ORIGINAL RESEARCH PAPER

Volume-7 | Issue-7 | July-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# C-REACTIVE PRTEIN (CRP) LEVELS ASSOCIATION WITH INFECTIONS IN CRITICALLY ILL PATIENTS

Medicine

**Avadhesh N Khare** Gandhi Medical College,Hamidia Hospital, Bhopal (M.P.) India.

**Sonil Srivastava*** Gandhi Medical College,Hamidia Hospital, Bhopal (M.P.) India. *Corresponding Author

## ABSTRACT

C-reactive protein (CRP), an acute-phase protein synthesized by the liver following stimulus by various cytokines markedly increase within hours after infection or inflammation.

A prospective cohort study was conducted in a 30 bed Emergence medical ward in a Hamidia Hospital, Bhopal (M.P.) India .Patient were divided in 3 groups based on CRP at time of admission. In gp 1 CRP <1mg/dl, gp2 1-10mg/dl & gp 3 >10mg/dl. The incidence of infection was directly related to the CRP level on ICU admission. [gp1 27.77% vs gp3 73.07% p<.05 ].Hence serum C-reactive protein (CRP) measurement can be used in the early diagnosis of infection in ICU patients.Follow-up measurements of serum C-reactive protein anticipate the appropriateness of antibiotic therapy.Because the CRP test is widely available and relatively cheap, it is likely to be widely used.

## KEYWORDS

*C-reactive protein,ICU patients,infection*

### INTRODUCTION-

Serum levels of C-reactive protein (CRP), an acute-phase protein synthesized by the liver following stimulus by various cytokines , markedly increase within hours after infection or inflammation[1].The inflammatory conditions that have been described to be associated with a high CRP concentration may include infections such as bacterial infections [2], fungal infections [3] and severe viral infections including severe acute respiratory syndrome [4], systemic inflammatory diseases such as rheumatoid arthritis [5,6] tissue necrosis such as myocardial infarction [2,7] and necrotising pancreatitis [8], multiple trauma [9], neoplasia [10,11], vasculitis during the flare-ups of systemic lupus erythematosus (SLE) [12] and possibly in some drug overdoses [13].

Many studies shows increased CRP in patients with sepsis[14-19].

A progressive increase in CRP over 200 mg/l is very unusual in the absence of infective complications, especially if it occurs later than three days after the onset of trauma [20]

Furthermore, studies showed that a sudden rise in daily CRP concentrations can be useful as an early warning sign of nosocomial infections in critically ill patients [21,22], and as such, it may alert clinicians to initiate investigations such as microbiological cultures, radiological imaging or empirical antimicrobial therapy [23].

The dynamic response of the CRP concentrations to treatment over a period of days is much more useful than a single value [ 24,25 ].

### CRP concentration in blood

In healthy young adult volunteer blood donors, the median concentration of CRP is 0.8 mg/l, the 90th centile is 3.0 mg/l, and the 99th centile is 10 mg/l [26], Shine, B, de Beer et al), but, following an acute-phase stimulus, values may increase from less than 50 µg/l to more than 500 mg/l, that is, 10,000-fold.

### LIMITATIONS

Third, the absolute value of CRP is not sensitive or specific enough to discriminate between bacterial, fungal or severe viral infections [2-4] and neither between gram-positive and gram-negative organisms.

### MATERIALAND METHOD

The study was conducted in the Departments of Medicine at Gandhi Medical College & Hamidia Hospital, Bhopal from April 2010 to Nov 2011. The study subjects selected from patients who are admitted in the emergency medical wards.Patient were divided in 3 groups based on CRP at time of admission. In gp 1 CRP <1mg/dl, gp2 1-10mg/dl & gp 3 >10mg/dl.

### TYPE OF STUDY

Prospective cohort study

### Inclusion Criteria

.Patients with acute inflammatory condition like Myocardial Infarction, STROKE,SYSTEMIC INFLAMATORY RESPONSE SYNDROME SEPISIS AND OTHER CRITIECAL ILLNESS.

### Exclusion Criteria

1.Patient with alcohol consumption more than 20 gm per day.

2.Patient with chronic inflammation like rheumatoid arthritis, gout. Infection was diagnosed according to usual clinical, laboratory, and microbiological parameters.

### STATISTICALANALYSIS

All the patient divided in three groups based on their CRP at time of admission. The data for all the groups are expressed as mean ± SD. Continuous variables were compared with analysis of variance for repeated measurements. Proportions were compared using the Z test. Chi square test was done to determine the significance of association of infection with CRP.

### OBSERVATIONS

**TABLE NO. 1 DISTRIBUTION OF PATIENT IN CRP GROUPS AT ADMISSION**

| | NO OF PATIENTS | PERCENTAGE |
|---|---|---|
| Group 1 - <1 | 36 | 37.89% |
| Group 2 - 1-10 | 33 | 34.70% |
| Group 3 - >10 | 26 | 27.36% |

**TABLE NO. 2 SEX DISTRIBUTION IN GROUPS**

| Sex | Group 1 (n=36) | | Group 2 (n=33) | | Group 3 (n=26) | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Male | 17 | 47.22% | 15 | 45.45% | 13 | 50% |
| Female | 19 | 52.77% | 18 | 54.54% | 13 | 50% |

**TABLE NO. 3 AGE DISTRIBUTION IN GROUPS**

| Age | Group 1 | | Group 2 | | Group 3 | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| 25-34 | 3 | 8.33 | 5 | 15.15 | 3 | 11.53 |
| 35-44 | 6 | 16.66 | 7 | 21.2 | 5 | 19.2 |
| 45-54 | 10 | 27.77 | 6 | 18.1 | 9 | 36.15 |
| 55-64 | 9 | 25 | 11 | 33.3 | 6 | 23.07 |
| 65-74 | 7 | 19.44 | 3 | 9.09 | 3 | 11.53 |
| 75-84 | 1 | 2.77 | 1 | 3.03 | 0 | 0 |

Major number of patient are between age 35-64 .

**TABLE NO. 4 DISTRIBUTION OF INFECTED PATIENT IN CRP GROUPS AT ADMISSION**

| | NO OF PATIENTS | PERCENTAGE |
|---|---|---|
| Group 1 - <1 | 10 | 27.77% |
| Group 2 - 1-10 | 19 | 57.57%! |
| Group 3 - >10 | 19 | 73.07% ! # |

! p <.05 Vs Group 1
*#p <.05 Vs Group* 2

Group 3 has statistically significant increase in infection than group 1 & 2(p<.05). Group 2 has statistically significant increased in infection than group 1(p<.05).

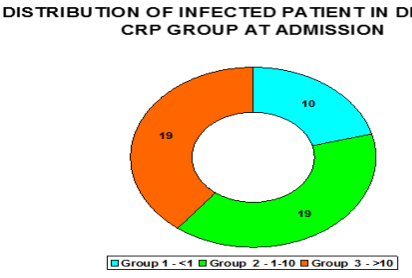


**Figure no 1**

## RESULTS

Patient divided in 3 groups based on CRP at time of admission. In group 1 CRP<1mg/dl group2 1-10mg/dl & group 3 >10mg/dl. Patients with high CRP levels had significantly higher infection.

The max no. of patient between 35-64..The mean age almost same in each group[ gp153.4+13.36 gp 2 51.6+13.18 gp3 51.5+13.6.p>.05] The incidence of infection was directly related to the CRP level on ICU admission [gp1 27.77% vs gp2 57.57% vs gp3 73.07% p<.05] .

## DISCUSSION

Reny jl, vuagnat a, ract c, benoit mo, safar m, fagon jy[27]. evaluate diagnostic and prognostic values of CRP dosage in critically ill patients crp in combination with sirs was useful to diagnose infection in icu patients; a crp decrease > or = 50 mg/l between admission and day 4 was the best predictor of recovery.

Due to the fast rise in crp concentrations, critically ill patients will often already have raised CRP levels on ICU admission. The relatively short half-life of approximately 19 h makes it a useful monitor for follow-up of inflammatory response, infection, and antibiotic treatment. In addition, laboratory tests for CRP are easily available and less costly than cytokine tests.

Póvoa P, Coelho L, et al[28]Concluded that CRP was a better marker of infection than temperature,this is in accordance to our study.

Lisboa T, Seligman R,[29] similarly conclude CRP is a useful biochemical surrogate of bacterial burden in patients with ventilator-associated pneumonia. Follow-up measurements of serum C-reactive protein anticipate the appropriateness of antibiotic therapy Almeida E, Moreira P, Fernandes A[30], .Found a plasma CRP of 50 mg/l or more was highly suggestive of sepsis .

Parnaby RM, Eaton SE, Shafi MS, Bell D[31]. assess the value of routine serum C-reactive protein (CRP) measurement in the early diagnosis of infection in ICU patients. Neither absolute CRP levels nor rates of change in CRP were found to relate significantly to proved infection ,which was not in accordance with our study.

## CONCLUSIONS-

From our study it is concluded that serum levels of CRP should be used in the early diagnosis of infection in ICU patients.Follow-up measurements of serum CRP anticipate the appropriateness of antibiotic therapy .Because the CRP test is widely available and relatively cheap, it is likely to be widely used.

Trends of CRP concentrations during the first 48 h of ICU admission can be important in predicting the outcome and perhaps timely modifying the therapeutic interventions. However, further studies are needed .

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