

RESEARCH ARTICLE

Evaluation of high sensitivity C-reactive protein in allergic rhinitis

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ABSTRACT

Background: Allergic rhinitis is a major chronic respiratory disease due to its prevalence, impact on the quality of life, impact on work/school performance and productivity, economic burden, and link with asthma. C-reactive protein (CRP) is a marker of inflammation and infection. A positive relationship has been shown between raised CRP levels in allergic rhinitis and asthma. **Aim and Objective:** This study aims to evaluate high sensitivity CRP levels in allergic rhinitis cases and in controls. **Materials and Methods:** The study was carried out in the Department of Physiology at People's College of Medical Sciences and Research Center, Bhopal, Madhya Pradesh. The study was done on 80 male and female subjects of the age group of 18–40 years. Forty males and females suffering from allergic rhinitis attending the Ear, Nose, and Throat Outpatient Department of People's College of Medical Sciences and Research Centre, Bhopal, were taken as the cases. Forty healthy male and female employees of various constituent institutes of people's university were taken as controls after careful selection as per inclusion and exclusion criteria. CRP was done by latex-enhanced turbidimetric immunoassay (CRP kit). **Results:** The levels of CRP were significantly higher in allergic rhinitis cases ($P < 0.001$) as compared to controls ($P < 0.001$). **Conclusion:** The results of the present study indicate that the concentration of CRP was increased in allergic rhinitis cases as compared to the controls. In allergic rhinitis, there is inflammation of the airways and so the levels of CRP are elevated.

KEY WORDS: Allergic Rhinitis; C-reactive Protein; Inflammation

INTRODUCTION

Allergic rhinitis is a symptomatic disorder of the nose which results in an immunoglobulin E-mediated immunological response following the exposure to an allergen. In allergic rhinitis, there is an inflammation of the nasal airways due to irritation of the mucosa by allergens such as dust, pollen grains, food, and mites.^[1]


It accounts for more than half of all allergy cases in India affecting every sixth person. All over the world, it is one of

the more common chronic diseases and it extracts a heavy price both in terms of medical costs and quality of life.^[1]

It adversely affects the sufferer's quality of life, cognitive and learning functions, ability of taking decisions, etc. In young people, it is related to low energy levels, poor memory, and impaired decision-making.^[1]

It is associated with comorbidities such as sinusitis and conjunctivitis, and it has a strong link with asthma. Symptoms of allergic rhinitis include rhinorrhea (free discharge of thin nasal mucus), nasal obstruction, nasal itching, and sneezing.^[2]

Approximately 40% of the patients with allergic rhinitis have asthma and 80% of the asthmatic patients suffer from persistent nasal symptoms.^[3] Upper respiratory tract inflammation may extend to lower respiratory tract inflammation which can be assessed by estimation of C-reactive protein (CRP) and pulmonary function tests.

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CRP is a well-known inflammatory marker. Serum concentration of CRP is generally determined to assess a systemic inflammation, for example, pneumonia and cardiovascular disease.^[4] CRP is an established marker of acute inflammation and its serum concentration is frequently determined to assess the grade of systemic inflammation, for example, in rheumatic or intestinal diseases, pneumonia, and tuberculosis in adults.

Recently, the immune turbidimetric method on latex particles has been used to determine very low CRP concentrations, thus, enabling the use of CRP concentration as a prognostic marker of chronic inflammation in patients with cardiovascular disease, diabetes mellitus, asthma, and allergic rhinitis.^[5]

A positive relationship has been reported between increased CRP levels in allergic rhinitis and asthma.^[2] As inflammation is one of the major characteristics of respiratory allergic diseases, there is an increase in the C. R. P. concentration.

Chronic airway inflammation is one of the major features of allergic rhinitis and involves many cell types, of which mast cells, eosinophils, and T-lymphocytes play the most important role. In sensitive individuals, the inflammation induced by environmental allergens leads to symptoms of allergic rhinitis such as nasal congestion, rhinorrhea, sneezing, and nose itching. CRP is an inflammatory marker.^[6] As inflammation is one of the major characteristics of respiratory allergic diseases, the aim of this study was to estimate whether the determination of CRP concentration would be of use as a marker of inflammation in adults with allergic rhinitis.

MATERIALS AND METHODS

This study was carried out in the Department of Physiology, People's College of Medical Sciences and Research Centre, Bhopal, Madhya Pradesh. The study was done on 80 males and females of the age group of 18–40 years. Forty males and females suffering from allergic rhinitis attending the Ear, Nose, and Throat Outpatient Department of People's College of Medical Sciences and Research Centre, Bhopal, were taken as cases and 40 healthy male and female employees of the various constituent institutes of people's university were taken as controls after careful selection as per inclusion and exclusion criteria. Patients with diagnosis of any other disease such as coronary artery disease, diabetes mellitus, liver disease, renal failure, tuberculosis, carcinoma and critical illness were excluded in the study. Pregnant women, alcoholics, smokers and tobacco chewers were also excluded in the study. Pregnant women, alcoholics, smokers, and tobacco chewers were excluded from the study.

The study was approved by review and ethical committee before starting the study work. A written consent was taken

by the patients willing to participate in the study. No invasive procedure was carried out.

Grouping of Subjects

Cases and controls were grouped according to their age and gender. The groups were as follows:

- Group 1A case males 18–40 years
- Group 1B control males 18–40 years
- Group 2A case females 18–40 years
- Group 2B control females 18–40 years.

Sample Collection of Blood for CRP

Approximately 2 ml of the blood sample was collected in plain vials for CRP estimation. Samples were centrifuged at 3000 rpm for 10 min. Serum is separated and immediately stored in a freeze at 0°C until further analysis. Methodology for CRP is quantitative turbidimetric 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 contents of the patient's sample that can be quantified by comparison from a calibrator of known CRP concentration.^[7] Normal levels of C. R. P. : < 3 mg / L.

Statistical Analysis

Statistical Analysis : SPSS Software Version 2.0 has been used.

RESULTS

The mean CRP value in Group 1A was 9.7 ± 3.7 and in Group 1B was 2.0 ± 2.6 . The CRP is a marker of inflammation. The value of CRP is increased in allergic rhinitis cases as compared to the controls. As evaluated by the unpaired “*t*”-test, the difference between these two groups was statistically significant (“*t*” = 9.24 and “*P*” = 0.000).

The mean CRP value in Group 2A was 9.6 ± 2.8 and in Group 2B was 2.0 ± 0.5 . The CRP value is increased in allergic rhinitis cases as compared to the controls. Evaluation by the unpaired “*t*”-test showed that the difference in CRP values between these two groups was highly significant (“*t*” = 11.93 and “*P*” = 0.000) [Tables 1 and 2].

DISCUSSION

In the present study, the mean CRP value in Group 1A was 9.7 ± 3.7 and in Group 1B was 2.0 ± 2.6 . The CRP is a marker of inflammation. The value of CRP is increased in allergic rhinitis cases as compared to the controls, “*t*” = 9.24 and “*P*” = 0.000; the difference between these two groups was statistically significant.

Table 1: Group 1A and Group 1B (18–40-year-old males)

Group	Cases Group 1A	Control Group 1B	“t” value	“P” value
Mean C-reactive protein mg%	9.7±3.7	2.0±2.6	9.24	0.000 HS

$P < 0.05$ or $P = 0.05$ significant, $P < 0.001$ or $P = 0.000$ highly significant

Table 2: Group 2A and Group 2B (18–40-year-old females)

Group	Cases Group 2A	Control Group 2B	“t” value	“P” value
Mean C-reactive protein mg%	9.6±2.8	2.0±0.5	11.93	0.000 HS

$P < 0.05$ or $P = 0.05$ significant, $P < 0.001$ or $P = 0.000$ highly significant

The mean CRP value in Group 2A was 9.6 ± 2.8 and in Group 2B was 2.0 ± 0.5 . The CRP value is increased in allergic rhinitis cases as compared to the controls. CRP values between these two groups were highly significant.

The most significant allergic disease in the world is allergic rhinitis and approximately 10–25% of the population suffers from it.^[8] The heavy weight of the allergic rhinitis on health-care system is enormous and contributes 55% of all the allergies.^[9]

Many studies have indicated that CRP levels are increased in acute respiratory (AR).^[2] The CRP concentration in case of Group 1A and Group 2A is 9.7 ± 3.7 and 9.6 ± 2.8 , respectively. The CRP level is higher in AR cases as compared to the controls. The values of CRP in control Group 1B and Group 2B are 2.0 ± 2.6 and 2.0 ± 0.5 , respectively. In our study, there is a significant increase in CRP concentration and it is supported by Jousilahti *et al.*,^[2] Galez *et al.*,^[10] and Pellizzaro and Heuertz^[11]

CRP is an inflammatory marker. It is an acute-phase reactant. The levels of CRP are increased in response to tissue injury, infection, and inflammation.^[12] In AR cases, there is inflammation of the respiratory airways and it leads to increased levels of CRP. In our study, we found an increase in the CRP levels in AR cases of males and females both. The study is supported by Kony *et al.*^[13] and Galez *et al.*^[10]

Kony *et al.*^[13] studied the association of lung function with CRP. They found lower forced expiratory volume in 1 s in subjects with a high CRP level. They concluded that increased CRP concentration is strongly associated with impaired lung function found in AR cases.

Takemura *et al.*^[6] studied the CRP in AR cases and asthma. Serum levels of CRP were significantly increased in asthma and AR cases. The rise was directly related to airflow obstruction and airway inflammation.

Olafsdottir *et al.*^[14] they noticed increased levels of CRP in asthma, allergic rhinitis, and respiratory impairment. High sensitivity CRP is considered as a benchmark of inflammation.

Limitation

CRP is a sensitive marker of inflammation. Inflammation of the upper as well as lower airways can be detected by it. We estimate CRP value only for acute rhinitis; we should extend our study for other airway disorders.

CONCLUSION

The results of the present study indicate that CRP concentration was increased in allergic rhinitis cases as compared to the controls. In allergic rhinitis, there is inflammation of the airways and so the levels of CRP are elevated.

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