

## Evaluation of Tobacco Smoking Effect on the Enzymatic Activity of Serum Gamma-Glutamyltransferase

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### Abstract:

**Background:** A cell-surface protein called gamma glutamyl transferase (GGT) aids in the extracellular breakdown of glutathione. Although the enzyme is produced in a variety of tissues, the liver produces the majority of the GGT in serum, making it the most sensitive enzymatic biomarker of liver disease at the moment. to measure the serum GGT enzyme activity in order to assess the impact of smoking on liver disorders.

**Methods:** There were one hundred and twenty participants in the study. Every subject was divided into two groups. Group 1 is made up of sixty volunteers who smoke regularly. Group 2 is made up of sixty volunteers who do not smoke. Disposable syringes were used to reserve four to six milliliters of venous blood from each subject. The samples were immediately centrifuged at 3000 revolutions per minute for ten minutes, after which the obtained serum was immediately analyzed.

**Results:** According to the data, the smoker group belongs to the moderate smoker group. According to the obtained data, the smokers' group had a mean serum GGT activity of (23.49± 3.39 IU/L). This number was significantly higher than the 12.92 ±2.73 IU/L (p<0.003) obtained in the non-smokers group.

**Conclusion:** Smokers tend to continue to suffer from the harmful consequences of smoking due to a significant increase in GGT activity. Additional research is required to elucidate the relationship between serum GGT activity and dietary and environmental variables.

**Keywords:** Serum Gamma Glutamyl Transferase (GGT), smoking, enzymatic activity.

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### Introduction

The enzyme known as gamma-Glutamyltransferase (GGT) is found in many organs throughout the body, with the liver having the highest quantities. In most disorders that cause damage to the liver or bile ducts, GGT is more prevalent in the blood.

The GGT level in a blood sample is determined by this test. GGT is normally present in trace amounts, yet it can rise in an inflamed liver. When parts of the bile ducts that carry bile from the liver to the intestines become obstructed, GGT usually rises to the top of the blood's list of liver enzymes. As a result, it becomes the most sensitive liver enzyme test for identifying bile duct issues. [1-3] Clinical studies have revealed that GGT is extremely sensitive in acute and chronic liver disease. Increase in serum GGT activity can forecast morbidity and mortality of liver disease. This aspect may have supplementary responsibility in the aetiology or development of the hepatocellular

carcinoma. [2,4] According to basic and clinical research, smoking cigarettes has an impact on the liver because they include many toxins that change the enzymatic and inflammatory pathways in the liver's physiology. Smoking has been demonstrated to accelerate the development of chronic liver disorders and to raise the risk of cirrhosis.

Furthermore, smoking cigarettes may make alcohol's harmful effects on the liver worse. [5] In the general population, the relationship between smoking and liver function is less obvious. A few population studies have looked at the connection between liver function indicators such alkaline phosphatase (ALP), gamma-Glutamyltransferase (GGT), alanine aminotransferase (ALT), and aspartate aminotransferase (AST) and their levels of smoking. [6,7] Additionally, GGT has been proposed as a biomarker for oxidative damage caused by alcohol and smoking.

It is an emerging risk marker for both total and cause-specific mortality, as well as for a number of common diseases like diabetes and cancer. [8,9] Better consideration of the factors influencing entity GGT levels has consequently shown to be a highly significant endeavour for public health.

There haven't been many research examining the connection between GGT levels and prior smoking, and it's still unclear if the effect exists regardless of alcohol consumption. The purpose of this study was to evaluate the relationship between serum GGT levels and smoking status.

### Material and Methods

From January 2022 to December 2022, the current study was conducted in the pulmonary medicine department of Katihar Medical College and Hospital in Katihar, Bihar. Informed consent was obtained in writing from each participant. Every outcome was anonymous.

The study included one hundred and twenty people. Two groups were formed out of each contributor. Sixty volunteers in Group 1 were habitual smokers. These were assigned to a study group. Group 2 was made up of sixty volunteers who did not smoke regularly. They served as the control group. There were 58 males and 2 females in group 2 and 54 males and 6 females in group 1.

Each of the two sets' subjects (the healthy and informed ones) gave verbal agreement when asked to participate in an interview about their smoking history, including how many cigarettes they smoked each day and how many years they had smoked. The following were the inclusion criteria: participants who were older than eighteen and had a history of smoking ten to twenty cigarettes a day

were classified as moderate smokers. The exclusion criteria included nonsmokers, severe illness, frequent medication use, vitamin use, and past food supplementation. The study's data collection from female smokers was difficult and insufficiently done; further attempts to involve female applicants were unsuccessful because they were ashamed to participate in the research; as a result, the majority of participants were male smokers.

Each subject had four to six milliliters of venous blood drawn using disposable syringes. The samples were immediately centrifuged for ten minutes at a speed of three thousand rounds per minute. The obtained serum was then immediately examined.

The two groups' serum GGT activity was determined using kits in accordance with the Szasz, Rosalki, and Tarlow procedure explanation.

Version 15 of the SPSS software for Windows was used to analyze the results statistically. The different factors were assessed in relation to one another and put to the test using an unpaired student exam. It is noted that  $p < 0.05$  is significant.

### Results

The objective of the present study was to assess the relationship between serum GGT levels and smoking status.

The study comprised 120 people in all, split into two groups. A control group and a study group were selected.

The age ranges and daily cigarette consumption of smokers and non-smokers are shown in Table 1. According to the results, the smoker group was categorized as moderately smokers.

**Table 1: the (Mean  $\pm$  SEM) of age and no. of cigarette smoking by smoker and non-smoker groups**

Groups	No. of patients	Age (Mean $\pm$ SD)	No. of cigarettes/day
Smokers (Group 1)	60	39.73 $\pm$ 2.84	10-20
Non-smokers (Group 2)	60	35.0 $\pm$ 2.61	0

The results obtained, as shown in Table 2, indicate that the smoker group was classified as a moderate smoker group. In the group of smokers, the average S.GGT activity was 23.49 $\pm$  3.39 IU/L. This number was significantly higher than the 12.92  $\pm$  2.73 IU/L ( $p < 0.003$ ) obtained in the non-smokers group.

**Table 2: Serum Gamma Glutamyl transferase activity in smoker and non-smoker groups**

Groups	No. of patients	Serum Gamma Glutamyl transferase (IU/L) (Mean $\pm$ SD)
Smokers (Group 1)	60	23.49 $\pm$ 3.39
Non-smokers (Group 2)	60	12.92 $\pm$ 2.73

### Discussion

Additionally, gamma-glutamyltransferase (GGT) has been proposed as a biomarker for oxidative stress caused by alcohol and smoking. It is an emerging risk marker for both total and cause-specific mortality, as well as for a number of common diseases like diabetes and cancer. Therefore, increasing awareness of the variables

influencing an individual's GGT levels has become a goal of great importance for public health.

There aren't many research examining the connection between GGT levels and prior smoking, though. [10, 11] Serum GGT is a biomarker of higher alcohol intake, according to numerous studies; however, GGT is also known to be impacted by other conditions, including obesity,

smoking, and hepatic steatosis.<sup>12</sup> There is growing evidence that elevated serum GGT levels are linked to a higher risk of cardiovascular events, metabolic syndrome, and diabetes; hence, this liver enzyme has received increased attention recently. It's feasible that patients with higher GGT levels have improved insulin resistance, which could mediate some of the relationship between GGT and the numerous illnesses seen in earlier investigations. [13]

The current study finds a link between cigarette smoking and serum GGT. To encourage participants to refrain from this risk, preventative measures should be emphasized at all reasonable levels. This approach considerably increased the likelihood that cigarette users would experience a drop in serum GGT levels compared to non-smokers. Our results align with the ones obtained by Gressner et al., [14]

Increases in GGT levels in the serum have been linked to liver disorders; this suggests that liver function enzymes can be used as biomarkers to assess hepato-biliary diseases. Generally speaking, GGT is considered to have emerged as the diagnostic test that is clinically useful. [14] Cigarette smoking may be considered one of the discriminatory risk factors for liver problems, according to the explanation offered by the results of the current study.

### Conclusion

Smokers' much enhanced GGT action seems to maintain the harmful effects of cigarette smoking. To fully understand the relationship between dietary and lifestyle variables and serum GGT activity, more research is necessary.

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