

# CORRELATION BETWEEN SERUM ADIPONECTIN LEVELS AND LUNG FUNCTION IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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## Abstract

FEV1 is a lung function parameter that has been used as a marker of severity and disease progression in COPD. Biomarkers associated with rapid lung function impairment have been studied to improve the diagnosis and prognosis of COPD. Adiponectin has been identified as a potential biomarker for disease severity and progression in COPD patients as a result of its involvement in the pathogenesis of COPD. This study aims to examine the relationship between serum adiponectin levels and lung function in COPD patients. This study used a cross-sectional design with observational analytics and was conducted for 3 months with a total sample of 48 COPD patients. The results showed that there is a relationship between serum adiponectin levels and lung function in COPD patients ( $P < 0.05$ ).

**Keywords:** Chronic Obstructive Pulmonary Disease, Adiponectin, Lung Function, FEV1.

## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a non-communicable disease that affects approximately 300 million people, or 4% of the world's population. COPD is currently one of the top three causes of death in the world and 90% of deaths are mainly in low and middle socioeconomic countries [1]. COPD is characterized by irreversible airflow limitation that is usually progressive and associated with an abnormal inflammatory response of the lungs to harmful particles or gases. This condition results in decreased lung ventilation function in COPD patients [2].

The pulmonary function examination is an objective method for assessing changes or disturbances in lung function in patients with lung disease or suspected lung disorders. With the results of lung function examinations, you will be able to determine the pattern of functional impairment, whether the disorder is obstructive or restrictive [3]. Obstructive or restrictive ventilation defects can be identified through Spirometry and FEV1/FVC calculations. An obstructive defect is indicated when  $FEV1/FVC < 70\%$  and FEV1 decreases more than FVC. Chronic obstructive pulmonary disease (COPD) and asthma are both common examples of obstructive defects. FEV1 can be expressed as a percentage of the predicted value which is currently used as a marker of the severity and progression of COPD [4]. Several biomarkers have been investigated to improve the diagnosis and prognosis of COPD and have been linked to a faster decline in lung function. Adipose tissue has been found to be associated with systemic inflammation in COPD patients in the past few years. In addition to being an energy storage facility, adipose tissue also produces mediators that are involved in

inflammation [5]. Adiponectin (APN) is a novel cytokine synthesized by adipocytes that may have a potential role in regulating the inflammatory response in COPD.[6]. Plasma adiponectin levels are closely related to plasma TNF- $\alpha$  levels in COPD patients. In this regard, high plasma adiponectin levels may play an important role in the counter-regulation of proinflammatory cytokines accompanied by systemic inflammation [7]. In addition, circulating adiponectin levels were associated with C-reactive protein (CRP) levels, interleukin-8 (IL-8)] levels, and interleukin-6 (IL-6)] levels in COPD patients. The results of this study suggest that increased adiponectin may play a role in systemic inflammation in COPD [8]. This study aims to examine the relationship between serum adiponectin levels and pulmonary function in patients with COPD.

## MATERIALS AND METHODS

### Location and Research Design

This study was conducted at the UPF Balai Besar Kesehatan Paru Masyarakat Makasar (BBPKMM). Data collection for this study was carried out from September to December 2023. The type of this study is observational analytic with a cross-sectional design.

### Research Method

The study population was all COPD patients in Makassar city, with the research sample consisting of COPD patients at UPF BBKPM. The sampling technique used in this study was purposive sampling, which means taking samples from the population according to the specified inclusion criteria. The criteria for inclusion are stable COPD patients who are currently being treated at the UPF BBKPM Makassar Clinic and are willing to take blood samples. The number of samples found was 48 respondents.

The research implementation included a brief interview regarding the identity of the respondent, measuring body weight and height, measuring FEV1 using a spirometer, and taking blood samples at the UPF BBKPM Makassar clinic. Then, blood samples were placed into EDTA tubes and serum was obtained by centrifugation at 1000 g for 5 minutes at room temperature. Samples were stored at  $-70^{\circ}\text{C}$  until analysis. Serum adiponectin concentration was measured by enzyme-linked immunosorbent assay (ELIZA) using the ELIZA adiponectin kit carried out in the Hasanuddin University Medical Research Center (HUMRC) laboratory.

## RESULTS

Research demographic data can be seen in the following table:

**Table 1: Characteristics of Respondents**

No	Respondent Characteristics	Frequency *
1	Age	58 $\pm$ 11.06
2	Gender Man Woman	40(83.3%) 8( 33.3 %)
4	BMI (kg/m <sup>2</sup> )	20.56 $\pm$ 3.04
5	Lung Function (%)	42.87 $\pm$ 21.05
6	Serum adiponectin levels ( $\mu\text{g/mL}$ )	20.61 $\pm$ 13.63

Source: Primary Data

The research results showed that the average age of respondents was 58 years. In the gender category, the majority of respondents were male (83.3%), and only 33.3% of respondents were female. In this study, the body mass index of respondents was also measured in the normal category if they had a BMI of 18.5-25 and less if their BMI was <18.5. The results showed an average BMI of 20.56.

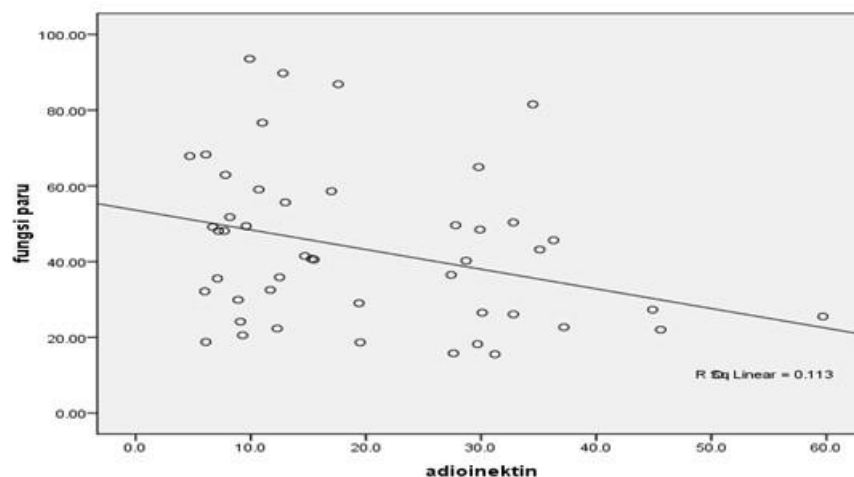
In this study, serum adiponectin and lung function were measured, in this case, the percentage value of forced expiratory volume in the first second (FEV1). The relationship between serum adiponectin levels and lung function in COPD patients can be seen in the following table.

**Table 2: Correlation of Serum Adiponectin Levels with FEV1 in COPD Patients at the Makassar Lung Health Center (N=48)**

Correlation		Serum Adiponectin Levels	A
Lung Physiology Function	Coefficient Correlation	-0.298	
	Sign (2-tailed)	0.040	0.050
	N	48	

Source: Primary Data

The results of statistical tests using *the Spearman test* showed a value of  $p=0.040 < 0.05$ . Thus it can be concluded that there is a significant relationship between serum adiponectin levels and lung function in COPD patients at the UPF BBKPM Makassar Clinic. The correlation coefficient shows a negative relationship with the strength of the relationship being quite strong. The plot diagram of the relationship between adiponectin levels and lung function can be seen in the following picture:



**Figure 1: Plot Diagram**

## DISCUSSION

COPD is a heterogeneous condition characterized by progressive airway inflammation. In the pathogenesis of COPD, inflammatory mediators such as IL-8, IL-6, and TNF $\alpha$  are secreted in the airways by inflammatory cells, which are responsible for repeated injury and repair of the airways, ultimately leading to airway obstruction [9].

Adipose tissue, which has long been considered the only major storage site for excess energy, is a complex, essential, and highly active metabolic and endocrine organ. In recent years, adipose tissue was reported to be involved in systemic inflammation in COPD patients through the bioactive hormone secretin, known as adipokine, a mediator involved in the regulation of metabolic and inflammatory processes. Adiponectin is a proteic hormone, that is likely involved in various metabolic processes including immunity, insulin resistance, lipid, and glucose metabolism [9,10], and has important anti-inflammatory, anti-atherosclerotic, and anti-obesity effects [12]. In metabolic disorders, adiponectin expression is strongly downregulated and inversely proportional to body mass index (BMI) and glucose and cholesterol levels. Other researchers previously reported that adiponectin is an important serum biomarker in COPD because its serum levels are higher in COPD patients than in healthy controls [13].

The results showed that 35.4% of respondents experienced an increase in serum adiponectin levels. In another study, male patients with mild, moderate, severe, and very severe low-weight COPD were analyzed. Serum adiponectin concentrations were higher in COPD patients compared with the control group [14]. Measurement of adiponectin levels can be used to assess disease severity and progression and can assist in risk stratification and therapy [15]. This was demonstrated in significantly higher serum adiponectin concentrations in patients with COPD exacerbation compared with the control group [16].

The results of statistical tests using *the Spearman Test* showed a value of  $p=0.040 < 0.05$ . Thus it can be concluded that there is a significant relationship between serum adiponectin levels and lung function in COPD patients at the UPF BBKPM Makassar Clinic. The correlation coefficient shows a negative relationship with the strength of the relationship being quite strong. The results of this study are by research conducted by Yeon (2015 ) which showed that the results of this study revealed that plasma adiponectin levels were significantly related to COPD severity parameters (FEV1) [17]. Other research that is in line with this research is research conducted by Kento Sato (2014) which shows that plasma adiponectin levels are inversely correlated with forced expiratory volume in 1 second (FEV1) per forced vital capacity in men and women [18].

## CONCLUSION

Currently, the severity of COPD can be seen from the results of measuring FEV1 using a spirometer, while serum adiponectin levels are one of the biomarkers of severity in COPD patients.

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