

ORIGINAL RESEARCH

Prevalence Of Atherosclerotic Cardiovascular Disease (ASCVD) In Newly Diagnosed Diabetics using Carotid Intima Media Thickness (CIMT)

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Received Date: 23 August, 2024

Accepted Date: 12 September, 2024

ABSTRACT

Atherosclerosis is characterised by intimal lesion called atheroma that impinge on the vascular lumen and can rupture leading to sudden occlusion. Carotid intimal media thickness is used as a surrogate marker of atherosclerosis. Thus, the aim of the study was to estimate the prevalence of atherosclerotic cardiovascular disease in newly diagnosed diabetics using carotid intimal media thickness. The study was conducted on 50 patients. The result showed that the mean age of the patients was 52.3± 8.36 years, with majority of the patients belongs to age group of >50 years of age followed by 41-50 years of age. Majority of the patients were females, but higher prevalence of atherosclerosis was observed in males (95%) compared to females (71%) who were diabetics. Patients with other comorbidities like HTN has higher prevalence of atherosclerosis. It was observed that patients with risk factors like smoking, alcohol had higher prevalence of atherosclerosis. Diabetes complications and uncontrolled glycemic control also correlates the with atherosclerosis. Dyslipidemia also positively correlates with atherosclerosis prevalence (p<0.05). Overall, these findings highlight the potential utility of CIMT in the detection of subclinical atherosclerosis and a useful tool helping to guide treatment decision for preventing clinical events.

Keywords: ASCVD, CIMT

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INTRODUCTION

Atherosclerosis is characterised by intimal lesion called atheroma (or atheromatous or atherosclerotic plaques) that impinge on the vascular lumen and can rupture leading to sudden occlusion. The atheromatous plaque or lesion is distinguished by a soft, yellowish, protruding structure of lipid core composed of cholesterol and cholesterol esters.¹ It can cause coronary artery disease, stroke, peripheral artery disease, or kidney disease, depending on the location of affected artery. Atherosclerosis worsens with age and usually starts when a person is young. Atherosclerosis remains asymptomatic for many years because arteries widen at plaque location and thus there is no significant impact on blood flow. Even majority of the plaque that ruptures do not produce symptoms until significant narrowing or occlusion that hinder blood flow to different organs enough to produce symptoms.

The carotid IMT is a surrogate marker for the presence and progression of atherosclerosis, and it can be measured using carotid ultrasonography. The risk of cardiovascular (CV) morbidity and mortality is increasing as the CIMT value increases. This is true for diabetics, pre diabetics and even nondiabetics.² In Indian diabetic patients, CIMT has been observed to function as an autonomous prognostic indicator for cardiovascular morbidity and mortality.³

The present study was conducted to assess the prevalence of atherosclerotic cardiovascular disease (ASCVD) in newly diagnosed diabetics using carotid intima media thicknesses (CIMT).

INCLUSION CRITERIA

Patients with newly diagnosed diabetics who were >30 years of age. Diagnosis of diabetes mellitus was as follow:

1. symptoms of diabetes plus,

- Random blood glucose >200mg/dl,
- 2. Fasting blood glucose >126mg/dl,
- 3. 2Hr post prandial blood glucose >200mg/dl,
- 4. 5.HbA1c > 6.5 %

EXCLUSION CRITERIA

Age < 30 and >60 yeras,
Prior episode of acute metabolic complications,
Patients on lipid lowering agents,
Previous h/o CABG or PCI intervention,
Acute signs and symptoms of CHF/ Cerebrovascular disease.

DATA COLLECTION

After obtaining informed consent from the patients diagnosed to have diabetes mellitus a detailed history about risk factors, Comorbidities, diabetic complications, treatment history were asked. A detailed clinical examination to look for peripheral signs of atherosclerosis and diabetic complications was done. All patients were subjected to the following investigations CBC, LFT,RFT,Lipid profile, HbA1C, FBS, 2HR PP BG, CIMT.

MATERIAL AND METHOD

The cross-sectional study included 50 patients with newly diagnosed diabetics who meet the inclusion criteria and were selected after obtaining written consent. The patients were recruited from OPD and medicine ward of GURU Nanak Dev Hospital, Amritsar. This study was undertaken after approval of the Institutional Ethics Committee, Govt. Medical college, Amritsar.

STATISTICAL ANALYSIS

Data entry was done in MS Excel and computations including proportion and values were calculated using appropriate software. Mean +/- SD was calculated for quantitate data. Chi-square test was applied to measure association between categorical data. P value less than 0.05 were considered statistically significant.

RESULTS

The present study was conducted on 50 patients to estimate the prevalence of ASCVD in newly diagnosed diabetics using CIMT. It was observed that maximum risk of ASCVD were in age group >50 years of age (90% out of total > 50 years) and minimum risk among < 30 years (33.4% out of total <30 years of age). The mean age was 52.3 ± 8.36 years in this study.

Out of total 50 patients' higher prevalence of ASCVD was observed among male (95%) while only (71%) in females who were diabetics. Patients with other comorbidities like HTN (85.3%) has higher prevalence of atherosclerosis corresponds to CIMT.

Out of total 50 patients it was observed that patients with risk factors like smoking and alcohol intake 89.7% out of all had higher CIMT compared to patients with no risk factor only 55.6% showed increased CIMT.

Diabetes complications and uncontrolled glycemc control also correlates the with CIMT. HbA1c levels >8% (89%) showed increased risk of ASCVD. Dyslipidemia especially serum LDL> 100mg/dl and Total Cholesterol≥ 200mg/dl positively correlates with atherosclerosis prevalence, but TGs does not.

TABLE 1: Age Distribution of Patients with ASCVD prevalence

Age years	Frequency without ASCVD	Frequency with ASCVD	Percentage
≤ 30	2	1	6%
31-40	3	5	16%
41-50	2	5	14%
>50	3	29	64%
Total	10	40	100%

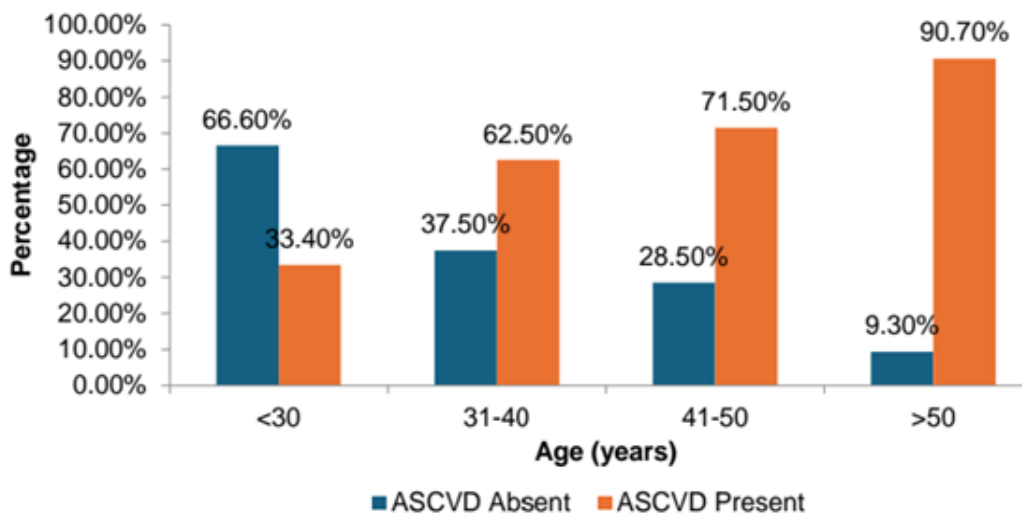


TABLE 2: CORRELATION OF CIMT WITH RISK FACTOR

Risk factors	ASCVD absent	ASCVD present	Percentage
Absent	7	14	42%
Present	3	26	58%
Total	10	40	100%

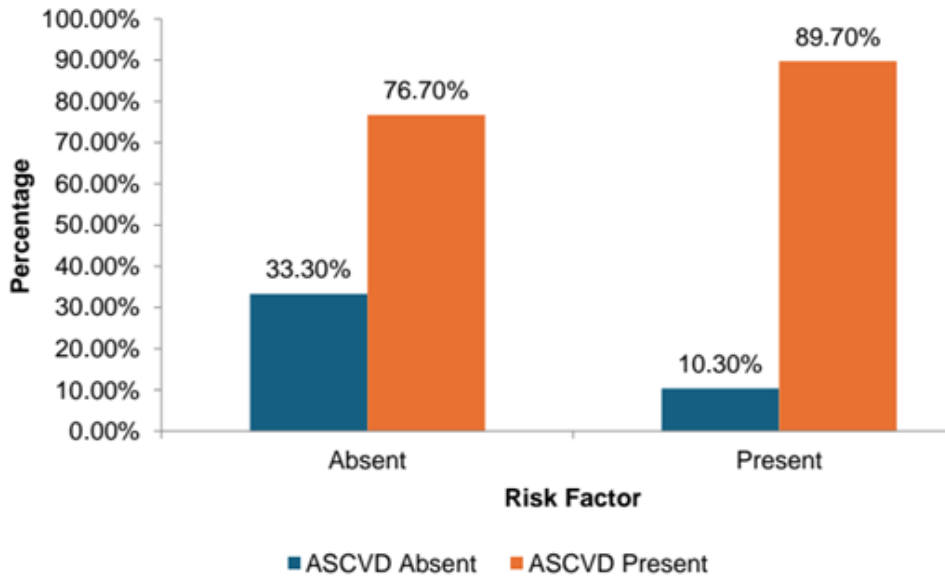


TABLE 3: CORRELATION OF CIMT WITH COMORBIDITY (HTN)

Comorbidity (HTN)	ASCVD absent	ASCVD present	Percentage
Absent	4	5	18%
Present	6	35	82%
Total	10	40	100%

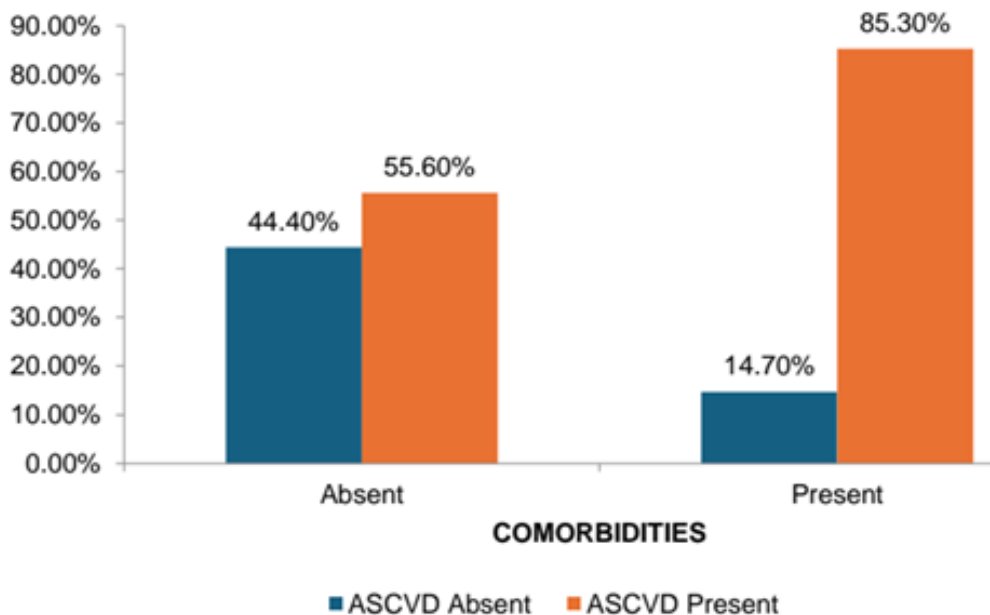


TABLE 4: CORRELATION OF CIMT WITH DIABETIC COMPLICATIONS (MICROVASCULAR)

Diabetic complications)	ASCVD absent	ASCVD present	Percentage
Absent	10	6	32%
Present	0	34	68%
Total	10	40	100%

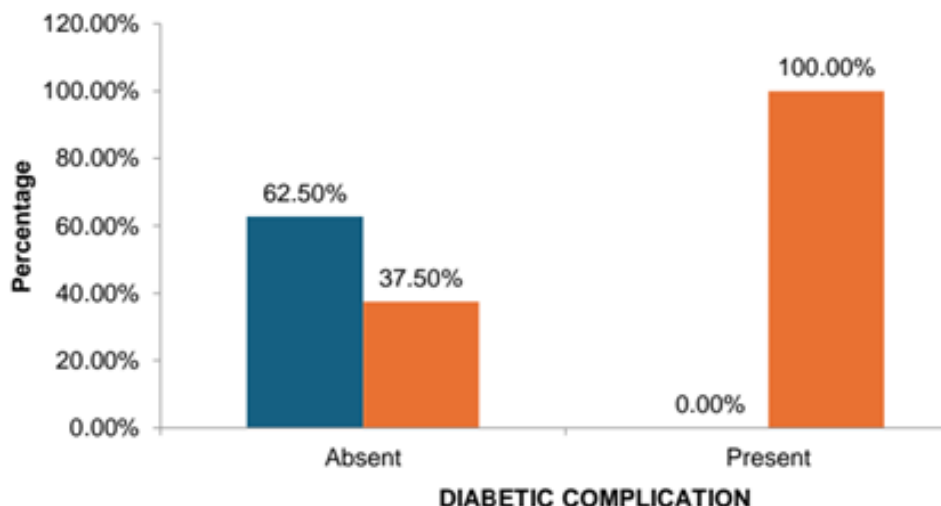
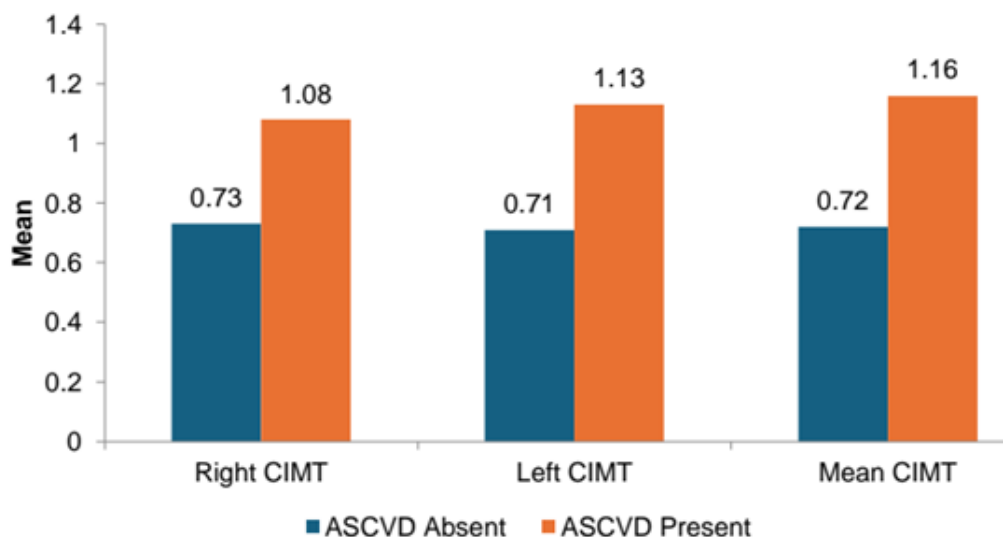


TABLE 5: CORRELATION OF MEAN CIMT WITH RISK OF ASCVD

CIMT	ASCVD absent	ASCVD present
Right(mm)	0.73	1.08
Left (mm)	0.71	1.13
Mean CIMT (mm)	0.72	



DISCUSSION

Majority of diabetics has higher risk of ASCVD, and this can be determined at subclinical stage using CIMT by doppler.

The study population included 50 newly diagnosed diabetic patients of both sexes of different age groups. The predominant group of the diabetic population under study were in the mean age of 52.3 ± 8.36 years. This means that with increasing age, there is an increased risk of atherosclerosis. Majority of our study population, which showed a significant increase in ASCVD due to increased CIMT, were in the age group > 50 years. Similar to our study, **Riyazudeen M et al**⁴ had a study population of an age group between 20 and 80 years with a mean age of 56.3 ± 10.1 years and showed a positive correlation with atherosclerosis with increasing age using CIMT. Similarly, other study **Taneja et al**⁵ also showed a mean age of increased

CIMT in patients within an age of 56.45 ± 8.10 years in the > 50 years age group.

When gender distribution was compared in the study population, there were 31 females, of which 71% showed increased CIMT, and 19 males, of which 95% showed increased CIMT. This shows that gender has a positive correlation with the risk of ASCVD for males. Similarly, **Taneja et al**⁵ also showed that males have a slightly higher CIMT than comparable female groups, but it is not clinically significant.

Out of the total 50 patients, 40 patients had a high prevalence of ASCVD, in which 35 patients were hypertensive and only 5 patients were non-hypertensive. i.e. out of the total hypertensive patients, 85.3% showed an increased risk of ASCVD compared to only 55.6% in non-hypertensive patients. Our study showed a positive correlation with a significant p-value of < 0.05. This means that hypertensive patients had

more prevalence of ASCVD. Similarly, **Kada Venkata Ramana et al⁶** had a study population of 120 patients and concluded that patients with diabetes and hypertension accelerate the progression of atherosclerosis and showed higher CIMT than isolated hypertensive patients.

In our study, among the study patients, 29 were in high-risk group and 21 patients were not in high-risk group and out of all individuals with risk factors 89.7% showed higher CIMT compared to only 76.7% in those who were not in high-risk group. This means there is a significant increased risk of ASCVD in patients who are smokers and alcoholic, with a significant P value of < 0.05. **Holland Z et al⁷** also proved a positive association between risk factors like smoking, etc with increased CIMT in diabetics. Out of total 50 patients, in patients without diabetic complications only 37.5% showed increased CIMT compared to patients with diabetic complications in which 100% had increased CIMT. This means increased CIMT in diabetic has a positive correlation with diabetic complications with a P value of <0.05. In concordance with our study Taneja GP and colleagues also concluded that with increase in diabetic complications there is increased CIMT. **Latika sibal et al⁸** also reported that with increased CIMT in diabetics there are more chances of microvascular as well as well as macrovascular complications. Similarly, **Ryuuichi kasamiet al⁹** study also concluded that diabetics with carotid atherosclerosis had higher vascular complications.

In our study 50 patients were observed. Out of total patients 22 patients with LDL < 100mg/dl, only 13(59%) patients showed increased CIMT compared with 28 patients with LDL >100mg/dl and among them 27 (96%) patients showed increased CIMT. Similarly, group of patients with higher total cholesterol showed increased CIMT. This means with uncontrolled LDL and total cholesterol also there is increased CIMT with a p value of < 0.05 resulting in higher prevalence of ASCVD. In concordance to our study **Riyazuddeen M et al⁴** had a study population of 59 patients and had a significant positive correlation of total cholesterol and LDL cholesterol with CIMT (p value <0.05). Similarly, **Bernd kowall et al¹⁰** showed positive association between Total cholesterol, LDL cholesterol and increased CIMT.

In our study out of total 50 patients, 30 (60%) patients were in group with Fasting blood glucose (FBG) > 140mg/dl and 20 patients (40%) with FBG < 140mg/dl and showed that there was higher CIMT in patients with uncontrolled FBG >140mg/dl but is not clinically significant with p value >0.05. And similarly for 2-hour Post prandial (PP) blood glucose also there was no significant correlation. This means there is no correlation between uncontrolled blood glucose levels and increased risk of ASCVD. But HbA1C levels showed a significant positive correlation with CIMT with a p value of < 0.05 that means it is a predictor of ASCVD

risk. Similar to our study **Bernd Kowall et al¹⁰** showed no clinically significant association between fasting blood glucose and 2HR post prandial blood glucose with CIMT. Other study **Riyazuddeen m et al⁴** showed also showed a positive association between HbA1C levels and risk of ADSCVD.

CONCLUSION

The present study was aimed to determine the prevalence of ASCVD in newly diagnosed diabetics using CIMT. Diabetes is a risk factor for the development of atherosclerosis leading to marked mortality and morbidity. The current guidelines for ASCVD in diabetics fail to detect the prevalence of subclinical atherosclerosis in diabetics and hence, CIMT can be used to estimate the burden of atherosclerosis in asymptomatic individuals with diabetes. CIMT measurement is relatively cheap, safe, non-invasive and precise method of examining and evaluating the walls of carotid arteries. So, CIMT use can contribute to a better understanding of ASCVD progression in diabetes and advocate for targeted preventive measures and further therapeutic interventions can be tailored to mitigate cardiovascular risk in this vulnerable population.

Further research and larger studies are required to validate these findings and potentially incorporate the CIMT into routine clinical practice for screening markers of both macrovascular and microvascular complications of diabetes.

Funding: No funding sources

Declaration of Conflicting Interests: The author(s) declare no potential conflicts of interest with respect to research, authorship, and/or potential of this article.

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