Role of Blood C – Reactive Protein Levels in Upper Urinary Tract Infection and Lower Urinary Tract Infection in Adult Patients (>16 years)

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Abstract

Aim: Role of blood C – reactive protein levels in upper urinary tract infection and lower urinary tract infection in adult patients (>16 years).

Material and Methods: Study included 2 groups of patients – Test group (n=58). Control group (n=28). Test group further classified into 2 groups- a). Patients having upper urinary tract infection b). Patients having lower urinary tract infection. Patients were subjected to following tests – complete hemogram, blood C-reactive protein levels, urinalysis.

Results: The mean value of C-reactive protein in the cases of upper urinary tract infection 127.33 mg/l which is statistically significantly raised when compared to control(t-value 12.370 and p-value<0.01). C-reactive protein was significantly raised in upper urinary tract infection in comparison to control group( p<0.01), while in lower urinary tract infection this difference was insignificant (p<0.05).

Conclusion: C-reactive protein has a good diagnostic role in differentiating upper and lower urinary tract infection. The simple size of our study is very small to say these authentically, hence, further studies of large number of cases is required.

Introduction

In urinary tract infection differentiation between upper and lower urinary tract infections is recommended because of therapeutic and prognostic consequences. Various diagnostics approaches like clinical history, physical examination, urine and blood analysis are often inconclusive. More specific examination like ACB assay (antibody coated bacteria in urine), serum antibodies against bacteria, urethral catheterisation, bladder washout test, gallium scans, definitely contribute to localization of urinary tract infection but they are time consuming, and invasive, hence cannot be used routinely. Indirect non-invasive method of localizing urinary tract infection into upper and lower tract has been described ,such important method include C- reactive protein in blood.¹ ² ³

Material and Methods

This study was done in P.G. Department of Medicine, S.N. Medical College, Agra, India. With aims and objectives to study Role of blood C – reactive protein levels in upper urinary tract infection and lower urinary tract infection in adult patients (>16 years).

The study was conducted in 58 symptomatic, urine culture and sensitivity positive, but free from other diseases that may increase C-reactive protein levels , patients above 16 years of age. 28 apparently healthy, age and sex matched individuals free from diseases that can raise C-reactive protein were taken as control group. Urinary tract infection above the urinary bladder is considered as upper urinary tract infection, and below that as lower urinary tract infection. Patients were categorized into upper and lower urinary tract infection based on clinical features. Those with pain, discomfort, frequency, urgency and dysuria were considered as having lower urinary tract infection (LUTI), while temperature more or equal to 38.5°C with loin pain/high abdominal pain or renal angle tenderness were considered as indicative of upper urinary tract infection (UUTI).⁴ The following investigations were carried out in both study and control groups.

1. Complete hemogram
2. Urine analysis and culture sensitivity
3. Plasma C-reactive protein levels: quantitative estimation of C-reactive protein by immunoturbidimetric method. Normal value of C-reactive protein was < 5 mg/L
4. Abdominal and pelvis ultrasonography: sonography was performed by using 3.5 MHz mechanical sector scanner

In our study 3 clean catch midstream urine samples with proper instructions were taken for culture and those showing >10⁵ organisms/ml were taken as positive. Patients with all three samples positive were included in the study. Urine samples were taken by suprapubic aspiration when it was not possible to collect midstream sample. Patients with inflammatory conditions other than UTI, history of trauma, pregnancy, USG proven stones were excluded from study.

Results

Out of total n=58 cases with urinary tract infection, 38 (65.52%) cases were females and rest 20 (34.48%) cases were males. Out of total 58 cases of urinary tract infection, 24 were of upper urinary tract infection, and 34 were of lower urinary tract infection on the basis of clinical features. On urine culture E.coli was grown in 38


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 done to evaluate the role of C-reactive protein in upper urinary tract infection and lower urinary tract infection.

C-reactive protein is an acute phase reactant produced in liver. In this study serum C-reactive protein value of upto 5mg/L was taken as normal. Mean value of C-reactive protein in upper urinary tract infection was 127.33 mg/L and lower urinary tract infection was 4.7 mg/L. In control group C-reactive protein value in between the normal range i.e. 0-5 mg/L. This shows that C-reactive protein is significantly raised in upper urinary tract infection. This means that C-reactive protein can be used to diagnose inflammation in upper urinary tract infection. This confirms the observation of Gervaix, Alain MD et al,7 Stanley8 Hallerstein et al (1982),9 Jodal and Hanson (1976)10,11 who studied the usefulness of sequential determination of C-reactive protein value in acute childhood pyelonephritis.12 A study of Chieh-Wei Yen et al showed that longer febrile period and high C-reactive protein level are good indicators of prediction of the risk of pyelonephritis in urinary tract infection patients. Fever or an elevated C-reactive protein level often accompanies acute pyelonephritis and is found in rare cases of cystitis but also occurs in infections other than pyelonephritis.13 Till date there is no such study available in adult age group. The results of our study matches with the results of the studies done in the paediatric age group though the mechanism of urinary tract infection may be different in paediatric age group, so we can extrapolate these results to the adult age group to estimate role of blood C-reactive protein in upper urinary tract infection and lower urinary tract infection.

Follow-up C-reactive protein estimation was done in 8 patients of upper urinary tract infection showed a rapid decline in C-reactive protein levels after initiation of antibiotics, reaching near normal values of 7-14 days of treatment. Fall in C-reactive protein was coupled with improvements in general conditions as well as changes in ultrasound findings.

Conclusion

By doing this study we tried to establish the credibility of C-reactive protein measurement in upper urinary tract infection and lower urinary tract infection which is non-invasive test and is not associated with morbidity and also economically feasible in tertiary and peripheral setting. Following results drawn from our study we can say that C-reactive protein is a good diagnostic tool in upper urinary tract infection and lower urinary tract infection, as it is significantly raised in upper urinary tract infection (127.33 mg/L) with comparison to lower urinary tract infection (4.7) and control group (p<0.01). Sample size of our study is very small to say these authentically, hence, further studies large number of cases is required. 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.

References