

## Comparison and detection the level of C Reactive Protein in different age groups on patients of Rheumatoid Arthritis at tertiary care centre of Kanpur (U.P.)

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### Abstract

**Background:** C-reactive protein (CRP) is a phylogenetically highly conserved plasma protein, with homologous in vertebrates and many invertebrates that participate in the systemic response to inflammation. So the significance of this study is to detect the levels of CRP in RA patients and its association with different age groups.

**Objectives:** 1. To detect the levels of CRP in RA patients. 2. To compare the CRP levels in different age groups.

**Material and Methods:** A hospital based study was conducted among 180 rheumatoid arthritis patients who attended the medicine OPD in 1 year. A predesigned questionnaire was used to collect the particulars of the patient. 5ml blood sample was collected from patients after informed consent. CRP levels were detected by semi-quantitative method. Appropriate statistical methods were used for defining the objectives. Epi info software was used for analysis purpose.

**Results:** as the age increases the CRP levels increases ( $2.96 \pm 0.816$ , CI= 2.78-3.14) for the age group of 20-40 years. And ( $3.12 \pm 0.932$ , CI= 3.02-3.39) for 41-60 and above. Also the level of CRP increases it is considered only in mild category.

**Conclusion:** Proper investigation during the signs and symptoms must be done. As CRP increases with age all the necessary prevention and diagnostic techniques must be used.

**Keywords:** C reactive protein, Rheumatoid arthritis, semi- quantitative method

### 1. Introduction

C-reactive protein (CRP) is a phylogenetically highly conserved plasma protein, with homologous in vertebrates and many invertebrates that participate in the systemic response to inflammation. Its plasma concentration increases during inflammatory states, a characteristic that has long been employed for clinical purposes. A high level of CRP in the blood is a sign that there may be an inflammatory process occurring in the body. Rheumatoid arthritis (RA) is an enduring autoimmune disorder that principally affects joints. It typically results in warm, swollen, and painful joints. Pain and stiffness increases day

by day followed by other problems. Most commonly, the wrist and hands are involved, with the same joints typically involved on both sides of the body. The disease may also affect other parts of the body. This may result in a low red blood cell count, inflammation around the lungs, and inflammation around the heart. Fever and low energy may also be present. Often, symptoms come on gradually over weeks to months. While the cause of rheumatoid arthritis is not clear, it is believed to involve a combination of genetic and environmental factors.

The underlying mechanism involves the body's immune system attacking the joints. This results in inflammation and thickening of the joint capsule. It also affects the underlying bone and cartilage. The diagnosis is made mostly on the basis of a person's signs and symptoms. X-rays and laboratory testing may support a diagnosis or exclude other diseases with similar symptoms. Other diseases that may present similarly include systemic lupus erythematosus, psoriatic arthritis, and fibromyalgia among others. People who have arthritic conditions tend to have high CRP levels because inflammation underlies these disorders. Arthritis may push test results far beyond the range used to assess heart disease risk. In fact, when inflammation levels are in beginning assessed in patients with rheumatoid arthritis, inflammatory bowel disease or other autoimmune conditions, the hs-CRP test is not used. Histological studies conducted in patients with RA have demonstrated synovitis in joints without inflammation [1]. Biomarkers such as rheumatoid factor (RF) and the anticyclic citrullinated peptide (anti-CCP) have been shown to predate the clinical diagnosis of RA with the anti- CCP antibody being strongly predictive for the future development of RA (odds ratio, 28.9; 95% confidence interval [CI] [2-4]. So the rationale behind the study is to study and detect the level of CRP in patients of Rheumatoid arthritis at different age groups.

**2. Material and methods**

A hospital based comparative study was conducted in Biochemistry department among 180 patients of Rheumatoid arthritis of different age groups attending the OPD of General Medicine of Rama Medical College hospital and Research Centre, Mandhana, Kanpur (U.P.). The study was conducted for the period of 1 year (November 2015 to October 2016). Sample size was calculated on the basis of number of RA patients attending the OPD for 1 year. A predesigned semi-structured questionnaire was used as study tool to collect data regarding socio-demographic profile of the patients along with height, weight and clinical examination details.

**2.1 Inclusion criteria**

Arthritis patients (rheumatoid arthritis, osteoarthritis and juvenile chronic arthritis) of different age groups and either sex.

**2.2 Exclusion criteria**

- 1) Patients less than 20 years were excluded from the study.
- 2) Patient undergone any surgical operations and patients with other inflammatory diseases except arthritis.
- 3) Patients who were not willing to give sample.
- 4) Patient who have not given consent.

After permission from institutional ethics committee and informed consent patients were asked for the

blood sample, 5 ml of serum was collected under aseptic conditions. For the detection of CRP in serum semi-quantitative method is used, RHELAX-CRP kit was used which is a type of rapid latex agglutination test.

**2.3 Data analysis**

The collected data was consolidated in Excel sheets which was further analysed using EPI INFO software version 7.1.3.0. Descriptive statistics was used to determine mean and standard deviation (SD) of CRP levels. Unpaired student't' test was used to find the comparison between different age groups. *p-value*<0.05 was considered statistically significant.

**3. Results and observations**

**Table 1: Distribution of respondents according to socio-demographic profile**

Variables	Frequency (n=180) (%)
<b>Age (years)</b>	
20-40	77 (50)
41-60	103(50)
<b>Sex</b>	
Male	130
Female	50
<b>Education</b>	
Illiterate	62
Literate	118
<b>SES*</b>	
Upper	129
Lower	51

\*= modified kuppuswamy classification

Table 1 shows the socio-demographic profile of RA patients, most of the patients belonged to the age group of 41-60 years and above (57%). The diseases have been male preponderance (72%). Most of the patients were literate and belonged to upper socio-economic class.

**Table 2: CRP levels of RA patients according to age groups**

Age groups	CRP levels (mean±SD)	t, df	CI	P-value
20-40 years (n=77)	2.96±0.816	31.83,76	2.78-3.14	<b>0.001</b>
41-60 years (n=103)	3.12±0.932	34.95,102	3.02-3.39	<b>0.001</b>

t- unpaired t-test; df- degree of freedom; CI- confidence interval

In healthy individuals, the plasma CRP level is generally below 0.2 mg/dl. Due to micro- traumas that occur during the day, this level can increase up to 1 mg/dl. While a value between 1-10 mg/dl is considered as mild, any value above 10 mg/dl is considered a very high increase. Table 2 shows the mean levels of CRP, as the age increases the mean levels of CRP increases in the age group 20-40 years it is about (2.96) while from 41-60 and above it is (3.12). However both the age groups shows a significant association with CRP levels (*p*<0.05).

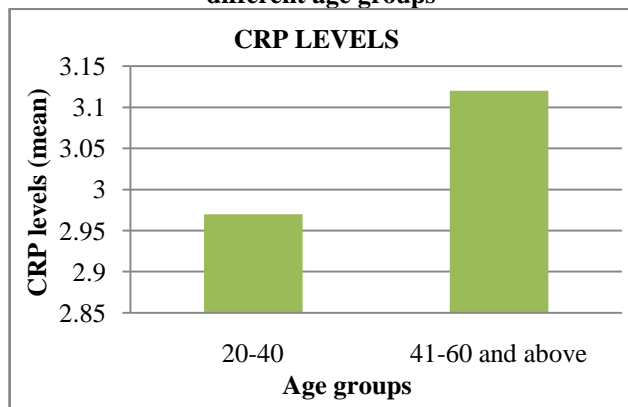
**Figure 1: Graphical representation of CRP levels at different age groups**

Figure 1 is the graphical representation of CRP levels in the both the age groups which shows a increase levels in 41-60 years as compared to 20-40 years.

#### 4. Discussion

The present study showed that there is mild increase in CRP levels in patients of Rheumatoid arthritis with two different age groups. In the age group from 20-40 years the levels were ( $2.96 \pm 0.816$ , CI= 2.78-3.14) which is highly significant. In the age group 41-60 and above the levels were high as compared to previous age group but belonged to mild category ( $3.12 \pm 0.932$ , CI= 3.02-3.39) which is also highly statistically significant. This results shows that not only age group but other determinants are also involved to the increased levels of CRP in RA patients. Kyoung-Woon (2014) *et al* stated the role of C-reactive protein in osteoclastogenesis in rheumatoid arthritis and found in their study that in the treatment of RA, lowering CRP levels is a significant parameter not only for improving disease activity but also for preventing bone destruction [5].

Sokka (2009) *et al* stated that Erythrocyte sedimentation rate, C-reactive protein, or rheumatoid factors are normal at presentation in 35% - 45% of patients with rheumatoid arthritis seen between 1980 and 2004 [6]. In a study conducted by Nancy A (2006) *et al* over rheumatoid arthritis women and found that 398 women reported a new diagnosis of RA. Of these, 90 cases were confirmed on medical chart review using American College of Rheumatology criteria. In age adjusted analysis, the relative risks for developing confirmed, incident RA associated 21 with increasing tertiles of CRP (first, second, and third) were 1.00 (reference value), 0.94 (0.54-1.61), and 1.29 (0.78-2.12) ( $P = .30$  for trend). Further adjustment for randomized treatment, age, body mass index, and smoking demonstrated corresponding relative risks of 1.00 (reference value), 0.95 (0.55-1.65), and 1.33 (0.77-2.30) ( $P = .48$  for trend). When examined whether CRP levels predicted incident RA within 4 years, between 5 to 8 years, and 9 or more years after CRP measurement, it was found no

significant associations for any time period [7]. Previously also H. Surekha Rani (2006) *et al* stated that CRP test was found to be positive in 69/75 cases of RA [8]. Nielsen NM (2004) *et al* done study on Seventy-nine patients (61% female; mean age at onset of symptoms 51 years) who had been blood donors before the onset of RA were identified. Preclinical increase in CRP levels was observed both in donors with and in those without serologic abnormalities [9]. Michael J (2000) *et al* studied Three hundred fifty-nine patients with active RA were studied as part of a 5-year randomized, prospective, open-label study of disease-modifying anti-rheumatic drug therapy.

Time-averaged CRP was calculated from samples obtained every 6 months, and patients were divided into groups with CRP values of  $<6$ ,  $6-12$ ,  $12-25$ , and  $\geq 25$  mg/liter. Radiographs of the hands and feet were scored by the Larsen method; a damaged joint was defined as one with a score of  $\geq 2$ . Showed that an elevated acute-phase response is associated with increased radiologic damage in rheumatoid arthritis (RA), but development of damage in previously normal joints (“new joint involvement”) has not previously been investigated. This study was undertaken to investigate the hypothesis that when there is suppression of disease activity as judged by the C-reactive protein level, new joint involvement is reduced to a greater extent than is progression in already damaged joints (“damaged joint progression”). The results of this study provide further confirmation that high CRP levels over time are associated with greater radiologic progression [10]. Wolfe F (1997), Mallya RK (1982) *et al*, R S Amos (1977) *et al* found high level of CRP in rheumatoid arthritis patients [11-13].

#### 5. Conclusion

In the present study CRP levels were studied in 180 patients which were divided in two age groups, there is a significant increase in the levels as the age increases also inflammatory responses also showed a rise in CRP levels which may be associated with signs and symptoms. This increase in CRP levels may be increased risk factor for cardiovascular diseases also so timely blood investigation with recommended kit to detect CRP levels must be done. Patients must be educated about further rise in CRP levels and its drastic complications.

#### 6. Limitations of the study

Firstly it was a hospital based study the data does not generalise the result. Secondly, only association of age groups are seen with CRP levels other factors are also to be included which may give more clear picture about the treatment aspect. Thirdly, a proper sampling technique is not included. Fourthly, dropout rate for missing patients were not included.

**Conflict of interest:** None declared

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