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A Study to assess the correlation between High-Sensitivity C-Reactive Protein and severity asthma among children admitted in Selected at Selected Hospitals in Indore

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Introduction

In children, asthma is the most prevalent form of chronic inflammatory illness of the airways. Around forty percent of all children under the age of five will have at least one episode of asthmatic symptoms, which may include coughing, wheezing, and shortness of breath. Bronchial hyper-responsiveness and persistent airway inflammation are two of the defining characteristics of asthma. Participating in the process are a wide variety of cell types, cytokines, and mediators. Asthma is characterised by not just inflammation at the local level but also inflammation throughout the body. This is shown by the fact that asthmatic individuals have higher levels of both plasma fibrinogen and serum amyloid A. Unfortunately, the pathophysiology of this condition is yet unknown.

The C-reactive protein (CRP), which was the first acute-phase response to be discovered and characterised, got its moniker from the fact that it has the ability to precipitate the somatic C-polysaccharide of Streptococcus pneumoniae. As a marker for both inflammation and tissue damage, its use is widespread. The sensitivity of the assays for CRP, despite their ease of use and low cost, was not comparable to that of the traditional techniques. Since the lower detection limit for CRP in standard assays ranges from 3 to 8 mg/L, these tests were unable to identify low-grade inflammation. Recent developments, on the other hand, have resulted in the availability of high-sensitivity tests for CRP in clinical labs. With a lower detection limit of 0.1–0.2 mg/L, high-sensitivity tests for CRP are able to detect the protein at very low quantities. It is stated that these assays have a sensitivity that is one hundred times greater than that of conventional assays. 9, 10 High-sensitivity CRP refers to CRP that was determined using assays that were particularly sensitive (hs-CRP). The use of hs-CRP indicated the existence of low-grade inflammation in a number of conditions, including cardiovascular diseases and diabetes mellitus, among others.

It is currently believed that hs-CRP, which has the potential to detect inflammation at very low levels, may be used as a reflection of systemic inflammation in asthma patients. It has been shown that people suffering from asthma had greater levels of serum hs-CRP compared to healthy controls. There were reports of negative connections between serum hs-CRP levels and spirometry indices, which reflected the positive associations that were found between elevated serum hs-CRP levels and impaired respiratory function. There have also been reports of positive associations between the levels of hs-CRP in the blood and the severity of asthma. Serum hs-CRP levels were shown to be significantly higher in asthmatic patients compared to healthy controls in a research conducted with paediatric individuals. The study also found that there were positive relationships between serum hs-CRP levels and the severity of asthma.

As a result of this, we decided to design a study to determine whether or not there are any significant relationships between the symptomatic severities of asthma, pulmonary function test (PFT)–spirometry and impulse oscillometry (IOS)–parameters, and hs-CRP in asthmatic children. Specifically, we were interested in determining whether these relationships exist.

Methodology

Participants in this research were three hundred young patients with asthma who were seen at the Pulmonary Medicine Department at Index Medical College Hospital. On the day of the clinic appointment, blood samples, a pulmonary function test (PFT), and histories were taken to establish the severity of the patient's symptoms. The presence of a fever, acute respiratory infections, or symptoms of other acute illnesses within seven days previous to blood sample were all grounds for exclusion from the study. Patients who had diabetes mellitus, cancer, a recent history of surgery, or chronic inflammatory conditions such as systemic lupus erythematosus, rheumatoid arthritis, or inflammatory bowel disease were not eligible for this study. Other comorbidities that can influence hs-CRP levels include diabetes mellitus, cancer, a recent history of surgery, and inflammatory bowel disease.

Patients were considered to have asthma if they had any classic asthma symptoms, such as wheezing, coughing, or dyspnea, in addition to reversibility in airflow blockage or bronchial hyper-responsiveness. After inhalation of a short-acting beta-2 agonist, reversibility in airflow obstruction was defined as

an increase in the forced expiratory volume in 1 second (FEV1) that was more than or equal to 12% higher than the baseline value. A positive result in bronchoprovocation as measured by the methacholine challenge test was considered to be diagnostic of bronchial hyper-responsiveness (MCT). This indicated that the concentration of the provocation led to a decrease of 20% in FEV1 (PC20) of less than 16 mg/mL. 20.After that, each individual patient was categorised into either the positive or the negative hs-CRP group, depending on the results of their blood tests.

Results

7.8 (5.2/11.7) years old was the median age of the 300 patients, and boys made up 60% of the patient population. 180 of these patients had hs-CRP readings that were positive, whereas 120 of these patients had hs-CRP values that were negative. Patients were separated into two groups based on their levels of hs-CRP; however, there were no significant differences between the groups in terms of age, gender, atopy, WBC count, neutrophilcount, eosinophil count, total IgE level, or body mass index. The patients were divided into three groups according to the severity of their asthma. 140 patients were intermittent, 75 were light persistent, and 60were moderate to severe persistent. 18 The levels of hs-CRP that were median for each group are as follows: 01 for the intermittent group, 02 for the mild persistent group, and 04 for the moderate to severe persistent group. There was not a significant difference in the levels of hs-CRP between the three different groups of asthma severity ($p = 0.003$). There was a statistically significant gap in asthma severity between the group whose hs-CRP levels were positive and the group whose hs-CRP levels were negative.The forced vital capacity (FVC), the percentage of anticipated FEV1, the FEV1/FVC ratio in percentage, and the FEF25–75 were all compared with hs-CRP. Of of them, FEV1 and FEF30–70 demonstrated statistically significant differences between the groups with positive and negative hs-CRP. Only FEF30–70 exhibited a significant positive connection with hs-CRP when looking at spirometry's variables (r-0.68)

Conclusion

In conclusion, the current research indicated that serum hs-CRP has substantial link between severity of asthma , thus, advocate the feasibility of hs-CRP as a marker for severity of asthma.

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