

Original Article

Serum Levels of Gamma Glutamyltransferase in Chronic Obstructive Pulmonary Disease Patients and Normal Individuals- Case Control Study

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OPEN ACCESS**ABSTRACT**

Introduction: Chronic obstructive pulmonary disease (COPD) is a heterogenous lung condition characterized by chronic respiratory symptoms like cough, dyspnea, sputum production and exacerbation due to abnormalities of airways. Gamma Glutamyltransferase (GGT) being a heterodimeric protein, bound on the extracellular surface of secretory cells. It plays an important role in processes of oxidative stress. Elevated serum GGT levels indicate oxidative stress and/or an inflammatory process

Materials and methods: The study was done in 60 persons. Among them 20 were patients with Acute exacerbation of COPD, 20 were stable COPD patients and 20 were healthy human beings. 3ml of Blood was collected from each persons. Serum GGT estimation was estimated in each person.

Results: The study was done in 60 persons. 43.30% (n=26) were males, 56.7% (n=34) were females. They were categorised into 3 groups. Acute Exacerbation of COPD, Stable COPD and control. GGT levels between males and females, mean \pm SD in males is 34.80 ± 15.13 , control is 24.15 ± 13.74 . This was statistically significant $p < 0.001$. Among COPD cases (n=40), mean \pm SD and Median are 35.41 ± 14.71 and 34.70 (17.40). The same among control (n=20), are 19.74 ± 10.85 and 22.45 (16.02). This is statistically significant $p < 0.001$. Mean \pm SD and Median among AECOPD Patients are 39.93 ± 18.41 , and 35.10 (29.9), and among control the Mean \pm SD and Median 30.90 ± 7.88 and 30 (13). This was borderline significant p value is 0.51.

Conclusion: AECOPD and stable COPD cases are common among males than females. Mean GGT levels are elevated among males than females in the present study. Mean GGT levels are higher among cases than the controls which is statistically significant. AECOPD and Stable COPD do not show significance in the GGT levels. To conclude GGT levels can be used as marker for AECOPD and stable COPD cases.

Keywords: Gamma Glutamyltransferase, chronic obstructive pulmonary disease, Acute Exacerbation, Stable cases.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a heterogenous lung condition characterized by chronic respiratory symptoms like cough, dyspnea, sputum production and exacerbation due to abnormalities of airways and/or alveoli(emphysema) that cause persistent, often progressive, airflow obstruction[1]. It is caused by smoking, biomass fuel exposure, indoor and out door pollution, and alpha 1 antitrypsin deficiency. COPD ranks the fourth leading cause of death worldwide and the only chronic disease that has continuously showed an increase in mortality [2–4]. Being an inflammatory condition there is strong evidence of oxidative stress in all parts of the body.

Gamma Glutamyltransferase (GGT) being a heterodimeric protein, bound on the extracellular surface of secretory cells membrane and on the external surface of most human cells, including lung epithelial cells [5]. It plays an important role

in processes of oxidative stress. Elevated serum GGT levels indicate oxidative stress and/or an inflammatory process[6] and are associated with chronic inflammatory diseases.[7-8] GGT may serve as a potential biomarker for assessing COPD progression, particularly during acute exacerbations.[9]. It is a key enzyme in the metabolism of glutathione, performs important roles in antioxidant mechanism. Given its role as a major antioxidant, GGT has been known as a surrogate marker of oxidative stress, and various studies have reported the involvement of GGT in the pathogenesis of various diseases, such as cardiovascular disease (CVD), cancer, lung inflammation, and neurologic diseases[10].

Though there are many investigations for diagnosis and grading of COPD, there is no specific evident marker to assess the ongoing inflammatory process in COPD patients. Hence the study is to establish more information on the inflammatory process which occurs in COPD patients.

AIMS & OBJECTIVES

- 1) To analysis the levels of Gamma glutamyl transferase in Chronic obstructive pulmonary disease patients and normal individuals.
- 2) To compare the serum levels of Gamma glutamyl transferase in chronic obstructive pulmonary disease patients and to elicit the variation in Gamma glutamyltransferase levels acute exacerbation and stable chronic obstructive pulmonary disease patients.

MATERIALS & METHODS (METHODOLOGY)

With prior institutional ethical committee approval, an Analytical cross sectional study was carried out from March 2024 to December 2024 among 20 stable COPD cases, 20 AECOPD cases and 20 controls with age group of between 40 to 75 years attending the outpatient & inpatient Department of Pulmonary medicine and General medicine, Government medical college Hospital, Virudhunagar. Convenient sampling method was used as sampling technique.

INCLUSION & EXCLUSION CRITERIA

Inclusion criteria for selection of stable COPD cases: Patients who are all above 40 years of age and diagnosed to have Chronic obstructive pulmonary disease as per GOLD guidelines, requiring OPD or inpatient treatment in Respiratory Medicine or General Medicine at Government Medical College Hospital Virudhunagar.

Inclusion criteria for selection of AECOPD cases: Patients who are all above 40 years of age and diagnosed to have Exacerbation of Chronic obstructive pulmonary disease as per GOLD guidelines, requiring inpatient treatment in ICU or stepdown ICU in Respiratory Medicine or General Medicine at Government Medical College Hospital Virudhunagar.

Inclusion criteria for selection of compare group: Normal individuals who are all above 40 years or patients aged more than 40 years without chronic respiratory/liver illness/ malignancy, and without any addictions will be selected for the control in the study.

Exclusion criteria for stable COPD & AECOPD cases:

1. Patients who are known alcoholic
2. Patient with known liver diseases like Cholestatic liver disease, other diseases like inflammatory bowel disease and atherosclerosis
3. Patients with lung malignancy or lung diseases.
4. Patients who are not willing to take part in this study.

Exclusion criteria for control group:

1. Individual less than 40 years of age
2. Individuals with known lung diseases.
3. Individual who are known alcoholic.
4. Individuals who are not willing to take part in this study
- 5.

Patients who are fulfilling inclusion & exclusion criteria will be subjected to complete history taking, physical examination, routine blood investigations, serum Gamma Glutamyl transferase level estimation, spirometry among COPD patients.

Glutamyltransferase level are measured in XL-640 Fully Automatic Clinical Chemistry Analyser. Normal value is 10-30U/L. Appropriate statistical methods will be used to analyse the study.

STUDY INSTRUMENTS

1. Structured questionnaire will be used.
2. Lab investigations such as serum Gamma glutamyl transferase and other routine blood investigations like Blood sugar, Hemoglobin etc.,
3. Spirometry using RMS spirometry instrument.

RESULTS

An Analytical cross sectional study was carried out among 20 (33.3%) AECOPD cases, 20 (33.3%) patients with Stable COPD and 20(33.3%) controls with age group of more than 40 to 75 years attending the outpatient & inpatient Department of Pulmonary medicine and General medicine, Government Medical college Virudhunagar.

Gender Distribution : Out of 20 AECOPD cases, 13 (65%) participants were male and 7 (35%) participants were female. Out of 20 stable COPD cases, 13 (65%) participants were male and 7 (35%) participants were female. Among the 20 controls, 8 (40%) participants were male and 12 (60%) participants were females.

Age Distributuion : Among AECOPD case participants(n=20), 8 (40%) with age less than 50 years, 12 (60%) with age more than 50 years. In Stable COPD case participants (n=20), 9 (45%) with age less than 50 years, 11 (55%) with age more than 50 years. In Controls participants (n=20), 50% with age less than 50 years, 50% with age more than 50 years. The mean age of AECOPD, stable COPD and controls were 55, 53.80, 52.50 respectively.

GGT levels – Male vs female : GGT levels between males and females, mean \pm SD in males is 34.80 ± 15.13 , control is 24.15 ± 13.74 . This was statistically significant $p < 0.001$.

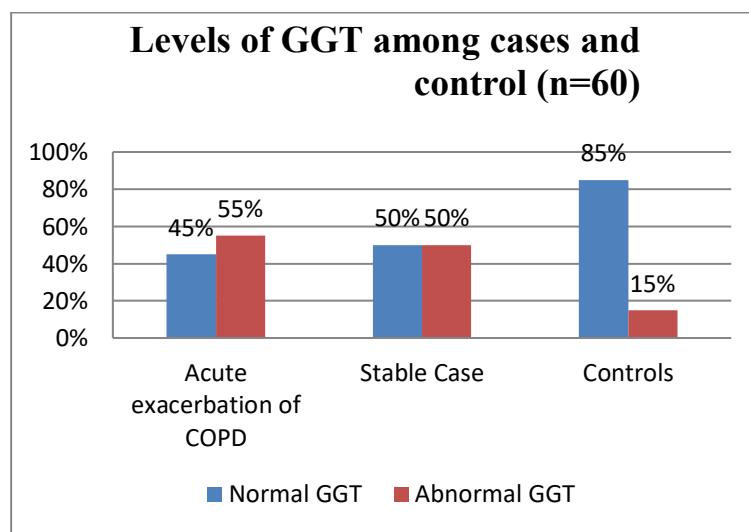
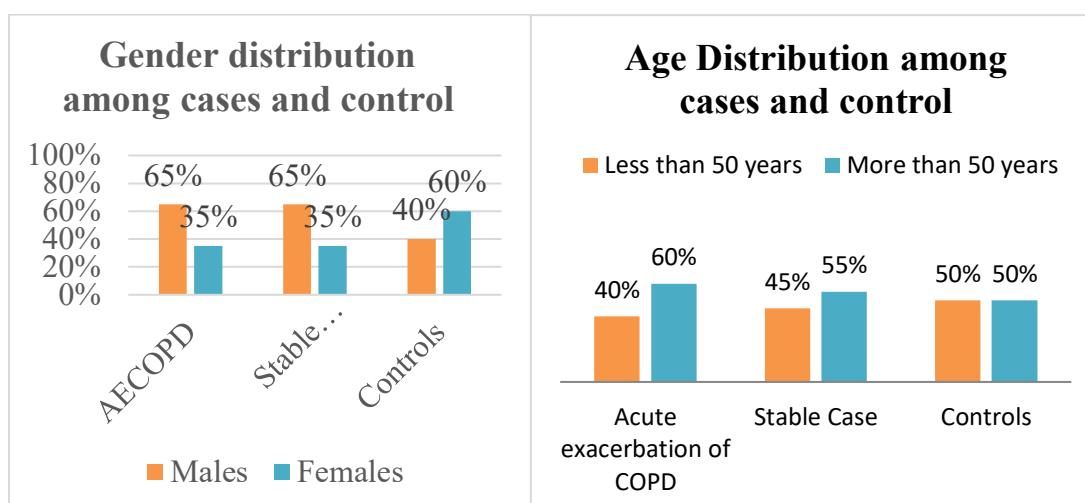
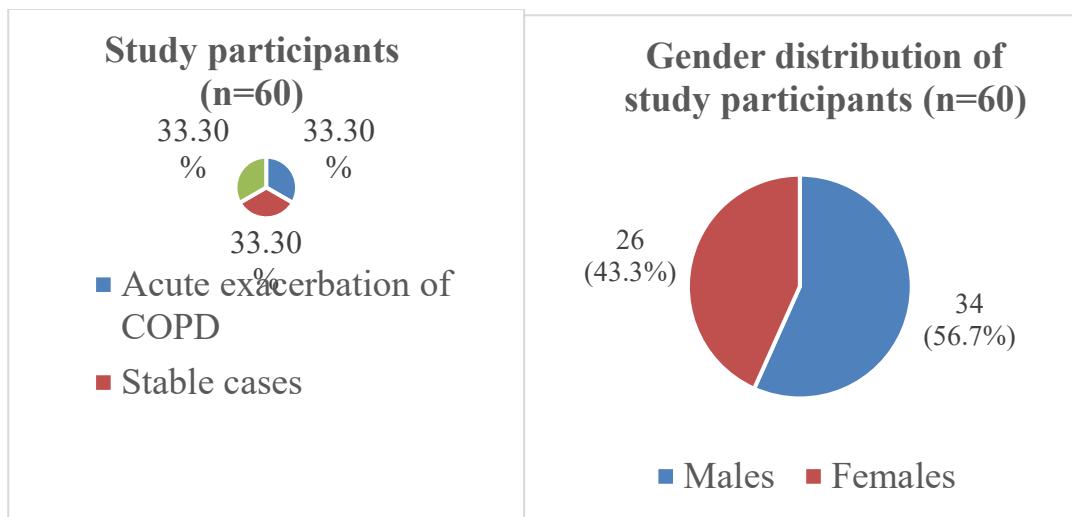
GGT levels – among AECOPD, stable COPD and Control : Among the AECOPD cases (n=20), 9 (45%) participants had GGT level between 5 to 30, 11 (55%) had GGT levels above 30. Among the Stable COPD (n=20), 10 (50%) participant had GGT level between 5 to 30, 10 (50%) had GGT levels above 30. Among the Control group (n=20), 17 (85%) participant had GGT level between 5 to 30, 3 (15%) had GGT levels above 30.

GGT levels – COPD cases vs control : Among COPD cases (n=40), mean \pm SD and Median are 35.41 ± 14.71 and 34.70 (17.40). The same among control (n=20), are 19.74 ± 10.85 and 22.45 (16.02). This is statistically significant $p < 0.001$.

GGT levels AECOPD cases vs stable COPD cases : Mean \pm SD and Median among AECOPD Patients are 39.93 ± 18.41 , and 35.10(29.9), and among control the Mean \pm SD and Median 30.90 ± 7.88 and 30 (13). This was borderline significant p value is 0.51.

Table : 1 MASTER CHART

		AECOPD (n=20)	Stable COPD (n=20)	Control (n=20)	GGT levels	Median	P value
Gender	Male	13 (65%)	13 (65%)	8 (40%)	34.80 ± 15.13	34.70 (17.40)	Male vs female - < 0.001
	Female	7 (35%)	7 (35%)	12 (60%)	24.15 ± 13.74	22.45 (16.02)	
Age	< 50	8 (40%)	9 (45%)	10 (50%)			COPD cases (n=40) vs Control - < 0.001
	>50	12 (60%)	11 (55%)	10 (50%)			
	Mean \pm SD	55 ± 10.05	53.80 ± 9.03	52.50 ± 12.39			
	Minimum to maximum age	41-78	41-70	32-77			
GGT levels	Normal GGT(5-30 IU/L)	9 (45%)	10 (50%)	17 (85%)			AECOPD vs stable COPD - 0.051.
	Abnormal GGT	11 (65%)	10 (50%)	3 (!5%)			
	Mean \pm SD	39.93 ± 18.41	30.90 ± 7.88	19.74 ± 10.85			
	Median (IQR)	35.10 (29.90)	30 (13.02)	17.35 (20.20)			
	Minimum to Maximum age	12.10 – 70.80	21.20 – 46	5 – 37.30			



DISCUSSION

Gender distribution of study participants between groups:

In our study, the percentage of male participants among AECOPD and stable COPD case groups are 65% each. The percentage of male participants among controls is only 40% and female participants are 60%. The gender distribution of both AECOPD and stable COPD group shows male preponderance which is attributed to smoking, occupational smoke exposure among males.

Age distribution of study participants between groups:

In our study among AECOPD cases, <50years of age is about 40%, >50years is about 60% with mean \pm SD 55 ± 10.05 . Among stable COPD cases, <50years of age is about 45%, >50years is about 55% with mean \pm SD 53.80 ± 9.03 and

among controls <50years of age is about 50%, >50years is about 50% with mean \pm SD 52.50 ± 12.39 . The study shows that the mean age of AECOPD case group is more than the stable COPD case group, which is again more than the mean age of Control group. The result indirectly conveys that increasing age is directly proportional to development of COPD and Exacerbations.

GGT levels among males and females

In our study the mean \pm SD and Median of GGT values among males are 34.80 ± 15.13 and 34.70 (17.40) respectively. Whereas the same among females are 24.15 ± 13.74 and 22.45 (16.02), p value <0.001 . There seems to be high GGT values among males than females, which could be due increased number of AECOPD and stable COPD cases among males.

Comparing GGT levels among overall COPD (AECOPD and Stable COPD cases) with Controls:

In our study GGT levels among overall COPD cases (AECOPD and Stable COPD cases) is 35.41 ± 14.71 and control is 19.74 ± 10.85 with significant p value 0.001. In another study by Desheng Sun et al., GGT values in COPD cases (AECOPD & COPD) 23.85. This was statistically significant p < 0.001 [4]. In another study done by Bagaria et.al GGT level in control group is 16.16 ± 3.55 U/L, the lowest among the GGT level in COPD group (n=40) had a higher mean of 27.70 with significant p value 0.001[10].

Comparing GGT levels in AECOPD & Stable COPD cases:

In our study GGT levels in AECOPD cases 39.93 ± 18.41 and in stable COPD cases 30.90 ± 7.88 and p value is 0.051. it is borderline significant. In a study by Desheng Sun et al., mean GGT in AECOPD cases is 32.9 ± 9.9 and in stable COPD cases is 24.0 ± 7.2 [4.] In another study by Bagaria et.al the GGT levels among AECOPD and stable COPD group are 31.36 ± 6.10 U/L and 23.80 ± 4.0 U/L respectively[9]. The present study findings are in comparable with the Bagaria et al. and Sun D et al study.

CONCLUSION

AECOPD and stable COPD cases are common among males than females. Mean GGT levels are elevated among males than females in the present study. Mean GGT levels are higher among cases than the controls which is statistically significant. AECOPD and Stable COPD do not show significance in the GGT levels. To conclude GGT levels can be used as marker for AECOPD and stable COPD cases.

LIMITATION

- As the Sample size is small, it may affect the statistical power and validity of the study. Further detailed study with huge samples might reveal more information.
- Follow up assessment of serum GGT levels after a course of treatment is not done. The absence of Longitudinal evaluation of GGT levels limits the ability to evaluate its prognostic significance.

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