



Comparative Analysis of Serum IL-6 Levels in Stable COPD and Acute Exacerbation of COPD Patients

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(Received: 16 March 2025

Revised: 20 April 2025

Accepted: 01 May 2025)

KEYWORDS

COPD, AECOPD, IL-6, inflammation, cytokines, biomarker

ABSTRACT:

Background: Chronic Obstructive Pulmonary Disease (COPD) is defined by chronic inflammation and progressive limitation of airflow. Exacerbations of COPD (AECOPD) are usually accompanied by higher levels of systemic inflammation and are frequently associated with increased inflammatory cytokines like Interleukin-6 (IL-6).

Objective: To evaluate and compare serum IL-6 levels in patients with stable COPD and those with AECOPD.

Methods: A cross-sectional observational study was conducted on 60 COPD patients in Uttar Pradesh University of Medical Sciences, Saifai. Patients were divided into two groups: 30 with stable COPD and 30 with AECOPD. Serum IL-6 levels were quantified with ELISA. Statistical evaluation was done using the Student's t-test where $p < 0.05$ was considered significant.

Results: The mean IL-6 level of the stable COPD group was 6.4 ± 2.1 pg/mL whereas for the AECOPD group it was 18.7 ± 5.6 pg/mL. Difference was statistically significant ($p < 0.001$), corroborating the view that IL-6 levels increase significantly during exacerbations.

Conclusion: IL-6 levels were significantly higher in AECOPD patients compared to those in a stable phase. This suggests that IL-6 may serve as a useful biomarker for identifying and monitoring acute exacerbations in COPD patients.

Introduction: Chronic obstructive pulmonary disease (COPD) is associated with increased morbidity and mortality rates, making it a worldwide public health issue [1]. It is clinically characterized by certain respiratory symptoms and an airflow obstruction that is not fully reversible [2]. A sudden decline in the patient's breathing ability or an increase in the severity of specific other symptoms are key indicators of acute exacerbations of COPD, which also contribute to the financial strain of the necessary medical services [3].

A systemic inflammatory response is a characteristic of every instance of COPD, intensifying during exacerbations. IL-6, or Interleukin-6, is a cytokine categorized as proinflammatory and plays a key role in the systemic inflammatory response that occurs after surgery or bodily trauma. Increased levels of IL-6 have been shown to result in poorer outcomes in COPD, including a greater frequency of exacerbations and hospitalizations [4]. This research aimed to assess the discriminative capacity of IL-6 in the stable phase and AECOPD to determine its potential as a marker of disease activity



Materials and Methods: Study Design and Setting: This was a cross-sectional observational study conducted in the Department of Pulmonary Medicine and Biochemistry at Uttar Pradesh university of Medical sciences.

Participants: Sixty patients diagnosed with COPD as per GOLD guidelines were included. Patients were categorized into:

- Group A: Stable COPD (n=30)
- Group B: Acute Exacerbation of COPD (AECOPD) (n=30)

Inclusion Criteria:

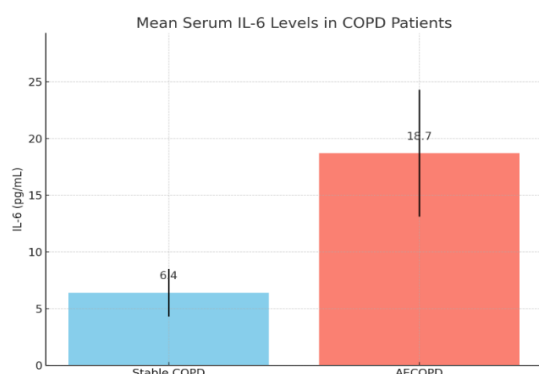
- Age > 40 years
- Confirmed diagnosis of COPD

Exclusion Criteria:

- Co-existing infections or inflammatory diseases
- Recent surgery or trauma
- Immunosuppressive therapy

Data Collection and Analysis: Venous blood samples were collected. IL-6 levels were measured using ELISA kits. Statistical analysis was performed using SPSS version 26.0. Mean and standard deviation were calculated. Student's t-test was applied to compare means, and p-values < 0.05 were considered significant.

Results: The demographic and clinical characteristics of the study participants were comparable between the two groups.



The bar graph comparing the mean serum IL-6 levels in patients with Stable COPD and AECOPD. It clearly shows

that IL-6 levels are significantly higher in the AECOPD group, aligning with your statistical results ($p < 0.001$).

Table 1: Showing the Serum IL-6 Levels

Group	IL-6 (pg/mL) Mean \pm SD
Stable COPD	6.4 \pm 2.1
AECOPD	18.7 \pm 5.6
p-value: < 0.001	

The mean serum IL-6 levels in AECOPD patients were significantly higher than those in the stable COPD group, suggesting a robust inflammatory response during exacerbation.

Discussion: Our findings align with previous studies that have shown elevated IL-6 levels during acute exacerbations of COPD. IL-6 promotes hepatic synthesis of acute-phase proteins like CRP and contributes to the recruitment of inflammatory cells. The sharp rise in IL-6 during exacerbations underscores its role in systemic inflammation and disease severity.

Several studies, including Barnes [5] and Wedzicha et al. [6], have highlighted IL-6 as a central cytokine in COPD pathogenesis. Our study reinforces this view and suggests that monitoring IL-6 levels may aid in predicting or identifying acute episodes.

Limitations:

- Small sample size may limit generalizability
- Single-center design
- Cross-sectional nature precludes causal inferences
- Lack of healthy control group

Conclusion: This study demonstrates a significant elevation in IL-6 levels during acute exacerbations of COPD compared to the stable phase. IL-6 may serve as a valuable biomarker for assessing disease activity and guiding clinical management in COPD.

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