

**ASSESSMENT OF ETIOLOGY, RISK FACTORS, COMPLICATIONS AND TREATMENT ASSOCIATED WITH DIFFERENT ATTACKS OF URINARY TRACT INFECTION****Dr. Haripriya Simha<sup>\*1</sup>, Dr. N. Hema Sri Lakshmi<sup>2</sup>, Dr. Y. Spandana<sup>2</sup>, Dr. S. Yoga Sree<sup>2</sup>, Dr. G.N.S. Santoshi Lakshmi<sup>3</sup>**<sup>1,2</sup>Department of Pharmacy Practice, Avanthi Institute of Pharmaceutical Sciences, CheruKupally, Bhogapuram.<sup>3</sup>Associate Professor, Department of Pharmacy Practice, Avanthi Institute of Pharmaceutical Sciences, Cherukupally, Bhogapuram.**\*Corresponding Author: Dr. Haripriya Simha**

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**ABSTRACT****Aim:** To ascertain the etiology, risk factors, complications and reoccurrence in patients with Urinary Tract Infection.**Result:** Total 150 patients were included in the study. out of then 130 patients were diagnosed with UTI Like in most of the studies on UTI, female patients in our study are significantly higher (58.66%) than male patients (41.33%). Bacteria (86.66%) was found to be most prevalent cause of UTI, followed by Fungi (10%) and viruses (3.33%). Among the risk factors, Medical risk factors (58.91%) were predominant in the development of UTI, followed by common risk factors (28.37%) and Medication risk factors (12.66%). Among the medicational risk factors, use of Immuno suppressant drugs was identified as the leading risk factor found in 24% (36 out of 150), of study population accompanied by use of calcium channel blockers 14.66%, use of muscle relaxants 1.33% and use of anti histamines 2.66% having similar significant impact. 78.66% of the patients had complications. Kidney failure were predominantly seen in 26.66%, followed by Pyelonephritis and Urosepsis with 18%, AGN with 7.33%, Haemorrhagic cystitis with 4.66%, Abscess formation near kidneys with 2.66%, Xanthogranulomatous pyelonephritis(1.33%). Concomitant conditions were found in 70% of patients with complications. 51 patients are found to be recurrent attacks of UTI. Bacterial UTI is commonly treated with ceftriaxone (45%), followed by Piperacillin+ Tazobactam and ciprofloxacin with 12%. Patients with Recurrent attacks were found to be treated frequently with Piperacillin+Tazobactam (24.3%), accompanied by Nitrofurantoin with 9.3%. Fungal UTI, patients with first attack were found to be treated with fluconazole(3.33%) and patients of recurrent fungal UTI were treated with AmphotericinB. In viral UTI, patients were found to be treated with cidofovir with 3.33%.and got significant values in student T test using spss software.**Conclusion:** In our study we concluded that females were more prone to develop UTI than males. Incidence of UTI was high in age group 0-15 yrs and in rural patients. Bacteria was identified as a major cause of UTI. In bacteria, E.coli is major cause of the bacterial UTI. Fever with chills and rigors are identified as a most experienced symptom in almost all patients. Medical risk factors was identified as a major risk factors indicating that constipation plays a dominant role for development of UTI. The impact of concomitant conditions in complicating UTI has been observed in our study. Nephrotic syndrome is the condition associated with UTI in majority of the patients. More than three-fourth of the patients had complications indicating that kidney failure is found to be greater extent with in 6-12 months, followed by pyelonephritis with in 0-3 months after development of UTI. 51 patients were being experiencing with recurrent UTI attacks, in which 2<sup>nd</sup> attack of UTI patients were predominant. Recurrent UTI was found in majority of the patients with most of them having untreated kidney stones followed by hydroureteronephrosis. Ceftriaxone was majorly used first line drug in uncomplicated UTI, while Piperacillin+Tazobactam was majorly used in recurrent attack followed by Nitrofurantoin. In our study, we have found 5 drug interactions were significant drug interaction while other 2 are moderate interactions and 5 ADRS were observed.**KEYWORDS:** UTI, etiology, risk factors, complications, diagnosis, treatment of urinary tract infection.

## INTRODUCTION

### Urinary Tract Infections

#### Definition

A urinary tract infection (UTI) is an infection in any part of your urinary system — your kidneys, ureters, bladder and urethra. Most infections involve the lower urinary tract — the bladder and the urethra.

#### Signs and Symptoms

Symptoms of a UTI depend on what part of the urinary tract is infected, ie, lower and upper urinary tract.

**Lower tract UTIs** affect the urethra and bladder.

#### Symptoms include

- Burning with urination, Increased frequency of urination without passing much urine, Increased urgency of urination, Bloody urine, Cloudy urine, Urine that looks like cola or tea, Urine that has a strong odor, Pelvic pain in women, Rectal pain in men,

**Upper tract UTIs** affect the kidneys.

#### Symptoms include

- These can be potentially life threatening if bacteria move from the infected kidney into the blood. This condition, called urosepsis, can cause dangerously low blood pressure, shock, and death Pain and tenderness in the upper back and sides, Chills, Fever, Nausea.

#### TYPES OF UTI

- Significant bacteriuria
- Asymptomatic bacteriuria
- Cystitis
- Urethral syndrome
- Acute pyelonephritis
- Chronic pyelonephritis

#### ETIOLOGY

UTIs are almost always caused by bacteria(*E.coli*), although some viruses(HSV-2), fungi(Candidiasis), and parasites(Trichomoniasis) can infect the urinary tract as well. The organisms that cause infection usually enter the urinary tract by one of two routes.

#### DIAGNOSIS

Diagnosis of urinary tract infection can be done by following methods-

- Nonculture methods for the laboratory diagnosis of UTI.
- Culture methods for the laboratory diagnosis of UTI.
- Imaging diagnosis of UTI.

#### RISK FACTORS

- Gender
- Pregnancy
- Genetics
- Menopause
- Health conditions
- Life style

## COMPLICATIONS

When treated promptly and properly, lower urinary tract infections rarely lead to complications. But left untreated, a urinary tract infection can have serious consequences.

Prostatitis, Kidney infection, Xanthogranulomatous Pyelonephritis, kidney failure, Blood poisoning (sepsis), Abscesses.

## TREATMENT

- Aminopenicillins
- Cephalosporins
- Anti infectives
- Sulfonamides
- Aminoglycosides
- Fluroquinolones
- Carbapenems
- Antifungal
- Antivirals

## AIMS AND OBJECTIVES

### AIM

To ascertain the etiology, risk factors, complications and reoccurrence in patients with Urinary Tract Infection.

### OBJECTIVES

- To obtain the prevalence of organism in development of UTI.
- To expose the most prevalent area for development of UTI
- To expose the most common risk factor for the development of UTI.
- Valuation of age related risk factors in UTI patients.
- Assessment of complications of UTI.
- Studying the impact of concomitant diseases on different types of complications..
- To determine the reason for recurrent attacks in UTI patients.
- To analyze the type and efficacy of drugs used in therapy of UTI.

## METHODOLOGY

**Study Design:** Prospective observational case series study.

**Study Population:** 150 cases of patients with Urinary Tract Infections.

**Study Site:** The study was conducted in department of general medicine and paediatrics in maharaja institute of medical sciences.

**Study Period:** The study was conducted in a period 6 months.

### Inclusion Criteria

- Patients of age between 0 – 75 years
- Patients who have been diagnosed with urinary tract infection
- Smokers and non-smoker
- Alcoholics and non-alcoholics

- Pregnant women

**Exclusion Criteria**

- Patient who have undergone any surgery.
- Patients of age above 70years.
- Patients who have undergone kidney transplantation.

**STUDY CONTENT**

The project consists of following steps:

1. Obtaining the permission of ethics committee from Maharaja Institute of Medical Sciences.
2. Enlisting the patients for the study as per inclusion criteria.
3. Assessing the patients according to objectives.
4. The data would be analyzed and interpreted to produce fruitful results.

**Place of investigation**

Collection of case information would be carried out at Maharaja Institute of Medical Sciences, Vizianagaram.

**RESULTS**

A total of 130 patients diagnosed with Urinary Tract Infections were included in our study.

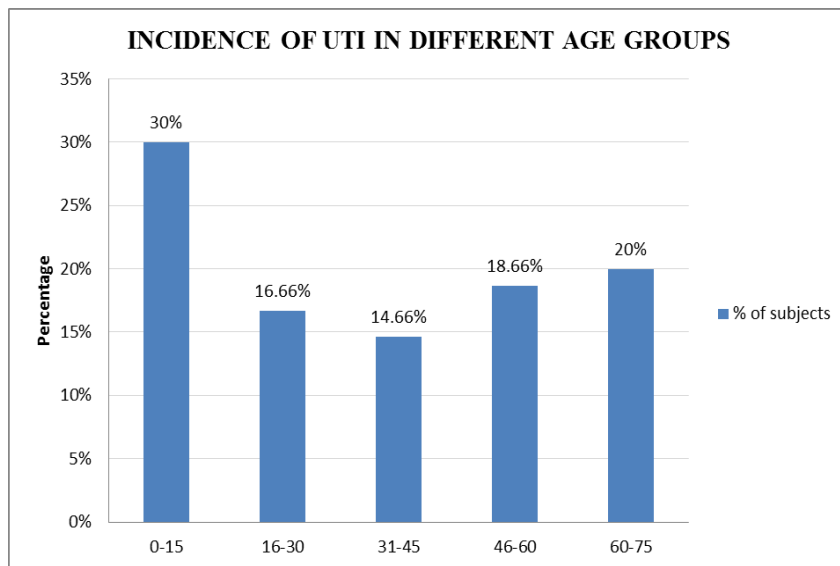
Several parameters were assessed and results were produced with emphasis on etiology, risk factors, complications, and their association with comorbid conditions, recurrent attacks in UTI patients.

**1. Incidence of Uti In Different Age Groups**

Patient aged 0 year and above were categorised into 5 different age groups (0-15, 16-30, 31-45, 46-60, 60-75). Results of our study showed majority of the subjects in the age group 0-15years with 45 (30%) subjects followed by 25 patients (16.66%) in age group 16-30 years, 22 patients (14.66%) in age group 31-45 years, 28 patients (18.66%) in age group 46-60 years and 30 patients (20%) in age group 60-75.

**Table 1.**

Age group (yrs)	No. of subjects	% of subjects
0-15	45	30%
16-30	25	16.66%
31-45	22	14.66%
46-60	28	18.66%
60-75	30	20%



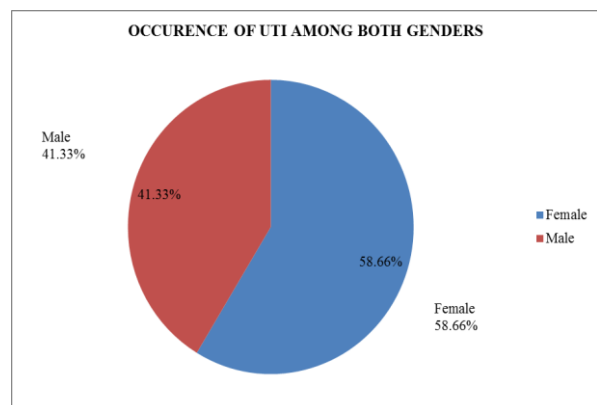
**Figure 1.**

**2. GENDER**

Like in most of the studies on UTI, female subjects in our study are significantly higher (58.66%) than male subjects (41.33%).

**Table 2.**

Gender	No. of subjects	% of subjects
Female	88	58.66%
Male	62	41.33%
Total	150	100%



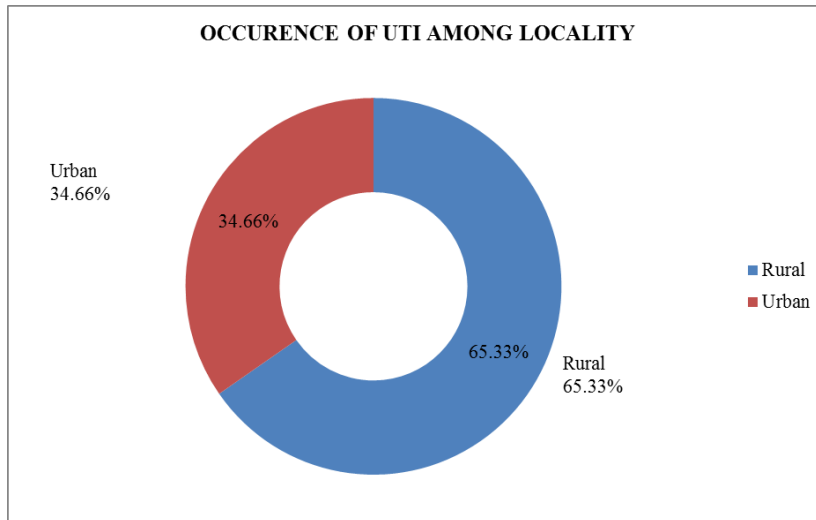
**Figure 2.**

**3. LOCALITY**

Like in most of the studies on UTI, Rural subjects (65.33%) in our study were significantly higher than urban subjects. (34.66%).

**Table 3.**

Locality	No.of subjects	Percentage(%)
Rural	98	65.33%
Urban	52	34.66%



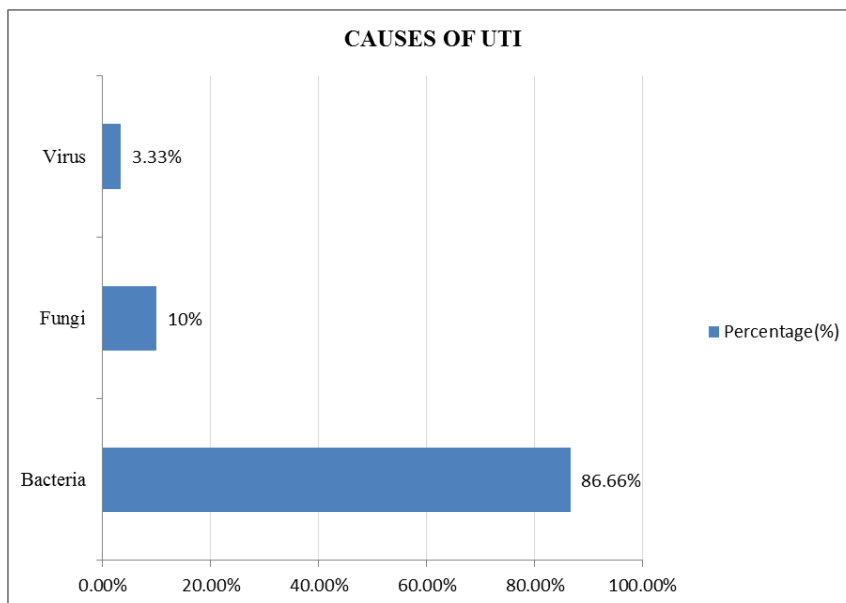
**Figure 3.**

**4. CAUSES**

Out of 150 population, Bacteria (86.66%) was found to be most prevalant cause of UTI, followed by Fungi (10%) and viruses (3.33%).

**Table 4.**

Type of Organism	No.of subjects	Percentage (%)
Bacteria	130	86.66%
Fungi	10	10%
Virus	5	3.33%



**Figure 4.**

**4.1. BACTERIAL UTI**

Out of 150 population, E.coli (35.33%) was found to be the most prevalent cause of Bacterial UTI, followed by Klebsiella sps (18.66%), Staphylococcus sps (11.33%), Streptococcus sps (6.66%), Pseudomonas sps (5.99%),

Proteus sps (3.99%), Citrobacter sps (1.33%), Micrococci sps (1.33%), Enterococci sps (0.66%), Trichomonas sps (0.66%), Chlamydia sps(0.66%).

Table 4.1.

Name of the bacteria	No. of patients	Percentage(%)
E.coli	53	35.33%
Klebsiella sps	28	18.66%
Staphylococcus sps	17	11.33%
Streptococcus sps	10	6.66%
Pseudomonas sps	9	5.99%
Proteus sps	6	3.99%
Citrobacter sps	2	1.33%
Micrococci sps	2	1.33%
Enterococci sps	1	0.66%
Trichomonas sps	1	0.66%
Chlamydia sps	1	0.66%

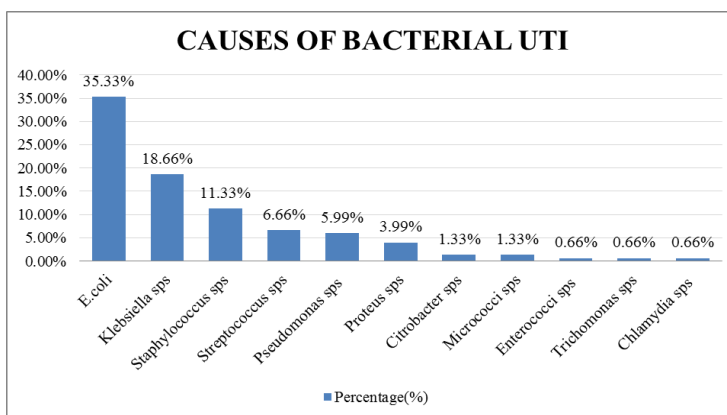


Figure 4.1.

**4.2. FUNGAL UTI**

Out of 150 population, Candida cystis (5.33%) was found out to be the most prevalent cause of fungal UTI, followed by Candida albicans (4.66%).

Table 4.2.

Name of the fungi	No. of patients	Percentage(%)
Candida cystis	8	5.33%
Candida albicans	7	4.66%

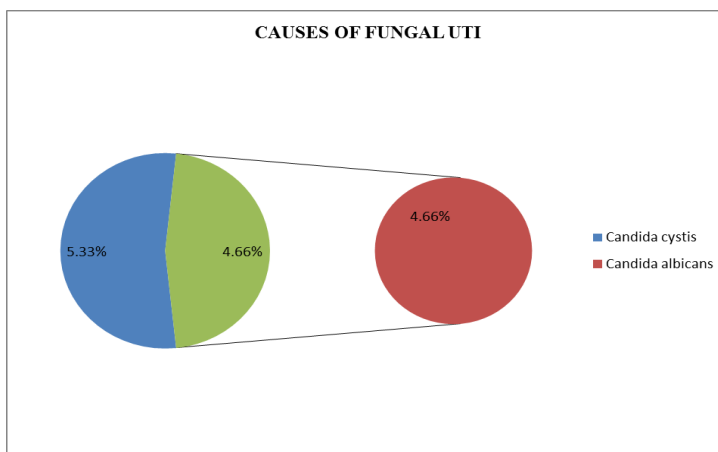


Figure 4.2.

**4.3. VIRAL UTI**

Out of 150 population, BK virus (2%) was found to be the most prevalent cause of viral UTI, followed by Adenovirus (0.66%) and CMV virus(0.66%).

Table 4.3.

Name of the virus	No. of patients	Percentage(%)
BK virus	3	2%
Adenovirus	1	0.66%
CMV	1	0.66%

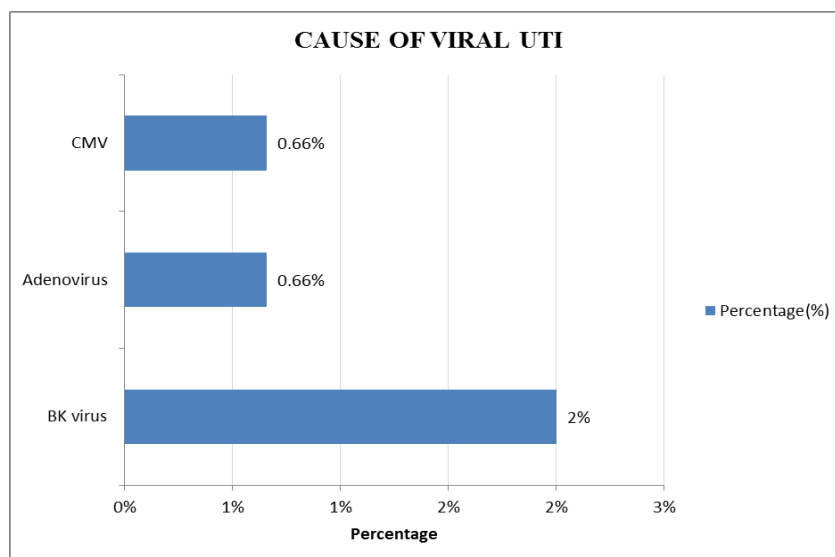


Figure 4.3.

**5. CLINICAL MANIFESTATION OF UTI**

Out of 150 population, Fever with chills and rigors (75.33%) was found to be major symptom in all subjects, followed by painful micturition (55.33%), Abdominal pain (40.66%), Nausea and vomiting (38.66%), High

frequency and urgency of urine (33.33%), Oliguria (30%), Cloudy and dark urine (20.66%), Haematuria (15.33%), Back pain (14.66%), Foul smelling urine (8%), Dribbling of urine (5.33%), Head ache (4%).

Table 5.

Symptoms	No. of subjects	Percentage%
Painful, burning sensation during micturition	83	55.33%
High frequency & feeling of urgency of urination	50	33.33%
Cloudy & dark urine	31	20.66%
Haematuria	23	15.33%
Foul smelling urine	12	8%
Abdomen pain	61	40.66%
Fever with chills & rigors	113	75.33%
Nausea & vomiting	58	38.66%
Backpain	22	14.66%
Headache	6	4%
Dribbling of urine	8	5.33%
Oliguria	45	30%

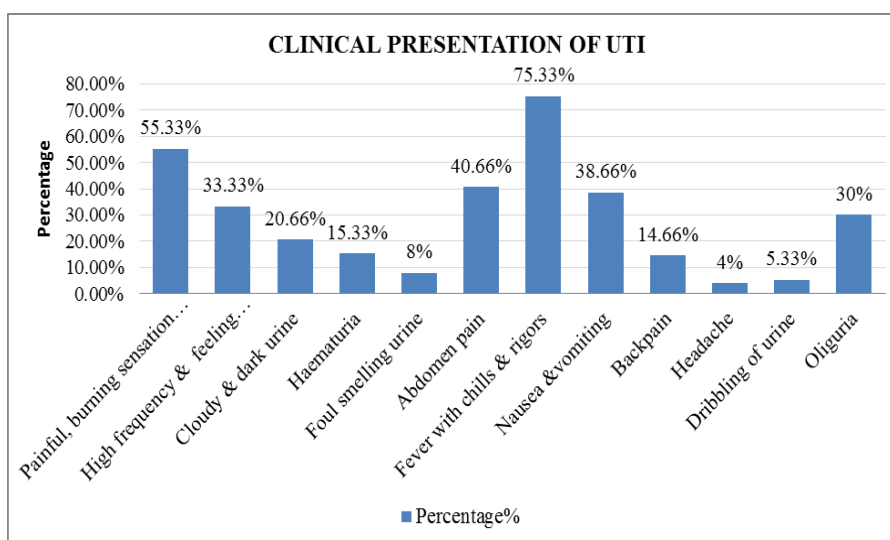


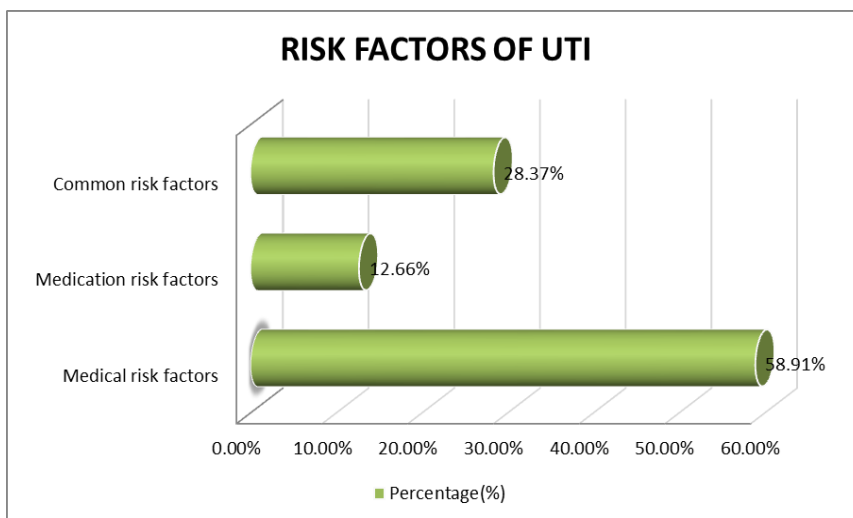
Figure 5.

**6. RISK FACTORS**

Among the risk factors, Medical risk factors (58.91%) were predominant in the development of UTI, followed by common risk factors (28.37%) and Medication risk factors (12.66%).

**Table 6.**

Type of Risk Factor	No. of subjects	Percentage (%)
Medical risk factors	299	58.91%
Medication risk factors	64	12.66%
Common risk factors	144	28.37%



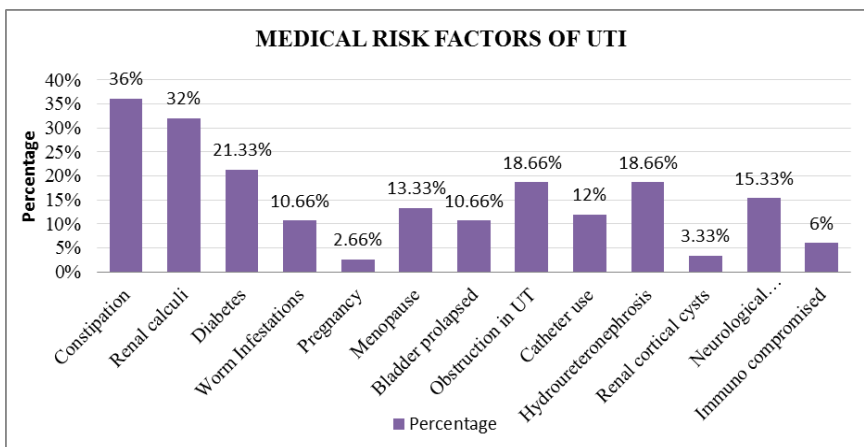
**Figure 6.**

**6.1. Medical Risk Factors**

Among the Medical risk factors constipation was identified as the leading risk factor found in 36% (54 out of 150) of study population accompanied by renal calculi (32%), Diabetes (21.33%). The other risk factors were worm infestations, pregnancy, Immuno compromised patients, neurological abnormalities, Menopause, Bladder prolapse, Obstruction in urinary tract, catheter use, Hydroureteronephrosis, Renal Cortical cysts were found in 10.66%, 2.66%, 6%, 15.33%, 13.33%, 10.66%, 18.66%, 12%, 18.66%, 3.33% respectively. The least significant risk factor was Pregnancy found in 2.66% of total subjects.

**Table 6.1.**

Risk Factors	No. of subjects	Percentage
Constipation	54	36%
Renal calculi	48	32%
Diabetes	32	21.33%
Worm Infestations	16	10.66%
Pregnancy	4	2.66%
Menopause	20	13.33%
Bladder prolapsed	16	10.66%
Obstruction in UT	26	18.66%
Catheter use	18	12%
Hydroureteronephrosis	28	18.66%
Renal cortical cysts	5	3.33%
Neurological Abnormalities	23	15.33%
Immuno compromised	9	6%



**Figure 6.1.**

### 6.2. Medication Risk Factors

Among the medicational risk factors, use of Immuno suppressant drugs was identified as the leading risk factor found in 24% (36 out of 150), of study population accompanied by use of calcium channel blockers 14.66%, use of muscle relaxants 1.33% and use of anti histamines 2.66% having similar significant impact.

Table 6.2.

Medication	No. of subjects	Percentage(%)
Immuno suppressants	36	24%
Calcium channel blockers	22	14.66%
Muscle relaxants	2	1.33%
Anti Histamines	4	2.66%

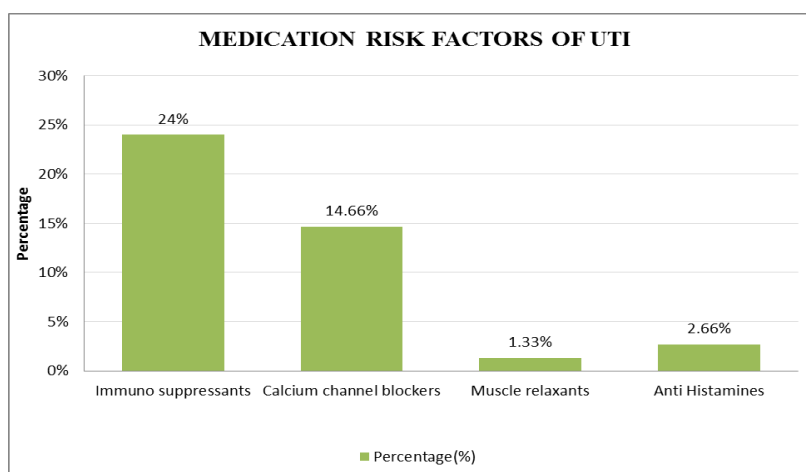


Figure 6.2.

### 6.3. Common Risk Factors

Among the common risk factors reduced water intake was identified as the leading risk factor found in 24% (36 out of 150) of study population accompanied by family history (17.33%) and sexual inter course (14%).

The other risk factors are common toilet usage, voluntary with holding of urine, incomplete bladder emptying and alcohol drinking were found in 8%, 11.33%, 8% and 13.33% respectively.

Table 6.3.

Risk Factors	No. of Subjects	Percentage
Reduced water intake	36	24%
Family History	26	17.33%
Sexual Intercourse	21	14%
Common toilet usage	12	8%
Voluntary with holding of urine	17	11.33%
Incomplete bladder emptying	12	8%
Alcohol drinking	20	13.33%

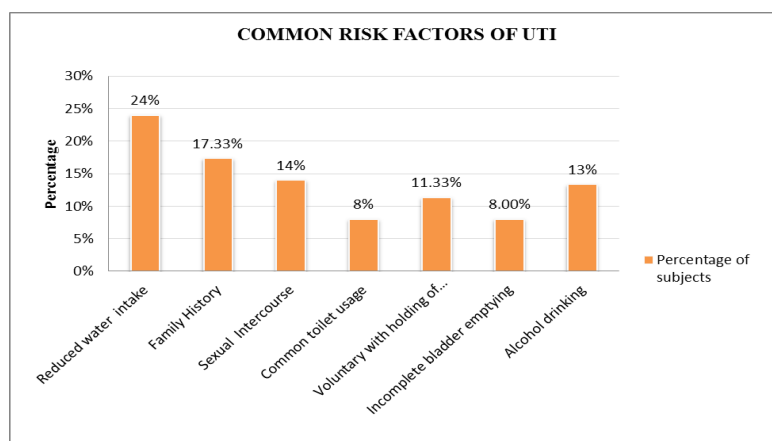


Figure 6.3.



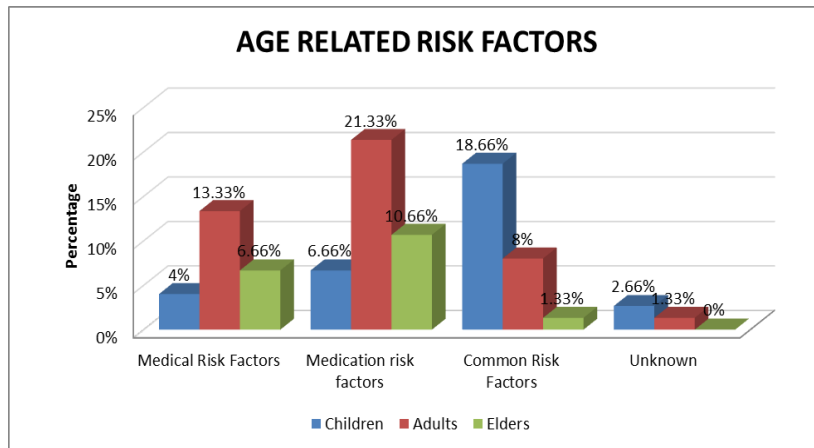
**7. AGE RELATED RISK FACTORS**

A noteworthy finding in our study was identifying the prevalence of risk factors in specific groups. The above mentioned risk factors were assessed individually in

different age groups. The leading risk factors in children was found to be Common Risk Factors (18.66%), in adults was Medical Risk factors (21.33%) and in elders was Medication Risk factors (10.66%).

**Table 7.**

Age group	Medical Risk Factors	Medication risk factors	Common Risk Factors	Unknown
Children	4%	6.66%	18.66%	2.66%
Adults	13.33%	21.33%	8%	1.33%
Elders	6.66%	10.66%	1.33%	0%



**Figure 7.**

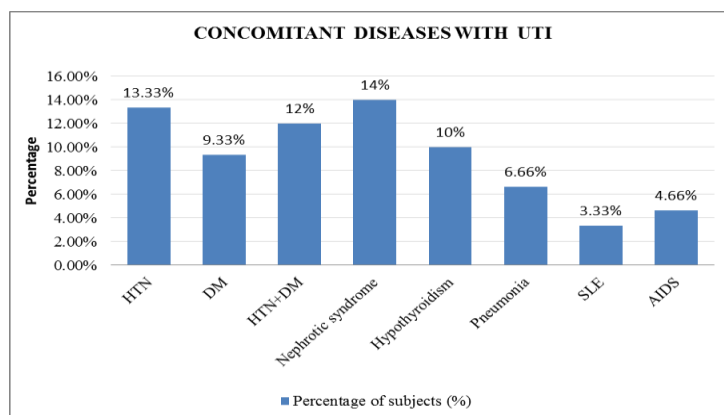
**8. Type of Concomitant Diseases Along With Uti**

In the total study population, Nephrotic syndrome (14%) is most concomitant condition along with UTI, followed by Hypertension (13.33%), Diabetes (9.33%) or both

combination (12%), Hypothyroidism (10%), Pneumonia (6.66%), AIDS (4.66%), SLE (3.33%) are shown there association for the development of UTI.

**Table 8.**

Name of the Disease	No. of subjects	Percentage of subjects (%)
HTN	20	13.33%
DM	14	9.33%
HTN+DM	18	12%
Nephrotic syndrome	21	14%
Hypothyroidism	15	10%
Pneumonia	10	6.66%
SLE	5	3.33%
AIDS	7	4.66%



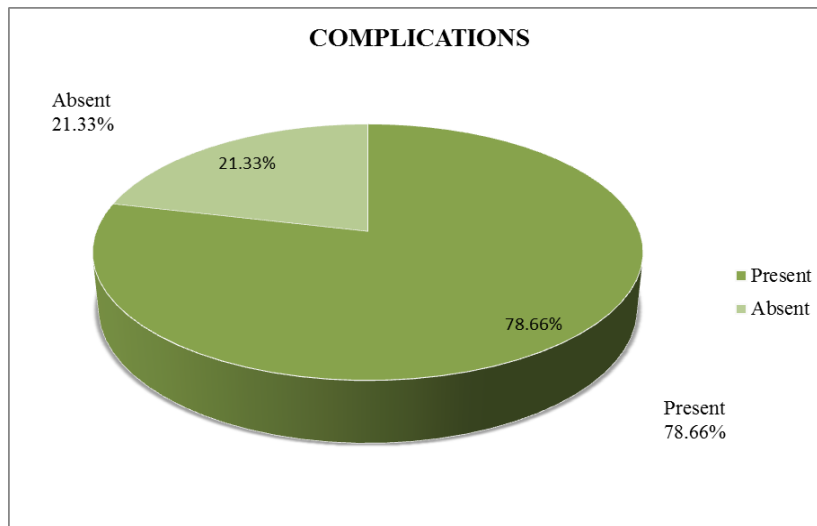
**Figure 8.**

**9. Complications**

In the total study population, 78.66% of the subjects had complications.

**Table 9.**

Complications	No. of subjects	% of subjects
<b>Present</b>	118	78.66%
<b>Absent</b>	32	21.33%



**Figure 9.**

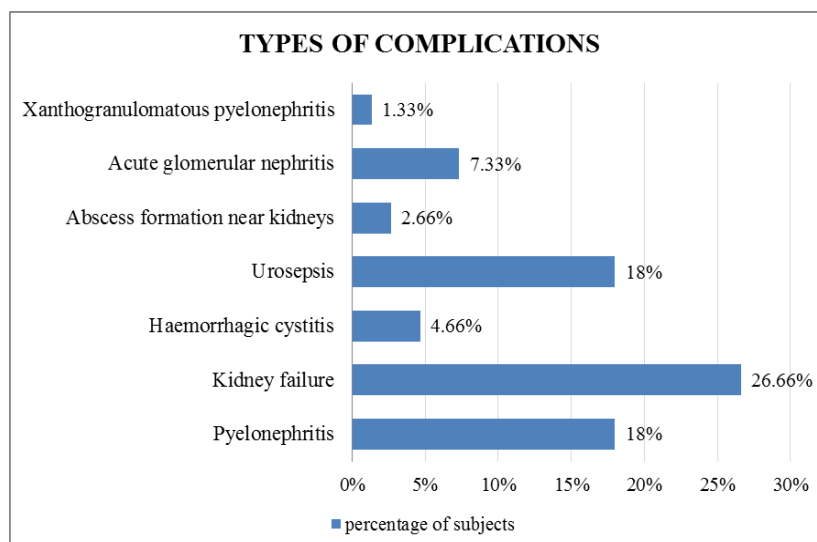
**10. Types of Complications**

Six types of complications were found in study population. Among those who had complication, Kidney failure were predominantly seen in 26.66% of total

population, followed by Pyelonephritis and Urosepsis with 18%, AGN with 7.33%, Haemorrhagic cystitis with 4.66%, Abscess formation near kidneys with 2.66%, Xanthogranulomatous pyelonephritis(1.33%).

**Table 10.**

Complications	No. of subjects	Percentage of subjects%
<b>Pyelonephritis</b>	27	18%
<b>Kidney failure</b>	40	26.66%
<b>Haemorrhagic cystitis</b>	7	4.66%
<b>Urosepsis</b>	27	18%
<b>Abscess formation near kidneys</b>	4	2.66%
<b>Acute glomerular nephritis</b>	11	7.33%
<b>Xanthogranulomatous pyelonephritis</b>	2	1.33%



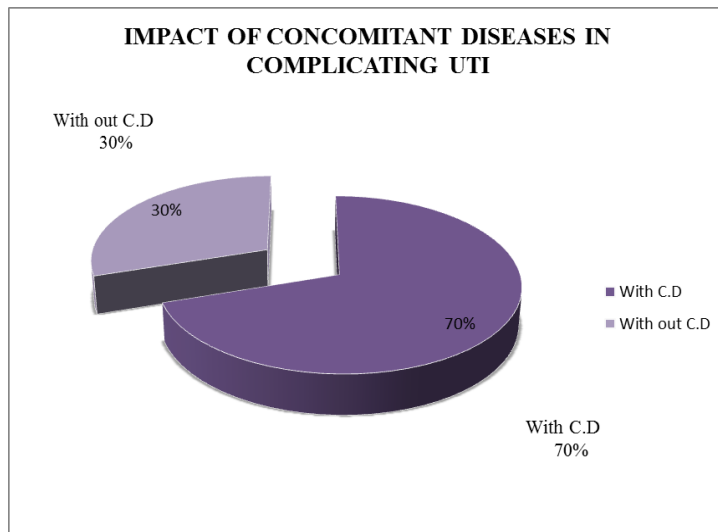
**Figure 10.**

**11. Concomitant Conditions and Complications**

Concomitant diseases had a significant effect on UTI subjects resulting in certain kinds of complications that increase the risk of mortality. Concomitant conditions were found in 70% of subjects with complications.

**Table 11.**

Pts. With complications	% of subjects
With C.D	70%
With out C.D	30%



**Figure 11.**

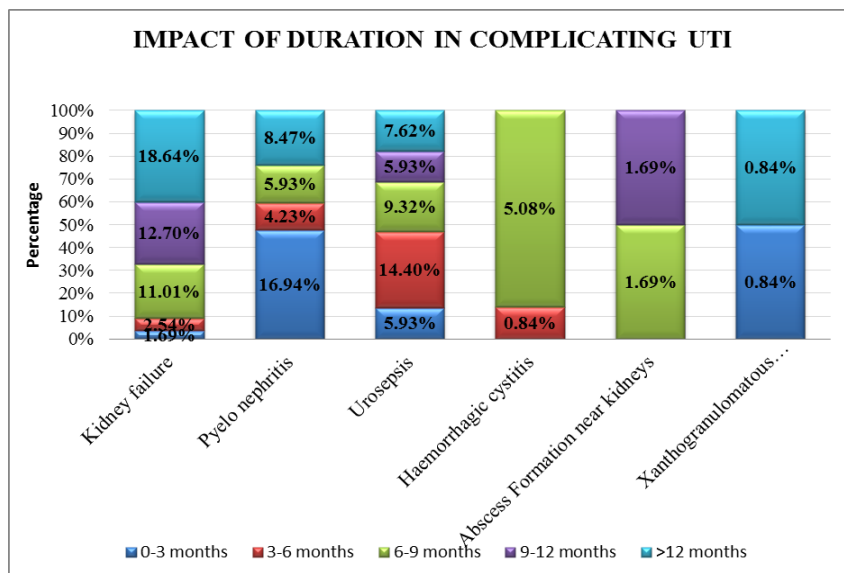
**12. Duration Between Uti And Complications**

The different time intervals are observed in the development between UTI and its complications. Pyelonephritis (16.94%) is more likely to develop in first 0-3 months after development of UTI. Urosepsis

(14.40%) have more chances to develop within 3-6 months of time interval. Kidney failure is more likely to develop with 11.01%, 12.7%, 18.64% in 6-9 months, 9-12 months, > 12 months respectively.

**Table 12.**

Duration	Kidney failure	Pyelo nephritis	Urosepsis	Haemorrhagic cystitis	Abscess Formation near kidneys	Xanthogranulomatous pyelonephritis
0-3 months	1.69%	16.94%	5.93%	0%	0%	0.84%
3-6 months	2.54%	4.23%	14.40%	0.84%	0%	0%
6-9 months	11.01%	5.93%	9.32%	5.08%	1.69%	0%
9-12 months	12.7%	0%	5.93%	0%	1.69%	0%
>12 months	18.64%	8.47%	7.62%	0%	0%	0.84%



**Figure 12.**

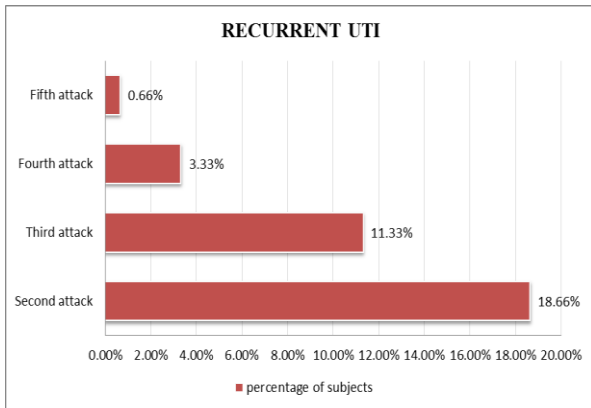
**13. RECURRENT UTI**

Among the total population(150), 51 subjects are found to be recurrent attacks of UTI. Out of 51 subjects, 28

were found to be second attack (18.66%), followed by third attack (11.33%), fourth attack (3.33%) and fifth attack (0.66%).

**Table 13.**

Attacks	No. of subjects	Percentage of subjects%
<b>Second attack</b>	28	18.66%
<b>Third attack</b>	17	11.33%
<b>Fourth attack</b>	5	3.33%
<b>Fifth attack</b>	1	0.66%



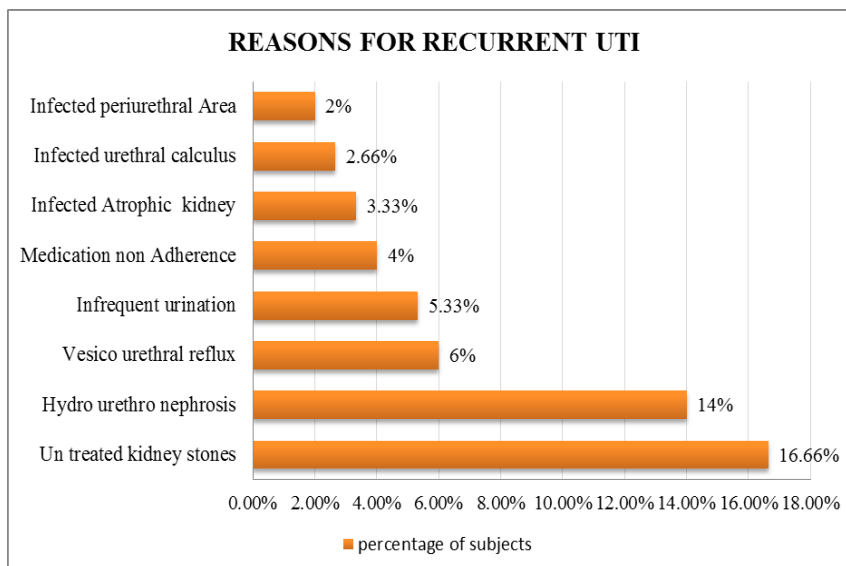
**Figure 13.**

**14. Reasons For Recurrent Uti**

Out of 150 population untreated kidney stones (25 out of 150 subjects) 16.66%, was found to be the most prevalent reason for the reoccurrence of UTI. Followed by the conditions hydrourethronephrosis, vesico urethral reflux, infrequent urination, medication non adherence, infected Atrophic kidney, infected urethral calculus, infected peri urethral area (14%), (6%), (5.33%), (4%),(3.33%), (2.66%), (2%) respectively.

**Table 14.**

Reasons	No. Of Subjects	Percentage of subjects(%)
<b>Un treated kidney stones</b>	25	16.66%
<b>Hydro urethro nephrosis</b>	21	14%
<b>Vesico urethral reflux</b>	9	6%
<b>Infrequent urination</b>	8	5.33%
<b>Medication non Adherence</b>	6	4%
<b>Infected Atrophic kidney</b>	5	3.33%
<b>Infected urethral calculus</b>	4	2.66%
<b>Infected periurethral Area</b>	3	2%



**Figure 14.**

**15. Treatment Approach**

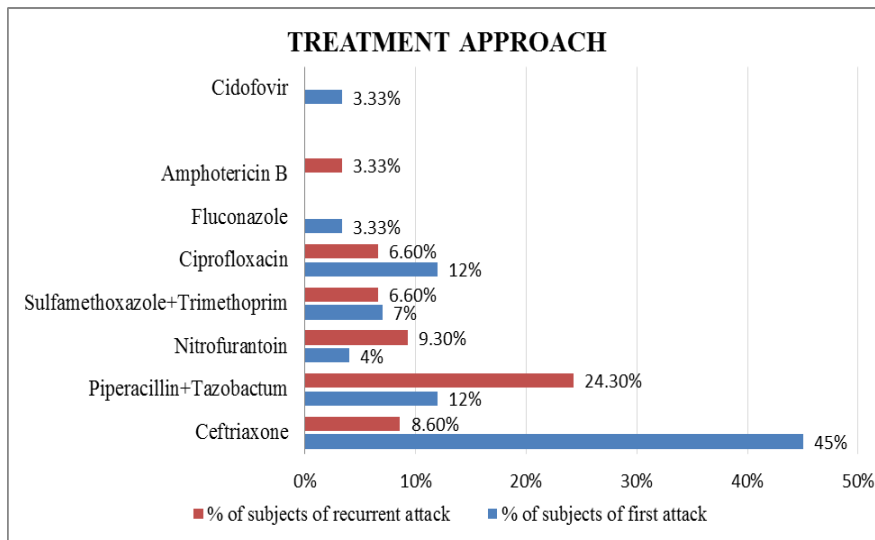
Different treatment approaches were used in treating our study population. Among total population (150), subjects of first attack of bacterial UTI were found to be commonly treated with ceftriaxone (45%), followed by Piperacillin+ Tazobactam and ciprofloxacin with 12%. Subjects of Recurrent attacks were found to be treated frequently with Piperacillin+Tazobactam (24.3%), accompanied by Nitrofurantoin with 9.3%.

In fungal UTI, subjects of first attack were found to be treated with fluconazole(3.33%) and subjects of recurrent fungal UTI were treated with AmphotericinB.

In viral UTI, subjects were found to be treated with cidofovir with 3.33%.

**Table 15.**

Treatment	% of subjects of first attack	% of subjects of recurrent attack
<b>Ceftriaxone</b>	45%	8.6%
<b>Piperacillin+Tazobactam</b>	12%	24.3%
<b>Nitrofurantoin</b>	4%	9.3%
<b>Sulfamethoxazole+ Trimethoprim</b>	7%	6.6%
<b>Ciprofloxacin</b>	12%	6.6%
<b>Fluconazole</b>	3.33%	0%
<b>Amphotericin B</b>	0%	3.33%
<b>Cidofovir</b>	3.33%	0%



**Figure 15.**

**16. Drug Interactions**

Out of 150 patients who were given polytherapy, 5 major drug interactions were found to be significant while other 2 are moderate interactions.

**Table 16.**

Drug-Drug Interaction	No. of patients	Percentage of subjects(%)
<b>Ondansetron-Tramadol</b>	4	57.14%
<b>Ciprofloxacin-Tramadol</b>	2	28.57%
<b>Trimethoprim-Losartan</b>	1	14.28%

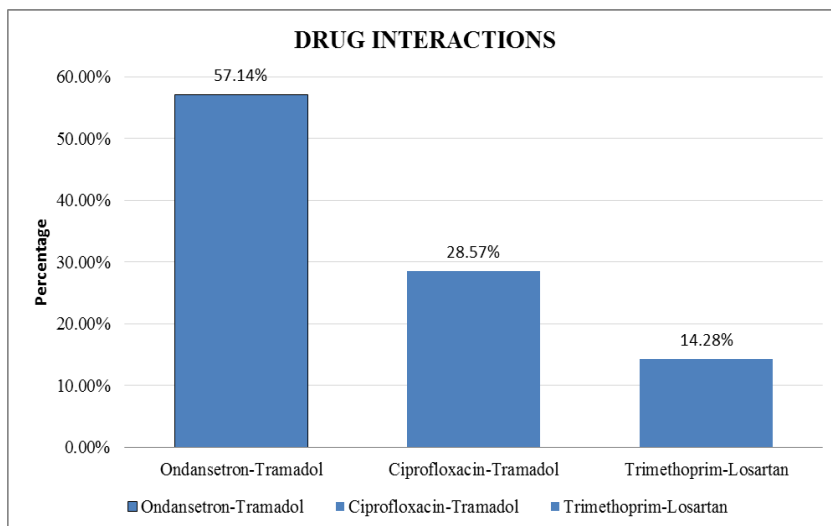


Figure 16.

**17. ADR**

Out of 150 patients, 5 patients experienced ADRS. Out of which 3 patients had skin rashes due to Piperacillin, one patient had episodes of diarrhea and one patient had dyspepsia.

Table 17.

Drug	No. of patients	Percentage of subjects(%)
Piperacillin	3	2%
Ceftriaxone	1	0.66%
Nitrofurantoin	1	0.66%

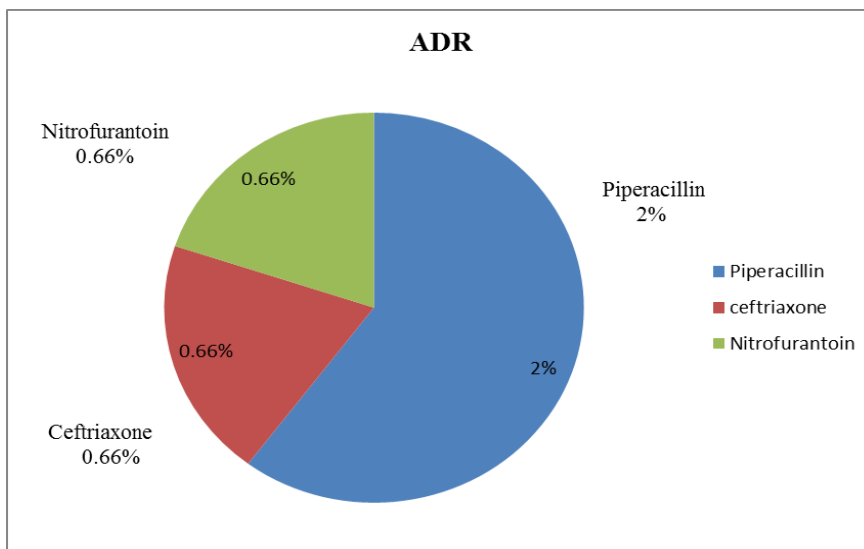


Figure 17.

**CONCLUSION**

In our study we concluded that females were more prone to develop UTI than males. Incidence of UTI was high in age group 0-15 yrs and in rural subjects. Bacteria was identified as a major cause of UTI. In bacteria, E.coli is major cause of the bacterial UTI. Fever with chills and rigors are identified as a most experienced symptom in almost all subjects. Medical risk factors was identified as a major risk factors indicating that constipation plays a dominant role for development of UTI. The impact of concomitant conditions in complicating UTI has been observed in our study. Nephrotic syndrome is the condition associated with UTI in majority of the subjects.

More than three-fourth of the population subjects had complications indicating that kidney failure is found to be greater extent with in 6-12 months, followed by pyelonephritis with in 0-3 months after development of UTI. 51 subjects were being experiencing with recurrent UTI attacks, in which 2<sup>nd</sup> attack of UTI subjects were predominant. Recurrent UTI was found in majority of the subjects with most of them having untreated kidney stones followed by hydroureteronephrosis. Ceftriaxone was majorly used first line drug in uncomplicated UTI, while Piperacillin+Tazobactam was majorly used in recurrent attack followed by Nitrofurantoin. In our study, we have found 5 drug interactions were significant drug

interaction while other 2 are moderate interactions and 5 ADRS were observed.

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