

## ORIGINAL RESEARCH

### C - Reactive Protein In children with Allergic Asthma

<sup>1</sup>Laxmi Chourasiya, <sup>2</sup>Dr. Jaya Jain, <sup>3</sup>Dr. Ashutosh Jain

<sup>1,2</sup>Department of Biochemistry, Index Medical College Hospital and Research Centre, Indore, Madhya Pradesh, India

<sup>3</sup>Department of Physiology, Index Medical College Hospital and Research Centre, Indore, Madhya Pradesh, India

#### Correspondence:

Dr. Jaya Jain

Department of Biochemistry, Index Medical College Hospital and Research Centre, Indore, Madhya Pradesh, India

Email: [amj.bafna@gmail.com](mailto:amj.bafna@gmail.com)

#### ABSTRACT

**Background:** Asthma is characterized by chronic inflammation of upper and lower airways. Allergic diseases like allergic asthma, allergic rhinitis is increasing worldwide. C-reactive protein is a marker of inflammation and infection. A positive relationship of inflammation has been shown between raised CRP levels in allergic asthma.

**Aims and Objective:** The study aims to evaluate high sensitivity CRP levels in allergic asthma cases and in controls.

**Materials and Methods:** The study was carried out in the Department of Biochemistry at Index Medical College Hospital and Research Centre, Indore Madhya Pradesh. The study was done on 80 males and females subjects of the age group 6 to 18 years. Forty males and female children suffering from allergic asthma attending the Ear, Nose and Throat outpatient department of IMCHRC, Indore were taken as the case. Forty healthy males and female children were taken as controls after careful selection as per inclusion and exclusion criteria. CRP was done by latex enhanced turbidometric immunoassay (CRP kit).

**Results:** The levels of CRP were significantly higher in allergic asthma cases ( $P < 0.001$ ) as compared to controls (0.001).

**Conclusion:** The results of the present study indicate that the concentration of CRP was increased in asthma cases as compared to the controls. In allergic asthma there is increased inflammation of upper and lower airways and so the levels of CRP are increased.

**Key words:** Allergic asthma, C-Reactive Protein(CRP), Inflammation.

#### INTRODUCTION

There is a worldwide increase in allergic respiratory disorders like asthma. It is affecting 10% to 20% population of the world.

Allergic asthma is a common chronic disease manifested with the symptoms in the upper (allergic rhinitis and sinusitis) and lower (asthma) airways. Mast cells, eosinophils and T lymphocytes play a major role in asthma.

As there is inflammation of airways, which is responsible for repeated episodes of wheezing, breathlessness, chest tightness and cough at night. Those symptoms have association with widespread but variable air flow limitations. The inflammation also causes hyperresponsiveness of airways (1,2). C-reactive protein is a good marker of inflammation,

infection and damages to the tissue. It contributes to the defense of the host against infection by activation of complement system.

Many studies have shown positive relationship between increased CRP level and allergic asthma. Asthma adversely affects sufferer's quality of life, cognitive and learning functions, ability of taking decisions etc. In children it is related to low energy levels, poor memory (1) etc.; Serum CRP level in allergic asthma, may be related to severity of asthma. CRP is associated with inflammation of airways and airflow obstruction (2). CRP is a established inflammatory marker. Serum concentration of CRP is generally evaluated to know severity of systemic inflammation, for example pneumonia and cardiovascular disease (3). CRP is frequently determined to assess the grade of systemic inflammation as in rheumatic or intestinal diseases, pneumonia and tuberculosis, allergic asthma, etc.; (3)

Recently the ImmunoTurbidometric method on latex particles has been used to determine very low CRP concentrations, thus enabling use of CRP level as prognostic marker of chronic inflammation in patients with cardiovascular disease, diabetes mellitus, asthma and allergic diseases (4).

A strong positive relationship has been reported between high CRP levels and allergic asthma (2). There is a increase in the CRP concentration because inflammation is one of the main characteristic of respiratory allergic diseases.

Chronic inflammation of the airways has very important role in the pathogenesis of asthma, and it involves many cell types such as eosinophils, T-lymphocytes, etc. In sensitive individuals the inflammation induced by environmental allergens leads to symptoms of asthma such as nasal congestion, cough, tightness in the chest, rapid breathing and shortness of breath, (5) Asthma is a long term disease of lungs. C-reactive protein is a inflammatory marker. Systemic inflammation and reversible airflow narrowing is the important feature of asthma (5)

Moreover inflammation plays an important role in pathogenesis and progression of asthma (6). Therefore in the present study we would find out concentration of CRP in allergic asthma and compare it with normal controls.

Suppression of inflammation with appropriate treatment is also associated with decrease in serum CRP levels (7). So serum CRP concentration can be taken as a means for detection of systemic inflammation, response to treatment as well as for estimating asthma status.

## **MATERIALS AND METHODS**

This study was carried out in the Department of Biochemistry, Index Medical College Hospital and Research Centre, Indore Madhya Pradesh. The study was done on 80 males and females of the age group 6-18 years. Forty males and females suffering from allergic asthma attending the Ear, Nose and Throat Outpatient Department of IMCHRC, Indore were taken as cases and 40 healthy males and females' controls, after careful selection as per inclusion and exclusion criteria.

## **INCLUSION CRITERIA**

1. Patients diagnosed with allergic asthma as case.
2. Age between 6 to 18 years
3. Healthy males and females as control
4. Physically and mentally fit
5. Co operative
6. Subjects giving consent for study

**EXCLUSION CRITERIA**

1. Patients diagnosed with any other disease like coronary artery disease, Diabetes Mellitus, Liver disease, renal failure, tuberculosis, critical illness, etc;
2. Pregnant women
3. Alcoholics
4. Hyperlipidemia
5. Smokers
6. Tobacco chewers
7. History of long term drug treatment

The study was approved by review and ethical committee before starting the study work. A written consent was taken from the patient willing to participate in the study. No invasive procedure was carried out.

**GROUPING OF SUBJECTS**

Group I A - Males and Females (6 to 18 years) as cases

Group I B – Males and Females (6 to 18 years) as controls

Sample Collection of Blood for CRP:-

Approximately 2ml of the blood sample was collected in a plain vial for CRP estimation. Samples were centrifuged at 3000 rpm for 10 minutes. Serum is separated and stored immediately in a fridge at 0°C until further analysis. The method for CRP estimation is quantitative turbidometric immunoassay. Latex particles coated with specific anti human CRP are agglutinated when mixed with samples containing CRP. The agglutination causes an absorbance change dependent on the CRP content of the patient sample that can be quantified by comparison from a calibrator of known CRP concentration(8).

Normal levels of CRP = <6 mg/L 0 to 6 mg/l

**STATISTICAL ANALYSIS**

SPSS software version 2.0 has been used.

**RESULTS**

The mean CRP value in group I A was  $13.6 \pm 2.30$  and in group I B was  $2.00 \pm 0.60$ . The CRP is a inflammatory marker. The value of CRP was increased in allergic asthma cases as compared to the controls. As evaluated by the “Z” value, the difference between these two groups was statically significant ( $Z=30.59$ ,  $P=0.000$ ).

**Table-1**

S. NO.	Traits	Cases Group I A	Cases Group I B	“Z” value	“P” Value	Sig./N.S.
1	CRP mg/L	$13.6 \pm 2.30$	$2.00 \pm 0.60$	30.59	0.000	H.S.

$P < 0.05$  or  $p = 0.05$  significant,  $P < 0.001$  or  $P = 0.000$  H.S.

**DISCUSSION**

In the present study the mean CRP value in Group I-A was  $13.6 \pm 2.30$  and in Group I-B was  $2.00 \pm 0.60$ . The C reactive protein is a well-known marker of inflammation. The value of CRP is increased in allergic asthma cases as compared to the controls.  $Z=30.59$  and  $P=0.000$ , the difference between these two groups was statistically significant.

The most significant allergic disease in the world is allergic asthma and approximately 10 to 25% of the population suffers from it(9). Asthma is a chronic inflammatory disease and airway inflammation causes raised CRP levels, respiratory impairment and bronchial hyper reactivity (10).

An association has been shown between elevated CRP levels and respiratory impairment such as wheeze, attack of breathlessness and nocturnal cough (10). The CRP belongs to the molecule called the Pentaxins. It is synthesized in liver. It is regulated by pro inflammatory cytokines such as TNFalpha (tumor necrosis factor-alpha) and interleukin-6. In the acute phase response there is a rapid increase in the production of CRP ( $\geq 10,000$  fold), which results in increased concentration of CRP in blood. The function of CRP is not well known but CRP may serve as a general scavenger protein and it has important role in opsonization, phagocytosis etc. (11,2). Many studies indicated that CRP levels are increased in allergic asthma and allergic rhinitis.

In our present study the CRP level was higher in group I A, and it was  $13.6 \pm 2.30$  (asthma cases) as compared to controls. The value of CRP in control group I B was  $2.00 \pm 0.60$ . We have found significant increase in CRP concentrations and it is supported by Jousilath P. et.al (12).

Galez et.al (13), Pellizzaro and Heuertz. (14). Konyet. al (15) studied the association of pulmonary function with CRP. They found lower forced expiratory volume in 1 second in patients with high CRP level. They concluded that increased CRP level is strongly associated with impaired lung function found in allergic asthma cases. Takemura et. al (5) studied the CRP in asthma cases. Serum levels of CRP were significantly increased in asthma cases. The rise was directly associated to air flow obstruction and airway inflammation.

Kasayamas. et. al documented that asthma is an independent risk for increased levels of CRP. They stated that asthma is a disease associated with increased plasma CRP levels independent of various other factors.

Limitations:

CRP is a sensitive marker of inflammation. Inflammation of upper and lower airways can be detected by it. We estimate CRP value for asthma; we should extend our study for other airway disease.

## CONCLUSION

The result of the present study indicate that CRP level was increased in allergic asthma cases as compared to the controls. In allergic asthma there is a inflammation of airways and so the concentration of CRP is elevated.

## REFERENCES

1. Chandrika D. Allergic rhinitis in India. An overview, *Int. J Otorhinlaryngol Head Neck Surg.* 2017;3:1-6.
2. Anderson G.P. et. al COPD; asthma and C-reactive protein *EurRespir J.* 2006, PMID:16707386 Review.
3. Van Bever HP, Desager K. N. et. al. Clinical evaluation of prognostic factor in childhood asthma. *PediatrAllergy Immunol.* 2002;13:77-83.
4. Pepys MB, Baltz ML, Acute phase proteins with special reference to C-reactive protein and related proteins (pentaxins) and serum amyloid Protein *Adv. Immunol* 1983;34:141-2112.
5. Takemura M, Matsumoto H., Nimi A., Veda T. et. al. High Sensitivity C-reactive protein in asthma *Respir, J.* 2006;27:908-12.
6. Wouters EF. The systemic face of airway disease. The role of C-reactive protein. *Eur. Respir J.* 2006;27:877-9. (Pub Med).
7. Dear T.E, Kamel T.B., Kerdany K.A. High sensitivity C-reactive protein as a biomarker for grading of childhood asthma in relation to clinical classification, and spirometry. *Predator Pulmonol.* 2012;212:47:220=5 (Pub med).

8. Casale TB., Dykuriycz MS. Clinical implications of the allergic rhinitis –astham linkAm.J. Med. Sci. 2004:327:204 37:127-38.
9. Hokoma Y. Nakamura RM. C-reactive protein current status and future. Perspective J.Clin. Lab. And 1987:1:15-7.
10. Kony S. Zureik M. Driss F. et. al Association of bronchial hyper responsiveness and lung function with C-reactive protein (CRP): a population based study. Thorax 2004:59:892-6.
11. Thomsom D. Pepsy MB; Wood S.P. The physiological structure of human C-reactive protein and its complex with phsophoctioline structure (1999:7:169-77.
12. Jousilath P. Salomaa V., Hakalaket. al The association of sensitive systemic inflammation markers with bronchial asthma. Ann. Allergy Asthma Imunol 2002:89:381-5.
13. Galez D. Dodiz S. Ravv M. et. al C-reactive protein in children with asthma and allergic rhinitis Biochem Med. 2006:16:163-9.
14. PellezaroA.M; Heuertz R.M. C-reactive protein levels are elevated in asthma and asthma like conditions. Clin lab sci. 2010:23: 223-7.
15. Kony S. Zureik M. et. al Association of bronchial hyperresponsiveness and lung function with C-reactive protein (CRP) A population based study. Thorax.
16. Olafsdottir IS., Gislason T., Jogi R. et. al. C-reactive protein levels are increased in allergic but not in non-allergic asthma. A multi centerepidemiological study. Thorax 2005:60:451-4.
17. Kasayama S. Tanemura M. Koga M.\Et. Al. Asthma is an independent risk for elevation of plasma C-reactive protein levels. Clin. ChimActa. 2009: Jan; 399(1-2)179-82 Da. 10.1016/Jacia 2008.09.`13 Epub 2008 Sept. 21.