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RESEARCH

Correlation of carotid intima media thickness with SGOT in diabetic patients–An analytical cross-sectional study in a tertiary care hospital

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Background: Uncontrolled diabetes mellitus predisposes to atherosclerotic cardiovascular diseases like coronary artery disease, Stroke leading to illness, complications, and death. Carotid intima media thickness (CIMT), performed by radiologists being simple and noninvasive, has been regarded as a tool to diagnose early atherosclerosis. Aspartate aminotransferase (AST) is a cardiac biomarker whose level will be elevated in myocardial injury and inflammation. This study was conducted to find correlation of SGOT with CIMT in diabetes patients.
Methods: 29 patients with type 2 diabetes mellitus were selected for this hospital-based analytical cross-sectional study. SGOT and CIMT were measured. The correlation between SGOT and CIMT was analyzed using Pearson correlation analysis.
Results: Of the 29 patients enrolled 34.5 % were female and 65.5 % were male. A statistically significant correlation was found between HbA1C, FBS with CIMT ($p < 0.001$). The mean age was 66.32 $\pm$ 10.981. 55% of the patients had CIMT more than 0.9 mm. We found a statistically significant correlation between SGOT and CIMT $r = 0.415$ with a p-value of 0.025.
Conclusion: SGOT is having a positive correlation with CIMT in diabetic patients. Hence SGOT can be utilized as a marker to prognosticate early atherosclerotic cardiovascular events like stroke and ischemic heart disease in diabetic individuals.

Keywords: CIMT, SGOT, atherosclerosis, diabetes

Introduction

Diabetes is a chronic complex metabolic disorder leading to impaired glucose tolerance and hyperglycemia, which in turn lead to end organ failure. As per the WHO report, every year about 422 million people have diabetes and 1.5 million deaths are directly due to diabetes (1). Both diabetes and cardiovascular diseases are characterized by subacute inflammation and resistance to insulin. Under the stimulus of various risk factors, it is evident that in the natural pathway of diabetes, inflammatory mediators play a major role (2).

Atherosclerosis is an inflammatory disease of the arteries, occurring as a result of arterial wall lesions, due to lipid retention in the intima and hence classically associated with altered lipid metabolism and hypercholesterolemia (3). Atherosclerotic cardiovascular events are among the major causes of illness, complications, and death among diabetic individuals.

Carotid Intima media thickness, being simple and noninvasive, is widely used as a marker of atherosclerosis as it can detect early atherosclerotic vascular changes (4). The thickness of intima and media can signal the presence of atherosclerosis (plaque build-up), even in its earliest stages even before any symptoms develop. As atherosclerosis advances, risk of cardiovascular disease increases; thus, CIMT helps in early identification and in planning preventive measures (5).

TABLE 1 | Classification of cases according to gender.

Sex	Frequency (*n*)	Percentage (%)
Female	10	34.5
Male	19	65.5
Total	29	100.0

TABLE 2 | Baseline characteristics of patients.

Statistics		Age	FBS	HBAIC	CIMT	SGOT
N		29	29	29	29	29
Mean		66.31	144.59	7.6552	1.0345	27.79
Median		68	134	7.7000	0.9000	
Std. deviation		10.981	52.290	1.76768	0.44823	10.894
Minimum		39	76	5.50	0.40	13
Maximum		86	272	12.40	2.10	49
Percentiles	25	57	97.0	6.1000	0.7000	19
	50	68	134	7.7000	0.9000	25
	75	74	185	8.8500	1.2500	35.50

SGOT is an enzyme present in the liver, skeletal muscle, brain, red blood cells, and the heart. High concentrations of SGOT may indicate damaged tissues, especially an injury of the heart due to a heart attack (6). Only limited evidence is available to support relationship between increased cardiovascular risk and SGOT (7), so this study was conducted to establish this relationship.

Objective

To study the correlation of CIMT with SGOT in diabetic individuals.

Materials and methods

For this hospital-based analytical cross-sectional study, 29 diabetic patients attending General Medicine OPD of Sree Gokulam Medical College and Research Foundation, Trivandrum, for a period of 2 weeks from February 17/2/2024 to 29/2/2024 were selected using consecutive sampling. We excluded patients with any underlying liver or kidney disease, history of coronary artery disease, history of alcohol abuse, and history of recent hospitalization (last 2 weeks) for any acute infection. The study was conducted after obtaining Institutional ethics committee clearance. A detailed pro forma was filled out for each patient, which included age, sex, CIMT, and laboratory parameters including FBS, HbA1c, and SGOT. CIMT was done as part of screening, measured using B mode ultrasound at common carotid artery. According to the European Society of Cardiology (ESC), CIMT values greater than 0.90 mm are considered as a tool to predict atherosclerotic events (8). Blood samples were taken and SGOT measured using a clinical chemistry analyzer. Normal SGOT was taken as 8 to 40IU/l. Collected data were analyzed using the SPSS statistical data package. Quantitative data were expressed as mean +/- SD and qualitative data expressed as percentage. The correlation between SGOT and CIMT was analyzed using Pearson correlation analysis.

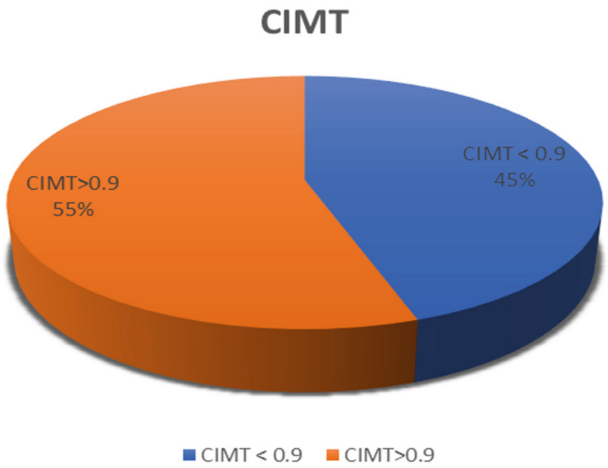

FIGURE 1 | Classification of cases according to carotid intima media thickness.

TABLE 3 | Correlation of CIMT with Age, FBS, HbA1C, and CIMT.

CIMT	Variable	*n*	Pearson correlation	*p*-value
	AGE	29	0.308	0.104
	FBS	29	0.812	<0.001
	HbA1C	29	0.709	<0.001
	SGOT	29	0.415	0.025

Results

A total of 29 diabetic patients were selected for the study, of whom 34.5% were female while 65.5 % were male (**Table 1**). The various patient characteristics are mentioned in **Table 2**. The mean age was 66.32 ± 10.981. The maximum HbA1c was 12 with a mean 7.65. 55% of the patients had CIMT more than 0.9 mm (**Figure 1**), the mean CIMT being 1.0345, with maximum value of 2.10. **Table 3** shows correlation of CIMT with various parameters. A positive correlation was found between CIMT with FBS and HbA1C with $p<0.001$, with r value 0.812 and 0.709, respectively. We found statistically significant correlation between SGOT and CIMT, r = 0.415 with a

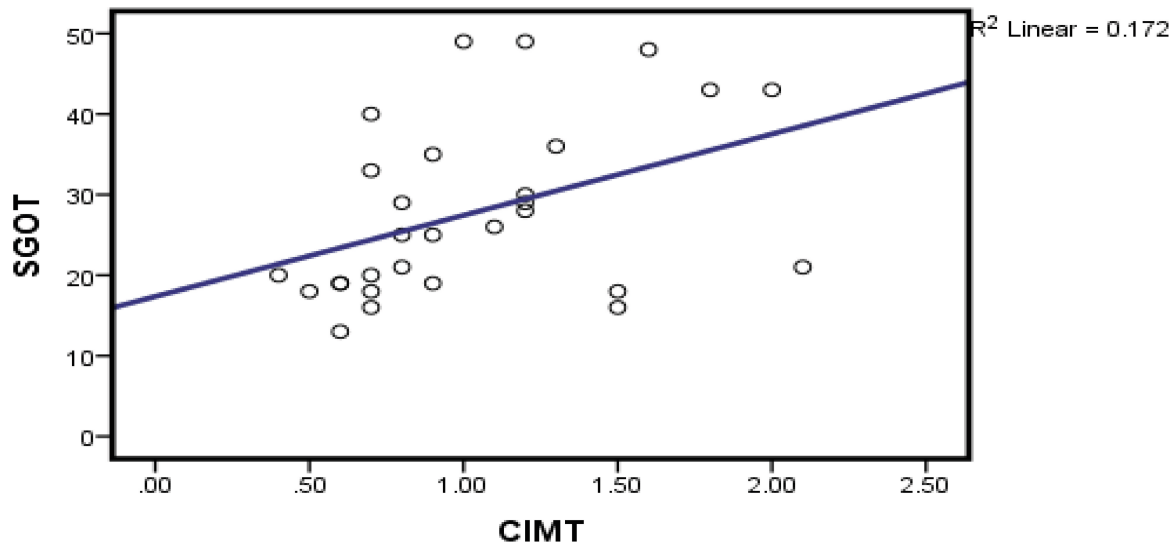

FIGURE 2 | Correlation of CIMT with SGOT.

p-value of 0.025 (**Figure 2**). However, the mean SGOT was 27.79 and maximum 49.

Discussion

CIMT was more in patients with high FBS and uncontrolled diabetes. CIMT can be used as a tool for screening early atherosclerosis in diabetic patients. Only limited evidence is available to support the relationship between increased cardiovascular risk and SGOT (7), so this study was conducted to establish this relationship. In the study by Aisah et al. (9), no relationship was found between higher SGOT and major adverse cardiovascular events including stroke and ischemic heart disease (*p*-value 0.434). In a study conducted by The Atherosclerosis Risk in Community (ARIC), it was found that, higher SGOT levels even within the normal range, were independently associated with atherosclerosis and subclinical myocardial injury (10, 11). The Framingham Offspring Heart Study did not show an association between AST and all-cause or CVD-related mortality over 20 years of follow-up in subjects with AST within normal range (12). We found a statistically significant correlation between SGOT and CIMT, $r = 0.415$ with a *p*-value of 0.025. SGOT was higher in patients with increased CIMT. Hence SGOT can be used as a marker to prognosticate atherosclerotic cardiovascular events in diabetic individuals.

Conclusion

SGOT is having a positive correlation with CIMT in diabetic patients. SGOT can be used to prognosticate adverse atherosclerotic cardiovascular events in diabetic patients early, as it is reliable and cheaper. Studies with more sample size need to be performed to establish this relationship.

References

1. World Health Organization. *Diabetes*. Geneva: World Health Organization (2024).
2. Tsalamandris S, Antonopoulos AS, Oikonomou E, Papamikroulis GA, Vogiatzi G, Papaioannou S, et al. The role of inflammation in diabetes: Current concepts and future perspectives. *Eur Cardiol Rev.* (2019) 14:50–9.
3. Shoelson SE, Lee J, Goldfine AB. Inflammation and insulin resistance. *J Clin Invest.* (2006) 116:1793–801.
4. Willeit P, Tschiderer L, Allara E, Reuber K, Seekircher L, Gao L, et al. Carotid Intima-media thickness progression as surrogate marker for cardiovascular risk: Meta-analysis of 119 clinical trials involving 100 667 patients. *Circulation.* (2020) 142:621–42.
5. Bulut A, Avci B. Carotid intima-media thickness values are significantly higher in patients with prediabetes compared to normal glucose metabolism. *Medicine (Baltimore).* (2019) 98:e17805.
6. National Cancer Institute. *SGOT*. Bethesda, MD: National Cancer Institute (2011).
7. Ndrepepa G. Aspartate aminotransferase and cardiovascular disease–A narrative review. *J Lab Precis Med.* (2021) 6:5585.
8. Simova I. Intima-media thickness: appropriate evaluation and proper measurement. *J Cardiol Pract.* (2015) 13:4–8.
9. Aisah I, Yuantari R, Rosita L. *SGOT levels in acute myocardial infarction patients with mayor adverse cardiovascular events (MACE)*. Yogyakarta: Atlantis Press (2022). p. 301–7.
10. NHLBI, NIH. *Atherosclerosis risk in communities (ARIC) study*. Bethesda, MD: NHLBI (2024).
11. Lazo M, Rubin J, Clark JM, Coresh J, Schneider ALC, Ndumele C, et al. The association of liver enzymes with biomarkers of subclinical myocardial damage and structural heart disease. *J Hepatol.* (2015) 62:841–7.
12. Goessling W, Massaro JM, Vasan RS, D'Agostino RB, Ellison RC, Fox CS. Aminotransferase levels and 20-year risk of metabolic syndrome, diabetes, and cardiovascular disease. *Gastroenterology.* (2008) 135:1935–44.