



## “A STUDY TO DIFFERENTIATE UPPER AND LOWER URINARY TRACT INFECTION WITH BLOOD CRP LEVELS”

**Dr. Motupalli Apoorva**

MBBS, Post graduate of General Medicine, Kurnool Medical College, Kurnool.

**Dr. Poola Varshitha**

MBBS, Post graduate of General Medicine, Kurnool Medical College, Kurnool.

**Dr. M. Maheshwar Reddy**

MD, Professor in General Medicine, Kurnool Medical College, Kurnool.

### ABSTRACT

**Background:** In UTI differentiation between upper and lower urinary tract infection has prognostic significance. **Objectives:** To explore a diagnostic method to differentiate for Upper and Lower Urinary tract infections. The present study was undertaken to determine the levels of CRP in patients with the diagnosis of urinary tract infection and to compare the levels of CRP in relationship to upper and lower UTI. **Methods:** 100 Patients with urine samples showing positive urine culture and patients showing symptoms of UTI were classified based on symptoms, clinical examination, investigations into upper and lower urinary tract infection. Serum C - reactive protein levels were estimated in all the study subjects. **Results:** In our study, the mean value of CRP in subjects with upper UTI (159.20) was significantly higher than the mean value of lower UTI (16.16). Statistical analysis was done between these two variables based on chi square test, for which the p value was  $<0.001$  ( $<0.05$ ) which is statistically significant. **Conclusion:** Serum C - reactive protein level measurements can be done in patients with symptoms of urinary tract infection especially in individuals with risk factors such as Diabetes Mellitus to make an prediction of upper urinary tract involvement. CRP levels can also be used for observing pathogenesis and curative effect, which is a non-invasive test and is not associated with morbidity and also economically feasible in tertiary and peripheral setting.

### KEYWORDS : Urinary tract infection, Localisation, C-Reactive protein

#### INTRODUCTION:

Urinary tract infection may involve only the lower urinary tract or both the upper and lower tracts. The term cystitis has been used to describe the syndrome involving dysuria, frequency, urgency, and occasionally suprapubic tenderness. However, these symptoms may be related to lower tract inflammation without bacterial infection and can be caused by urethritis (e.g., gonorrhea or chlamydia urethritis). Furthermore, the presence of symptoms of lower tract infection without upper tract symptoms by no means excludes upper tract infection, which is also often present.

Acute pyelonephritis describes the clinical syndrome characterized by flank pain, tenderness, or both, and fever, often associated with dysuria, urgency, and frequency. However, these symptoms can occur in the absence of infection (e.g., in renal infarction or renal calculus).

A more rigorous definition of acute pyelonephritis is the previously described syndrome accompanied by significant bacteriuria and acute infection in the kidney. Uncomplicated urinary tract infection refers to infection in a structurally and neurologically normal urinary tract.

Complicated urinary tract infection refers to infection in a urinary tract with functional or structural abnormalities, including indwelling catheters and calculi [1]. In general, infection in men, pregnant women, children, and patients who are hospitalized or in health care-associated settings may be considered complicated. In the patient with complicated infection, infecting microorganisms are more likely to be resistant to antimicrobial agents.

#### AIMS AND OBJECTIVES:

To explore a diagnostic method to differentiate for upper and lower urinary tract infections.

#### MATERIALS AND METHODS:

##### Place Of Study:

Government General Hospital, Department of General Medicine, Kurnool medical college, Kurnool, Andhra Pradesh.

##### Study Design:

Single center observational study

##### Sample Size:

100 patients with urinary tract infection attending General Medicine OPD or admitted in wards based on inclusion & exclusion criteria.

#### Study Duration:

1 year

#### Study Plan:

Based on previous studies, the mean value of C-reactive protein in upper urinary tract infection was 116.9 mg/L and lower urinary tract infection was 14.5 mg/L. About 100 patients attending General Medicine OPD and admitted in General Medicine wards were subjected to detailed history taking, clinical examination and investigations such as CBC, Urine culture & Sensitivity, Serum CRP levels, USG KUB, CT KUB (whenever necessary).

#### Inclusion Criteria:

Patients with urine samples showing positive urine culture and patients showing symptoms of UTI.

#### Exclusion Criteria:

Patients with inflammatory conditions other than UTI, history of trauma, pregnancy, USG proven renal calculi.

#### RESULTS

- Among 100 patients with UTI, 13% belong to the age group of 20-40 years, 41% between 41-60 years, 42% between 61-80 years and 4% of them was above 80 years.
- Among 100 cases, 26 were males and 74 were females.
- The most common accompanying illness in patients include DM only comprising of about 38%, plus BPH and CerebroVascular Accident each occupying 2%.
- The most common symptoms in patient with lower urinary tract infection include dysuria (85%), lower abdominal pain (25%), urgency (16%), frequency (13%).
- The symptoms in patients with infection involving upper urinary tract include fever (96%), chills (38%), vomiting (36%), loin pain (18%), and diabetic ketoacidosis (13%)
- The bacterial organisms in UTI was of gram negative bacilli of which E.coli was most common present in about 73%.
- Patients with a diagnosis of lower UTI occupy 55% and upper UTI about 45%.
- The mean value of CRP in subjects with upper UTI (159.20) was significantly higher than the mean value of lower UTI (16.16).

LOCATION OF UTI	FREQUENCY	PERCENT
LOWER	55	55.0
UPPER	45	45.0
Total	100	100.0

**Group Statistics:**

	Location of UTI	N	Mean	Std. Deviation	Std. Error Mean	Z test
CRP LEVEL Mg/L	Lower	55	16.1564	10.40704	1.40329	8.574**
	Upper	45	159.2089	49.12149	7.32260	

\*\*p&lt;0.001

**DISCUSSION:**

In UTI differentiation between upper and lower urinary tract infection has prognostic significance. The distinction between lower and upper tract infection is more important because renal involvement can induce parenchymal scarring that may lead to arterial hypertension and chronic renal failure.

The present study was undertaken to determine the levels of CRP in patients with the diagnosis of urinary tract infection and to compare the levels of CRP in relationship to upper and lower UTI. In the present study UTI was commonly seen in the age group between 40-80 years(83%) and predominantly involved female patients(74%).UTI was less commonly seen in young patients. In the age group of 20-40 years, only 13% had UTI. A similar result was observed by ML Pursnani et al. in which 65.52% cases were females and rest 34.48% cases were males. Diabetes mellitus which have been considered as an important risk factor for UTI were evaluated in the present study. Majority of patients in this study have DM accounting for 38%% and 49% of cases presents with no comorbidities. In India, large number of populations is found be diabetics accounting for 32 million at present and is expected to rise to 57.2 million by 2025.

The results in present study showed that mean CRP level was found to be higher among patients with upper urinary tract infection (159.21mg/L) compared to lower urinary tract infection(16.16 mg/L). Bharath MS et al. have studied the levels of CRP levels in patients with urinary tract infection and in their study the mean value of C- reactive protein in upper urinary tract infection was 116.9 mg/L and lower urinary tract infection was 14.5 mg/L . This shows that C-reactive protein is significantly raised in upper urinary tract infection. means that C-reactive protein can be used to diagnose inflammation in upper urinary tract infection.

Xu et al. have found that the serum CRP levels of the Acute Pyelonephritis group were significantly higher than those of the lower UTI group ( $68.17 \pm 39.42$  mg/l vs.  $21.39 \pm 14.92$  mg/l,  $P < 0.01$ , ). Correlation analysis demonstrated that CRP were in a significantly positive correlation with a correlation coefficient of 0.729 ( $P < 0.01$ ).

The organisms which were isolated in patients with urinary tract infection include E.coli (73%), Klebsiella (4%), Pseudomonas (4%), Proteus (2%), Acinetobacter (1%) and culture was normal in 16% of the patients who was previously treated with antibiotics. Moreover longer follow up studies with persistence of same degree of elevation of C- reactive protein may point to high risk cases which are likely to develop chronic parenchymal renal disease with hypertension in future.

**CONCLUSION:**

- In the present study, serum CRP levels were found to be significantly higher in patients with upper urinary tract infection compared to lower urinary tract infection.
- Serum C-Reactive Protein level measurements can be done in patients with symptoms of urinary tract infection especially in individuals with risk factors such as Diabetes Mellitus to make an prediction of upper urinary tract involvement.
- Early initiation of empirical antibiotic therapy can be done as for Complicated UTI in patients with higher CRP levels to prevent renal scarring.
- CRP levels can also be used for observing pathogenesis and curative effect, which is a non-invasive test and is not associated with morbidity and also economically feasible in tertiary and peripheral setting.

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