variations in acidity or basicity were not prescribed with alkalinizing agents and treated with only antibiotics. Only 47% of all patients were prescribed with alkalinizing agents.

Table 1: The prevalence of UTI in the patients of Nephrology and Urology departments during the study period of 6 months.

Diagnosis	No. of patients
Kidney stones / Renal calculus	451
Urinary tract infections	201
Chronic kidney disease	164
Benign prostatic hyperplasia	117
Acute kidney failure	78
Electrolyte disorders	58
Prostate cancer	45
Diabetic nephropathy	36

Total	1150

Table 2: The prevalence of UTI in the patients of different age groups.

Age in years	No. of patients (N=201)	Percentage (%)
<20	0	0
20-30	17	8.45%
30-40	21	10.44%
40-50	26	12.93%
50-60	45	22.38%
60-70	30	14.92%
70-80	41	20.39%
80-90	21	10.44%

Table 3: The chief complaints/symptoms seen in the patients.

Signs and symptoms	No. of patients (N=201)
Burning micturition	104
Abdominal pain	78
Fever	62
Frequent urination	55
Vomiting	43
Urinary incontinence	41
Loose stools	15

Table 4: The types of UTI in the patients of Nephrology and Urology departments during the study period of 6 months.

S.no	Types of UTI	No. of patients	Percentage (%)
I	Uncomplicated UTI	76	37.80%
II	Complicated UTI	109	54.20%
(i)	Diabetes Mellitus	25	22.90%
(ii)	Hypertension	20	18.30%
(iii)	Chronic kidney disease	16	14.60%
(iv)	Calculus or strictures	14	12.80%
(v)	Benign prostatic hyperplasia	14	12.80%
(vi)	Lower respiratory tract infection	11	10.09%
(vii)	Catheter	9	8.20%
III	Recurrent UTI	16	7.90%

Table 5: The common types of bacteria during the study period of 6 months.

Bacteria	No. of patients
Escherichia coli	61
Enterococcus species	20
Klebsiella pneumonia	18
Pseudomonas aeruginosa	9
Staphylococcus aureus	5

Enterobacter species	3

Table 6: Drug distribution/Drug prescribed in the management of UTI.

Drugs	No. of prescriptions (N=201)
Antimicrobials	201
Alkalinizing agents	95
Antispasmodics	30

Table 7: Antimicrobials prescribed according to sensitivity of the bacteria.

S.no	Class	Drugs	No. of prescriptions
1	Cephalosporins	Cefoperazone	121
		Ceftriaxone	17
2	Fluoroquinolones	Levofloxacin	8
		Ofloxacin	8
		Norfloxacin	7
3	Nitrofuran	Nitrofurantoin	10
4	Penicillin	Piperacillin+Tazobactum	23
		Amoxicillin	6
5	Aminoglycosides	Amikacin	11
6	Tetracyclines	Doxycycline	11
7	Carbapenems	Meropenem	18
8	Polymyxin	Colistin	6
9	Glycopeptide	Teicoplanin	3

Table 8: Antibiotics prescribed.

Antibiotics prescribed	No. of prescriptions	Dosage regimen
Cefoperazone	99	The dose prescribed: Cefoperazone, given as IV injection in dose of 1.5gm/BD Ceftriaxone, was given as IV injection in dose of 1gm/BD Nitrofurantoin, was administered as oral tablets in dose of 100mg/BD Levofloxacin, available as 250mg/OD oral tablets was administered Ofloxacin, was given as oral tablets 200mg/BD Norfloxacin, was given as 600mg/BD oral tablets Meropenem, given as IV injection in dose of 1gm/TID Amoxicillin, was given as IV injection in dose of 1.2gm/BD Piperacillin + tazobactum, was administered as IV injection in 3.75gm/TID to 4.5gm/QID Doxycycline, was administered as IV injection in dose of 100mg/BD
Ceftriaxone	17	
Nitrofurantoin	10	
Levofloxacin	8	
Ofloxacin	8	
Cefoperazone + meropenem	8	
Norfloxacin	7	
Amoxicillin	6	
Cefoperazone + doxycycline + (piperacillin + tazobactum) + meropenem	6	
Cefoperazone + (piperacillin + tazobactum)	5	
Piperacillin + tazobactum	4	
Amikacin	4	
(Piperacillin + tazobactum) + amikacin	4	
Meropenem	3	
Colistin	3	

Teicoplanin	3	Amikacin, given as IV injection in dose of 300mg/OD Colistin, was administered as IV injection in dose of 3MU/TID Teicoplanin, given as IV injection in dose of 400mg/BD
Cefoperazone + amikacin + doxycycline + (piperacillin + tazobactum)	3	
Colistin + doxycycline	2	
(Piperacillin + tazobactum) + meropenem + colistin	1	
	Total = 201	

Table 9: Management of UTI with comorbid conditions.

UTI with comorbid conditions	Comments
UTI with Diabetes Mellitus or HTN or CKD.	Usually Fluoroquinolones (Levofloxacin 250mg/OD, ofloxacin 200mg/BD, norfloxacin 600mg/BD) were preferred as in these patients there is insufficient renal function so such lipophilic drugs cause low volume of distribution alterations and doesn't deteriorate the renal conditions further.
UTI along with BPH or strictures.	Conditions were subsided by performing the required instrumentation and usage of antispasmodics (urispas 100mg/TID) medications to relax the bladder muscle for easy urine flow.
UTI with Respiratory tract infections.	Preferred antibiotic was Tetracyclines (e.g., Doxycycline 100mg/BD) which is a broad-spectrum antibiotic usually used to treat bacterial pneumonia.
UTI along with Stroke	Preferred antibiotic was Carbapenems (e.g., Meropenem 1gm/TID) which are used to treat severe bacterial infections.
Catheter related UTI	The catheters were first removed and changed conjugated with appropriate antibiotics treatment.

Table 10: Prevalence and management of Recurrent UTI.

Diagnosis	No. of patients	Management
Recurrent UTI	16	Preferred antibiotic was Nitrofuran (e.g., Nitrofurantoin 100mg/BD (10 patients, 62.5%)) and Carbapenems (e.g., Meropenem 1gm/TID (6 patients, 37.5%)) for which bacteria have higher susceptibility rates and are used to treat severe bacterial infections.

Discussion

In In the present observational study, the prevalence, the common bacterial infections, the patients' socio-economic status, the evaluation of management, prescribing pattern and patient counselling of urinary tract infections in the nephrology and urology department patients was evaluated.

In the present 6 months study, 201 patients were observed in a hospital, it was found that prevalence of UTI was the second (17.47%) most common disease in patients of nephrology and urology departments; which is complementary to earlier study where urinary tract infection (UTI) is the second most frequent infection in long-term care facilities and the most common cause of hospitalization for bacterial infection [46].

The prevalence of UTI was found to be higher in male (61%) patients compared to female (39%) patients; which is in contrast to previous studieswhere females are more prone or are at a higher prevalence than male. [47-51,12].

Majority of UTI occurred in the age group 21-30 years in previous study [49]; however we observed in our study that UTI was more prevalent in patients of age group 50-60 years (45, 22.38%). The highest

probability of UTI occurrence in relation to age is 0.228 which means it is more likely to occur in age group of 50-60 years of age.

It was found that most of the patients suffered from symptoms of burning micturition (104) followed by abdominal pain (78), fever (62) and other less frequent symptoms of problem; similar to previous study where common symptoms include a strong, frequent urge to urinate and a painful and burning sensation when urinating [52].

The highest number of cases i.e. 54.2% were complicated UTI suffering from predisposing factors,37.8% cases were uncomplicated UTI but still hospitalised to avoid severe infection and 7.9% cases were recurrent UTI; which is in contrast with earlier study [4].

During the study it was found that out of 105 isolates the majority were *Escherichia coli* isolates (58.09%) followed by *Enterococcus species* (19.04%), *Klebsiella pneumonia* (17.14%), *Pseudomonas aeruginosa* (8.57%), *Staphylococcus aureus* (4.76%) and the least *Enterobacter species* (2.85%); which is almost near to previous study except there *Klebsiella pneumonia* was the second most commonly isolated bacteria [53].

During the study it was found that the highest numbers of patients were of poor socio-economic status (30%) indicating lack of awareness of hygiene, which is a common etiological factor for UTI prevalence and the least number of patients were of upper high socio-economic status (5%); which is same as observed in a previous study where about 64% patients belonged to rural area, and 90% patients belong to lower or lower middle class. Around 68% patients were did not attend high school and almost 74% of the patients were married [50].

The treatment given to the patients suffering from UTI to manage their conditions involved drugs like antimicrobials, alkalinizing agents, and antispasmodics.

In current study the most prescribed antibiotics were the third generation Cephalosporins (55.42%) (Cefoperazone and ceftriaxone) which are prophylactic drug regimen of the hospital. Other antibiotics Penicillin (11.64%) ((Piperacillin+tazobactum) and amoxicillin), Fluoroquinolones (9.23%) (Levofloxacin, Ofloxacin and Norfloxacin) and others were prescribed; which is similar to earlier studies where a 3-day therapy with fluoroquinolone can be given as first line therapyandfor severely ill or hospitalized patients IV cephalosporins and fluoroquinolones should be considered [29,30,54].

Treatment of recurrent UTI was mainly by nitrofurantoin (62.5%) which is universally used to treat resistant bacteria thus having higher susceptibility rates similar to considerations of previous study [29].

An adjuvant therapy like alkalinizing agents (Syrup K. Cit, syrup Cital and syrup Citralka) (47.26%) which make the urine less acidic or neutralizes excess acid was prescribed which was even observed in a previous study where course of sodium citrate can provide good symptomatic relief [13]. Antispasmodics like flavoxate (urispas (14.92%)) was also prescribed which helps to reduce leaking of urine, frequent trips to bathroom; feeling of need to urinate right away and bladder pain, likely seen in earlier publication where flavoxate is used for same purpose [54].

Conclusion

This, an observational study was conducted to evaluate the prevalence, the common bacterial infections, and the patient's socio-economic status, the evaluation of management, prescribing pattern and patient counselling of urinary tract infections in the nephrology and urology department patients. The prevalence of UTI was the second (17.47%) most common disease in patients of nephrology and urology departments. Prevalence of male (61%) was found to be higher compared to female (39%) patients along with greater prevalence of complicated UTI cases (54.2%). Most of the patients suffered from symptoms of burning micturition (104) followed by abdominal pain (78), fever (62) and other symptoms of problem. Urine culture sensitivity test was observed for only 52.23% patients, yet all the patients were prescribed antibiotics whereas ethically antibiotics should be prescribed only after detecting the presence of bacteria. Most bacteria isolated were Escherichia coli (58.09%). The highest probability of UTI occurrence in relation to age is 0.228 which means it is more likely to occur in age group of 50-60 years of age.

It was found that the highest numbers of patients were of poor socio-economic status (30%) indicating lack of awareness of hygiene. The overly sensitive and prophylactic regimen of antibiotics was found to be prescribed in the study keeping in consideration of the patient's state, severity, and extent of disease. Analyzing the patients' records it was found that the most prescribed antibiotic was third generation Cephalosporins (55.42%) (Cefoperazone and ceftriaxone) which are prophylactic drug regimen of the hospital. Treatment of recurrent UTI was mainly by nitrofurantoin (62.5%) which is universally used to

treat resistant bacteria thus having higher susceptibility rates.

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