

STUDY OF 'C' REACTIVE PROTEIN IN ACUTE RESPIRATORY TRACT INFECTION IN CHILDREN OF GUJARAT

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Abstract

Background: There is a correlation between the onset of infection and levels of CRP. CRP synthesis starts increasing within four to six hours after the onset of inflammation or tissue injury. It may get double every eight hours and reaches its peak at 36 to 50 hours. **Materials and Methods:** 95 (ninety-five) children with acute respiratory tract infections were studied. CBC and CRP were evaluated, and a chest x-ray, if necessary, was studied to rule out the CRP level. The CRP level was also correlated with the WBC count. **Results:** The clinical manifestations included 93 (97.86%) fever, 95 (100%) cough, 77 (81%) rhinitis, 10 (10.5%) throat pain, 2 (2.1%) earache, and 18 (18.8%) breathlessness. The CRP level was 0.6–18.8 mg/dl on the first day, 0.6–4.8 mg/dl on the second day, 0.6–6.8 mg/dl on the third day. 65 (68.4%) had 6000–15000 WBC/mm and 17 (17.8%) had >15000 in CRP-positive patients. **Conclusion:** The elevated CRP values can be associated with the severity of respiratory tract infection. Hence, it will help the pediatrician to treat such patients efficiently to avoid morbidity and mortality.

INTRODUCTION

CRP is an acute-phase protein synthesized in the liver. It was first described by Tillet and Francies Jr. in 1930. They described it as a serum factor responsible for precipitation of acute phase with c-substance of pneumococcal cell wall.^[1] It was so named because the c-polysaccharide of *Streptococcus pneumoniae*, CRP, has two major biological roles. It is known to activate the complement system and modify the function of phagocytic leucocytes.^[2] Its production is mainly by interleukin-6, interleukin-1 β and tumor necrosis factor in response to infection or tissue inflammation. CRP, which is raised in different disease activations and inflammation, can be used as a diagnostic tool.

There is a correlation between the onset of infection and levels of CRP. CRP synthesizes and starts increasing within four to six hours after onset of inflammation or tissue injury.^[3] It may get doubled every eight hours thereafter and reach its peak approximately at 36 to 50 hours. Hence, an attempt is made to study the severity of acute respiratory tract infection on the elevated levels of CRP.^[4]

MATERIALS AND METHODS

95 children 1–5 years of age who regularly visited Pediatric Departments of GME and RS Medical College Gotri, Vadodara, Gujarat 390021 were studied.

Inclusive Criteria: Children aged between 1 to 5 years of age suffering from acute respiratory tract infections who have not taken any antimicrobial drugs for at least seven days for any reason. Parents or guardians of patients who gave written consent for treatment were selected for the study.

Exclusion Criteria: Patients with chronic liver disease, congenital anomalies of the cardiovascular system, auto-immune disease, or any other inflammatory diseases were excluded from the study.

Method: The history of every patient was recorded, and blood examinations included CBC. The serum samples were tested for CRP by a semiquantitative method. The reagent used was "RHELAX-CRP." Testing was based on the principle of agglutination; a chest x-ray (if needed) was studied.

The duration of the study was from January 2023 to December 2023.

Statistical Analysis: Various clinical manifestations of respiratory tract infection (RTI) and the

correlation of CPR-positive patients with WBC count were classified by percentage day of illness, and the CRP range was noted in every patient. The statistical analysis was carried out in SPSS software. The ratio of males to females was 2:1.

RESULTS

Table 1: Study of different clinical manifestations of CRP-positive patients in respiratory tract infections 93 (97.8%) had a fever, 95 (100%) had a cough, 77 (81.1%) had rhinitis, 10 (10.5%) had throat pain, 2 (2.1%) had an earache, and 18 (18.8%) had breathlessness.

Table 2: Study of day of illness and CRP levels: 5 (0.6-18.8 mg/dl) on first day, secondary 50 (0.6-4.8 mg/dl), thirty day 40 (0.6-6.8 mg/dl) on fourth day.

Table 3: Correlation of CRP levels with leucocyte count: 13 (13.6%) patients had <600, 65 (68.4%) patients had 6000-15000, and 17 (17.8%) patients had >15000.

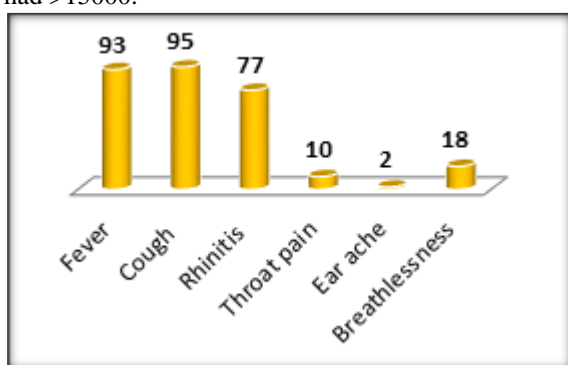


Figure 1: Study of different clinical manifestation CRP positive patients of respiratory tract infections

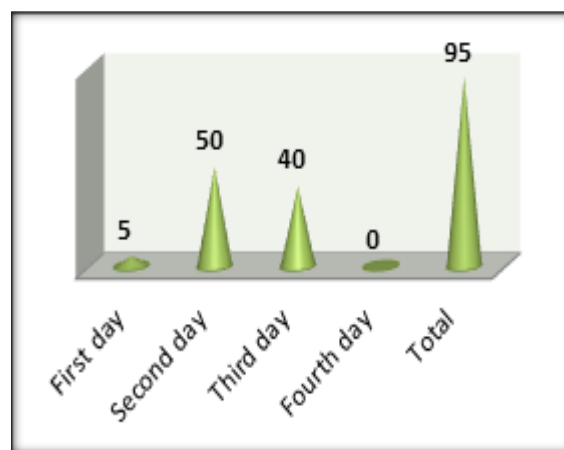


Figure 2: Study of day of illness and CRP levels

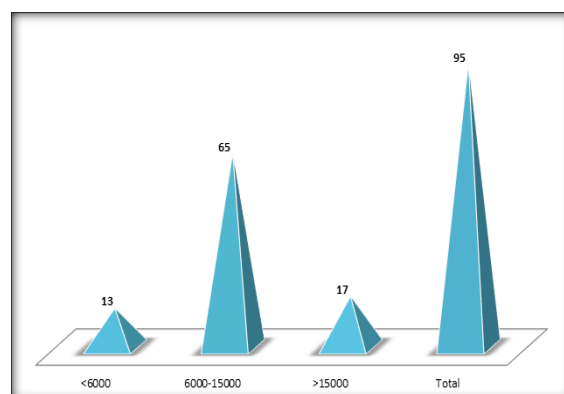


Figure 3: Correlation between leucocytes count and CRP positive patients

Table 1: Study of different clinical manifestation CRP positive patients of respiratory tract infections

Clinical manifestations	No. of patients (95)	Percentage (%)
Fever	93	97.5
Cough	95	100
Rhinitis	77	81
Throat pain	10	10.5
Ear ache	2	2.1
Breathlessness	18	18.8

Table 2: Study of day of illness and CRP levels

Day of illness on presentation	Total No. of patients (95)	CRP Range
First day	5 (5.2%)	0.6-18.8 mg/dl
Second day	50 (52.6%)	0.6-4.8 mg/dl
Third day	40 (42%)	0.6-6.8 mg/dl
Fourth day	--	CRP Not raised
Total	95	

Table 3: Correlation between leucocytes count and CRP positive patients

Leucocytes count WBC/mm ³	CRP positive patients	Percentage
<6000	13	13.6
6000-15000	65	68.4
>15000	17	17.8
Total	95	100

DISCUSSION

Present study of C-reactive protein in acute respiratory tract infection in children of Gujarat. The

clinical manifestations were 95 (100%) cough, 93 (97.6%) fever, 77 (81%) rhinitis, 10 (10.5%) rhinitis, 18 (18.8%) breathlessness, and 2 (2.1%) had earache (Table 1). 50 (52.6%) had 0.6-4.8

mg/dl, 40 (42%) had 0.6-6.8 mg/dl, and 5 (5.2%) had 0.6-18.8 mg/dl level of CRP (Table 2). 65 (68.4%) had 6000-15000 WBC/mm³, 17 (17.8%) had \geq 15000 WBC/mm³, and 13 (13.6%) had $<$ 6000 WBC/mm³ (Table 3). These findings are more or less in agreement with previous studies.^[5,6,7]

Differentiating between serious and nonserious infections is an important factor for the clinician. It is observed that serious infections tended to have higher CRP values; however, serious infections with CRP $<$ 5 mg/L were also found. The highest number of patients with pneumonia was also found in the CRP range of 20 to 50 gm/L. A serious infection with low CRP can be explained by the fact that in the early stages of disease, the inflammatory response is still developing and CRP is still low.^[8] Raised CRP values were found in the majority of the patients with viral infections, and the highest values were found in those with influenza A and B infections. Usually, CRP levels reach their peak during the first 2-4 days of infection. The CRP responses followed the presence of pain in muscles and joints, soreness of the throat, fatigue, clamminess, coughing, and expectoration, which, on the other hand, tended to persist while the CRP values approached normal. A minor elevation of CRP was observed in hypersensitivity to infection, and CRP values decreased continuously after the 10th day of illness. The persistence of cough after the CRP value had become lower than 10 mg/dl is in accordance with previous findings in patients with acute bronchitis.^[9] The persistence of cough and expectoration may, in many cases, not reflect the seriousness of the infection but rather a post-infectious host response.

It is reported that in febrile children, the CRP value was less than 20 mg/L and the duration of disease was more than 12 hours. With no identifiable focus of bacterial infection, all children could be classified as having a viral infection. CRP values of 20–40 mg/L were recorded in both viral and bacterial infections.^[10,11] and most febrile children with CRP \geq 40 mg/dl had a bacterial infection.

CONCLUSION

In the present study, cough, rhinitis, and fever were the most common symptoms of acute respiratory tract infections. Mean CRP levels were higher in

patients presented on the first day and decreased gradually in patients presented on the second and third days without receiving antimicrobials. Leucocytosis could not be correlated with raised CRP levels. Hence, it can be concluded that raised CRP levels will not be an indicator for starting antimicrobial drug therapy. Such clinical trials must be conducted with a large number of patients in a high-tech specialty hospital to confirm these findings.

Limitation of Study: Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest technologies, we have limited findings and results.

- This research work was approved by Ethical committee of GME and RS Medical College Gotri, Vadodara, Gujarat 390021.
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