

Study of C - reactive protein in Respiration Tract Infections in Madhya Pradesh Population**Balaji G. Tuppekar¹, Ashok Sudam Bansode²**¹Associate Professor, Department of Pulmonary Medicine LN of Medical College and research centre, Kolar road, Bhopal-462042 (MP)²Professor, Department of Pulmonary Medicine LN of Medical College and research centre, Kolar road, Bhopal-462042 (MP)

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Conflict of interest: Nil

Abstract:**Background:** Substantially raised CRP values are usually found in pneumonia, and raised CRP values may be found in uncomplicated viral respiratory infections. Hence, a range of CRP values can be expected when the infection is uncomplicated.**Method:** Out of 250 patients, 160 had pneumonia, and 90 had COPD with acute exacerbations. Serum CRP levels and other biomarkers of infections and chest x-rays were studied.**Results:** Mean CRP in pneumonia patients was 74.86 (\pm 10.2) and in COPD 15.80 (\pm 8.6), and the t test was 48.6 and $p < 0.001$. 103 (\pm 96.6%) had a CRP value of 50, 35 (21.8%) had pneumonia, and 3 (3.3%) COPD patients had 50-100 CRP value. In pneumonia patients, 16 (\pm 10) had a 100-150 CRP value, and 2 (\pm 1.25%) had 201-250, 2 (1.25%) had 251-500, and 2 (1.25%) had 551-600 CRP value.**Conclusion:** C-reactive protein values are higher in pneumonia patients as compared to COPD patients. These variations can be diagnostic values for clinicians to treat different respiratory tract infections.**Keywords:** latex agglutination test, pneumonia, COPD, Madhya Pradesh.

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Introduction

C-reactive protein is an acute-phase protein synthesized by the liver in response to a number of stimuli involving tissue damage. Interleukin 6 (IL-6) and other cytokines such as tumor necrosis factor (TNF), IL-1, and transforming growth factor are also involved in CRP production [1,2].

Respiratory tract infections elicit a powerful inflammatory response, both locally and systematically, with chemotherapeutic cytokine release into the peripheral circulation. There have been only a few studies on the diagnostic utility of CRP in respiratory tract infections [3].

CRP has also been used as an index of response to treatment for rheumatic fever and certain other conditions. CRP is tested either by capillary precipitation of patient sera and antisera prepared in rabbits against purified CRP or by passive agglutination using latex particles coated with anti-CRP antibody [4].

Hence, an attempt is made to evaluate the respiratory tract infections, i.e., COPD and pneumonia, compare their severity, and know the responses in adults.

Material and Method**Tuppekar et al.**

250 (two hundred fifty) patients aged between 20 to 55 years regularly visited the chest medicine department of L. N. Medical College and the research center on Kolar Road, Bhopal, 462042, Madhya Pradesh were studied.

Inclusive Criteria: Patients with respiratory tract symptoms lasting more than 15 days and coughs or pneumonia were included in the study.**Exclusion Criteria:** Patients with malignancy of the lungs, immune-compromised patients, and those already under treatment with oral corticosteroids Myocardial infarction, pulmonary oedema, pulmonary infarction, collagen vascular disorder, and liver disease were excluded from the study.**Method**

The previous history and occupation of every patient were recorded. A chest x-ray was taken to confirm the diagnosis. A blood examination included CBC, ESR, and sputum for AFB, and RBS, was studied.

A serum sample was preserved at the time of presentation for measuring the CRP. CRP was

measured in neat (undiluted) sera and in dilution of 1/10, 1/20, 1/30, 1/40, 1/60, 1/80, and 1/100 using a commercially available latex agglutination test (Humatex CRP). The value of CRP was calculated by multiplying the denominator of the dilution by six to get the value in mg/l. The mid-value of the positive and negative titre was used in the calculation.

Duration of study: The study lasted from May 2022 to June 2023.

Statistical analysis: The obtained results of pneumonia and COPD exacerbation CRP values were studied with percentages, and CRP values in both groups were compared with the z test. The statistical analysis was carried out in SPSS software. The ratio of males and female was 2:1.

Observation and Results

Table 1: Distribution of patients with respiratory tract infections: 160 (64%) pneumonia, 90 (36%) COPD

Table 2: Comparison of CRP values in both groups of respiratory tract infection patients: mean values for pneumonia were 74.86 (± 10.2) and 15.80 (± 8.6) in COPD patients; t test was 48.6 and p<0.001 (p value was highly significant).

Table 3: In pneumonia, 103 (64.3%) had 50 CRP (mg/L), 35 (21.8%) had 50–100 CRP, 16 (10%) had 150–200 CRP, 2 (1.25%) had 201-250 CRP, 2 (1.25%) had 251–550 CRP, and 2 (1.25%) had 551-600 CRP.

In COPD, 87 (96.6%) had 50 CRP (mg/l), and 3 (3.3%) had 100–150 CRP (mg/l).

Table 1: Distribution of patients of Respiration tract infections

Infection	No. of patients (250)	Percentage (%)
Pneumonia	160	64
COPD with acute exacerbation	90	36

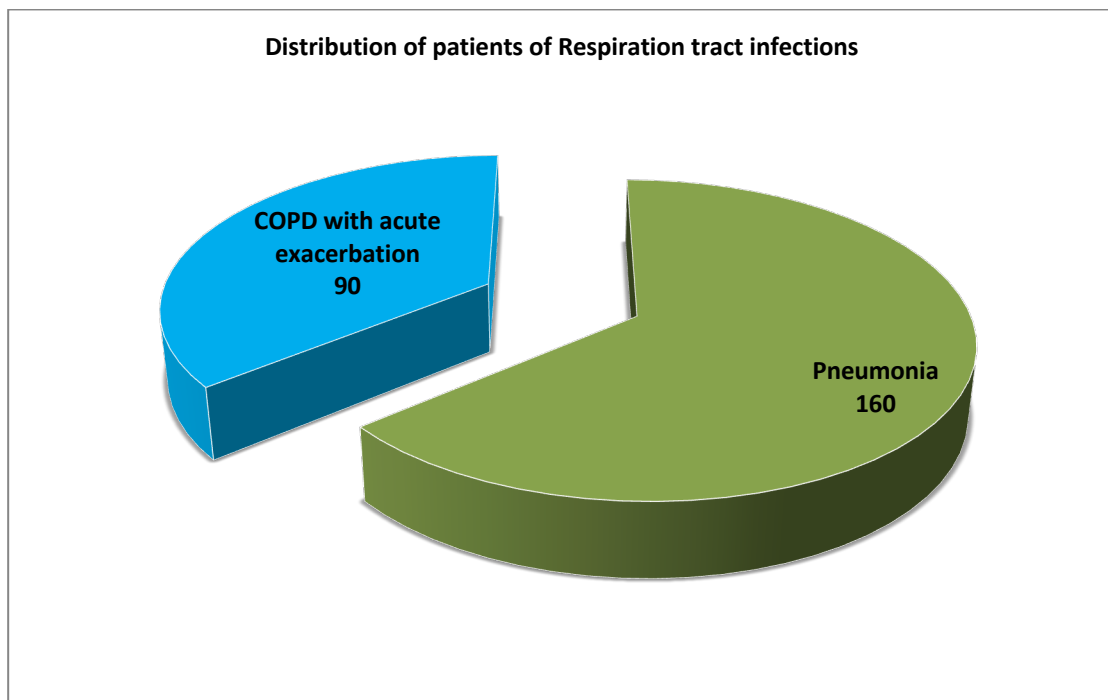


Figure 1: Distribution of patients of Respiration tract infections

Table 2: Comparison of CRP values in both groups of respiratory infections

Group	No. of patients	Mean value of CRP	t test	p value
Pneumonia	160	74.86 (± 10.2)	48.6	P<0.001
COPD with acute exacerbation	90	15.80 (± 8.6)		

P value is highly significant

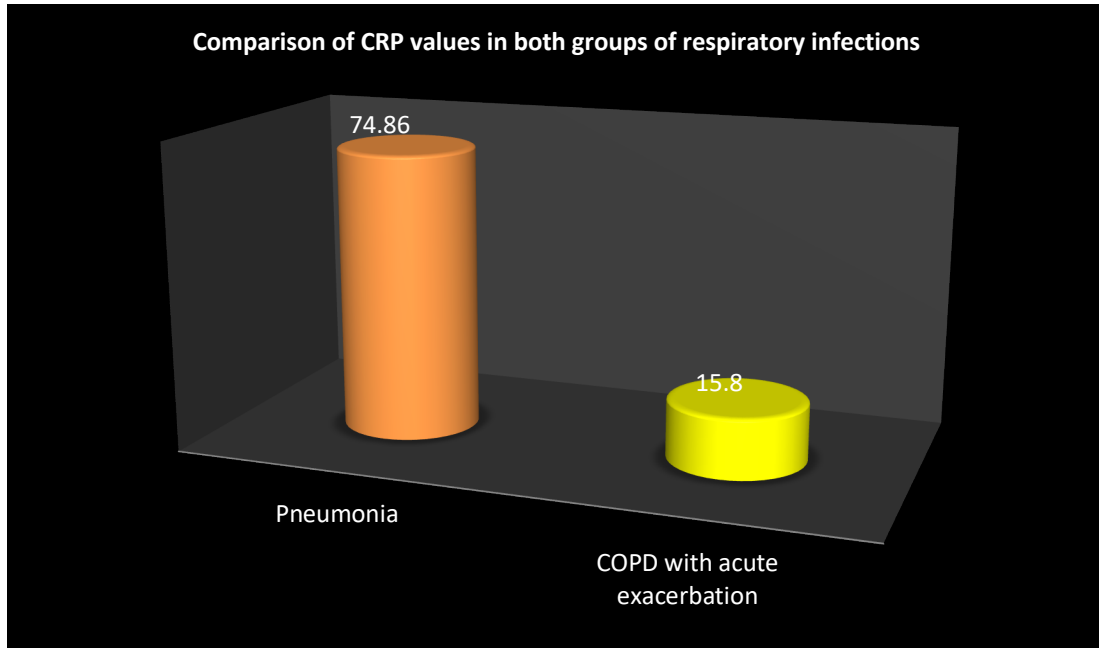


Figure 2: Comparison of CRP values in both groups of respiratory infections

Table 3: Distribution of CRP values in patients of respiratory tract infections

Values of CRP (mg/L)	No. of Pneumonia patients (160)	Percentage (%)	No. of COPD (90)	Percentage
0-50	103	64.3	87	96.6
50-100	35	21.8	3	3.3
100-150	16	10	--	--
150-200	--	--	--	--
201-250	2	1.25		
251-550	2	1.25		
551-600	2	1.25		
Total	160	99.85	90	99.9

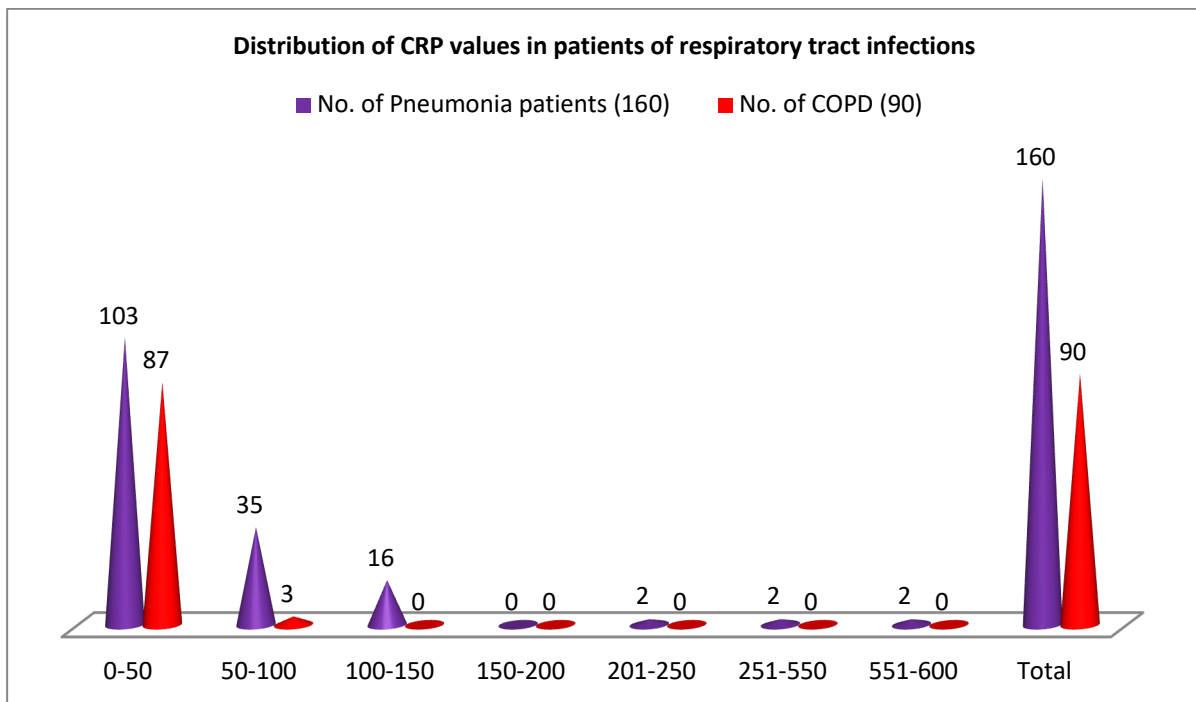


Figure 3: Distribution of CRP values in patients of respiratory tract infections

Discussion

Present study of C-reactive protein in respiratory tract infection in the Madhya Pradesh population. Out of 250 patients, 160 (64%) had pneumonia, and 90 (36%) had COPD (Table 1). In a comparative study of mean values in both groups, 74.86 (± 10.2) in pneumonia and 15.80 (± 8.6) in COPD patients, the t test was 48.6 and $p < 0.001$ (the p value was highly significant) (Table 2). In pneumonia patients, 103 (64.3%) had 50 CRP (mg/l), 35 (21.8%) had 50-100 CRP, 16 (10%) had 100-150 CRP, 2 (1.25%) had 201-250, 2 (1.25%) had 251-550, and 2 (1.25%) had 550-600 CRP (mg/dl). In COPD patients, 87 (96.6%) had 50 CRP (mg/l), and 3 (3.3%) had 50-100 CRP values (Table 3). These findings are more or less in agreement with previous studies [5,6,7]. CRP (C-reactive protein) is a non-specific acute-phase serum protein and a useful biomarker for the detection of inflammation and various active infections [8]. It has been shown to be beneficial in the clinical evaluation of the respiratory tract. Infection with fever in adults as well as in children was observed.

Additionally, an elevated CRP has been used as an indication to initiate antibiotic therapy [9]. C-reactive protein is an indication of pathology, and the disappearance of C-reactive protein is concomitant with the effectiveness of the drugs used in the treatment. This study was a blinded comparison of chest radiographs with a general practitioner-assessed diagnosis of pneumonia by chest radiography. The classical symptoms and signs of pneumonia were dyspnea, thoracic pain, self-reported fever, respiratory rate > 20 /min, percussion, dullness, and crackles, which were not predictive of pneumonia.

The final symptoms and signs model used to predict pneumonia included variables such as dry cough, diarrhea, and temperature (38°C), plus the ESR rate or C-reactive protein that best predicted pneumonia. Thus, a prediction rule for patients at low risk of pneumonia, including a CRP value > 20 mg/L, can reduce antibiotic prescribing in general practice.

The most common pathogens were Streptococcus pneumoniae, viruses, and Chlamydia pneumoniae, followed by Mycoplasma pneumoniae, Legionella pneumophila, and Coxiella burnetii. Lower levels of CRP were found in pneumonia caused by viruses and C. burnetii, as well as in negative microbiological findings. The median CRP levels in hospitalized patients were significantly higher than those in outpatients [10].

The researchers concluded that serum CRP is a useful marker for establishing the diagnosis of community-acquired pneumonia in adult patients with lower respiratory tract infections. CRP values are especially high in patients with pneumonia

caused by S. pneumoniae or L. pneumoniae. Moreover, high CRP values are suggestive of severity, which may be of value in deciding about the appropriateness of inpatient care [11].

Summary and Conclusion

The present study examines CRP values in respiratory tract infections. Highly significant differences were observed between pneumonia and COPD with acute exacerbations. No relationship between the CRP value and the organism could be found. Though no cut-off value could be found to differentiate the two groups of infections, a value of more than 50 mg/L went in favor of pneumonia. Hence, in this particular clinical setting, CRP could probably be an important parameter for differentiating doubtful cases, but this study demands further patho-physiological, pharmacological, genetic, immunological, and nutritional studies because the exact mechanism of the elevation of C-reactive protein in response to specific pathogenesis is still unclear.

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

This research paper was approved by the ethical committee of L. N. Medical College and the research center at Kolar Road, Bhopal, 462042, Madhya Pradesh.

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