Original Research Article

CAROTID INTIMA-MEDIA THICKNESS (CIMT) AS PREDICTOR OF SEVERITY OF CORONARY ARTERY DISEASE (CAD)

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Abstract

Background: The Carotid Intima-Media Thickness (CIMT) is an easy and cost-effective tool for assessing the cumulative impact of atherosclerotic risk factors and serves as an independent predictor of future cardiovascular risk. Measuring the CIMT of the Common Carotid Artery (CCA) using B-mode ultrasound has proven to be a suitable non-invasive method for visualizing arterial walls and monitoring the early stages of the atherosclerotic process.

Methods: The present study is a randomly selected observational study, with a total of 100 patients who are admitted to the Department of Cardiology and I.C.C.U. (Cardiac Care Unit) diagnosed with Acute coronary syndrome or CAD, who were willing to undergo Coronary Angiography. Patients with normal coronaries were taken as controls.

Results: In this study, a significant correlation was found between the presence of carotid plaque and the severity of coronary artery disease (CAD) with a p-value of 0.04. Out of 100 individuals studied, 64 (64%) had carotid artery plaque, regardless of location, while 36 (36%) had no plaque. Among the 86 patients with CAD, 59 (68.61%) had carotid plaque, and 27 (31.39%) did not. Additionally, out of the 14 patients without coronary artery disease, 9 (64%) had no carotid plaque, and 5 (37.71%) had carotid artery plaque. This study observed plaque in 64 (64%) patients, and no plaque in 36 (36%) patients. Bilateral carotid involvement was observed in 29 (45.31%) patients, while only one side of the carotid artery was involved in 35 (54.69%) patients.

Conclusion: This study investigated Carotid Intima-Media Thickness (CIMT) and carotid plaque as markers for CAD severity. Traditional risk factors and CIMT showed no significant correlation with CAD severity. However, the presence of carotid plaque was linked to more severe CAD. These findings suggest that a single CIMT measurement may not be useful for identifying CAD severity. In contrast, carotid plaque appears to be a promising indicator for higher CAD risk.

Keywords: Coronary Artery Disease, Carotid Intima-Media Thickness (CIMT), Atherosclerosis, Carotid Plaque.

Introduction

Cardiovascular Disease (CVD) and related mortality has emerged as a major health burden worldwide with atherosclerosis being the major cause. Over three-quarters of CVD deaths occur in low- and middle-income countries such as India. In India, there is wide variation in race, geographic factors, dietary habits, lifestyle, and tobacco and alcohol usage among populations. Some studies from India noted regional variations in CAD and reported a higher prevalence in southern India than in other regions of the country. According to a report from the Registrar General of India, mortality due to CHD is higher in southern India [1]. Measuring carotid intimal media thickness (CIMT) is a potentially useful method for identifying atherosclerosis before it obstructs blood vessels. [2-5] An increase in CIMT is associated with a higher risk of ischemic heart disease and cerebrovascular disease [6, 7]. Atherosclerosis is an inevitable part of aging, and its rate of development depends on several factors. Well-known risk factors for accelerated atherosclerosis include hypertension, smoking, dyslipidemia, and dysglycemia. Since several practical lifestyle and pharmacological interventions are available to attenuate atherosclerosis, it is crucial to identify individuals at risk early, especially because subclinical atherogenesis has emerged as a risk factor for coronary artery disease [8]. Atherosclerosis is often asymptomatic unless it is severe, necessitating direct examination of the vessel wall to detect the affected individuals in the early stages. Most previous studies have addressed the relationship between CIMT and acute cardiovascular events during follow-ups. Few studies have analyzed the relationship between CIMT and angiographic coronary artery disease, a stable endpoint with different pathophysiological mechanisms. Carotid Plaque has also been shown to be associated with CHD independent of CIMT measurement in several studies and seems to improve risk prediction. However, the results of these studies are inconsistent. Hence, this study is an attempt to describe the clinical and demographic profiles of the subjects and assess the relationship between CIMT or Carotid Plaque with the extent and severity of CAD using the modified Gensini score.

Material and Methods

The present study is a randomly selected observational study, with a total of 100 patients who are admitted to the Department of Cardiology and I.C.C.U. (Cardiac Care Unit) diagnosed with Acute coronary syndrome or CAD, who were willing to undergo Coronary Angiography. Patients with normal coronaries were taken as controls. This study got Ethics committee approval from the Institute.

Inclusion Criteria

1. Age more than 20 years (both male and female).
2. Present or past diagnosis of CAD.

Exclusion Criteria

1. Age <20 years and >65 years of age.
2. Patients who are not giving consent.
3. History of coronary artery bypass graft surgery
4. Previous coronary angioplasty
5. Valvular Heart Disease
6. Cardiomyopathy
7. Rhythm abnormalities
8. Congenital Heart Diseases
9. Previous carotid surgery
10. Pregnancy
11. Acute and systemic illnesses

After selecting the cases, the purpose of this study was discussed with all study participants. Written consent was taken from each of the participants before the study inclusion. All the study participants gave their consent. A detailed questionnaire which includes a detailed history to assess symptoms, risk factor profile, and current medical therapy, physical examination, and relevant investigations are done for each case. After confirming the diagnosis of ACS or CAD who are willing for CAG, underwent measurement of CIMT of distal CCA 1 cm proximal to the bifurcation of the Common carotid artery at its posterior wall bilaterally, mean of three readings are noted in mm. If the segment was with Plaque, the normal segment proximal to the plaque segment was taken for measurement and IMT of the Anterior and Posterior walls of bilateral Carotid bulbs, Internal carotid artery, and external carotid artery were also taken. If any plaques are found, the degree of stenosis is noted with insignificant or significant stenosis i.e., >5% of stenosis. Later patients were subjected to coronary angiography to see the extent of the disease and the Modified Gensini score was calculated.

Diagnosis of CAD: done according to the latest criteria with Clinical features, ECG changes, 2-ECHO, Cardiac biomarkers, and Coronary Angiography findings suggestive of CAD. Carotid Ultrasound Study:

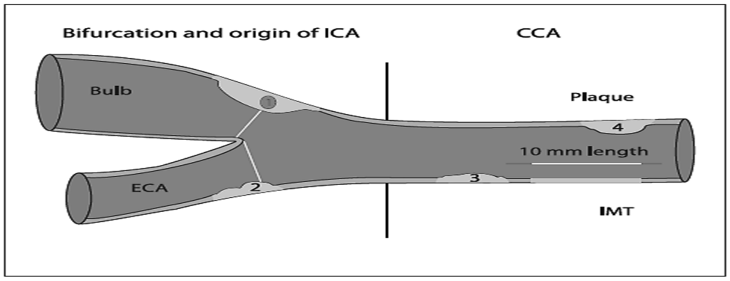

Figure 1: Representation of carotid tree, with plaque and IMT measurement according to Manheim consensus. 1. Thickness >1.mm; 2. Lumen encroaching >0.5mm; 3, 4:>50% of surrounding IMT value.

Carotid arterial scanning was conducted in a dark room by trained radiologists blinded to clinical information. Subjects were examined supine with slight neck hyperextension and rotation to the contralateral side. High-resolution B-mode color Doppler and pulse Doppler ultrasonography of both carotid arteries were performed using an Esoate ultrasound machine with a 7.5 MHz linear array transducer. Image depth was set at 4 cm, and the transducer frequency was fixed for an axial resolution of 0.2 mm. Measurements were taken at end-diastole (R wave of an ECG) to avoid systolic CIMT thinning.

Both common, internal, and external carotid arteries were identified longitudinally. CIMT was measured as the distance between the lumen echo and media-adventitia echo, with maximum far wall CIMT recorded during diastole. Carotid plaques were meticulously observed throughout the extracranial carotid system. Transverse views of both carotid arteries, including carotid bulbs, were also taken to enhance CIMT and plaque detection. CIMT was measured at the distal common carotid artery, 1 cm proximal to the carotid bulb, in a plaque-free region.

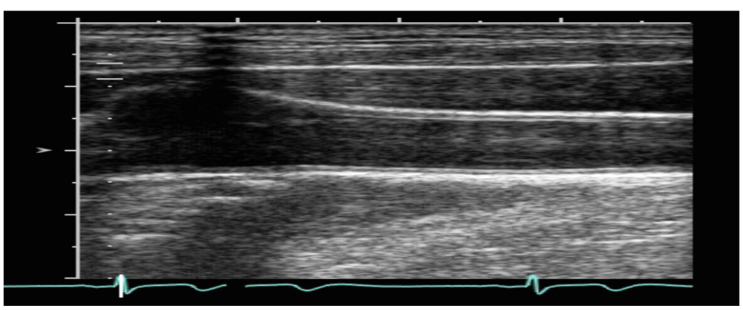

Figure 2: Showing the high-resolution ultrasound scan of carotid arteries

Three scanning angles were used: anterior oblique, lateral, and posterior oblique, focusing on the posterior wall. Manual measurements from the right and left sides were averaged for analysis. A CIMT >0.9 mm was considered increased, and carotid plaque was defined as an echogenic thickening >1.2 mm or a focal structure encroaching into the lumen by at least 50%. Plaques were noted as present or absent with their location.

Coronary Angiography and Scoring: Coronary angiography was performed through the femoral or radial artery using standard technique. Coronary lesions were assessed with multiple orthogonal views and visually evaluated for morphologic features similar to those reported by the ACC/AHA. Significant CAD was defined as a >50% reduction of the internal diameter of epicardial coronary arteries and side branches with a diameter >1.5 mm. Coronary angiography was performed in the catheterization laboratory (Siemens AXIOM-Artis, Munich, Germany), equipped with quantitative coronary analysis software. All angiographies were performed by the Seldinger technique through femoral artery access or Radial artery access.

The Modified Gensini score was applied to evaluate the extent and severity of coronary artery involvement. The Gensini score was computed by assigning a severity score to each coronary stenosis according to the degree of luminal narrowing and its importance based on location. Reduction in lumen diameter and angiographic appearance of concentric lesions and eccentric plaques were quantitatively evaluated. More specifically, reductions of 25%, 50%, 75%, 90%, 99%, and complete occlusion were given Gensini scores of 1, 2, 4, 8, 16, and 32 respectively. A multiplier was assigned to each main vascular segment based on the functional significance of the myocardial area supplied by that segment: 5 for the left main coronary artery; 2.5 for the proximal segment of the left anterior descending (LAD) coronary artery; 2.5 for the proximal segment of the circumflex artery; 1.5 for the mid-segment of the LAD; 1.0 for the right coronary artery, the distal segment of the LAD, the posterolateral artery, and the obtuse marginal artery; and 0.5 for other segments.

Statistical Analysis: Data entry was done using Microsoft Excel 2007 and analysis using Epi Info version 7. Data is presented in percentages and proportions. Appropriate statistical tests were applied wherever necessary. Statistical analysis was carried out for subject groups after categorizing each variable. Continuous variables are listed as the mean and standard deviation. The significance of the difference in means between the two groups was analyzed. Comparison of quantitative variables between groups was done using the Independent Student t-test and the chi-square test was applied for categorical variables. $P < 0.05$ was considered as statistically significant to determine the association between variables.

Results

In this study of a total of one hundred (100) ACS patients, clinical and demographic characteristics were noted in all subjects, measured mean CIMT in both Right and Left Common Carotid arteries and angiographic extent and severity of CAD by Modified Gensini Score in patients who underwent elective coronary angiography to assess the strength of any relation between CIMT and CAD.

In this randomly selected study, there were 67% males and 33% Females with a mean age, of 49.21 ± 9.83 years: (range, 27 to 65 years). A total of 37% of all patients were in the 41 – 50 years age group. The common presenting complaint was Chest pain in (97%) patients. The second most common presenting symptom was Shortness of breath in (64%) patients. The third most common presenting complaint was palpitations noted in (14%) of patients. Next in order are Cough (12%) of patients, Syncope (5%), and Orthopnea (3%) of patients.

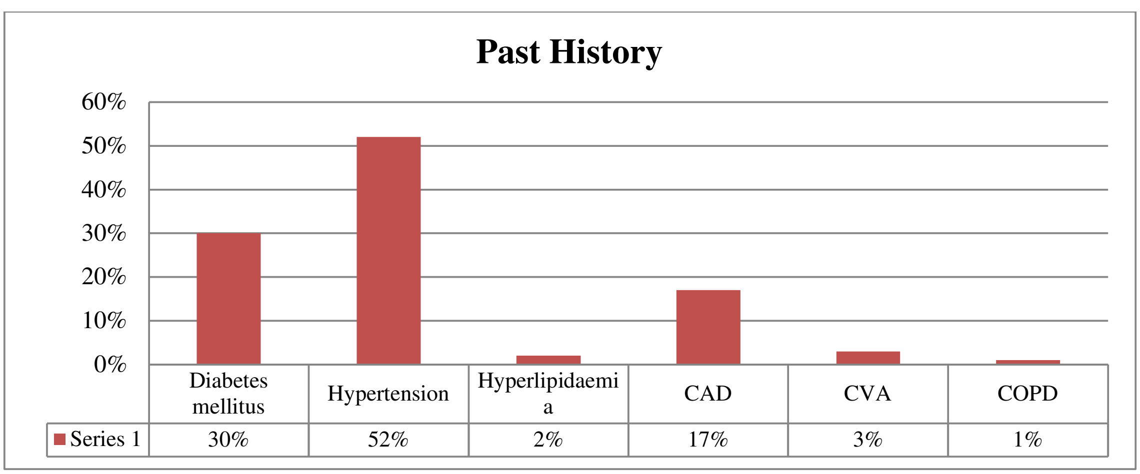

Figure 1: Showing the distribution of patients based on the past medical history

We found (8%) of subjects had a family history of premature coronary artery disease. In all patients, Body Mass index (BMI) was calculated. There were (4%) patients Underweight (<18.5), Normal BMI was noted in (69%) patients, and there were (27%) patients with Overweight (>25.0). In Men, the Waist Hip ratio is <1 present in 49 (72%) patients, and >1 present in 19 (28%) persons. In women, the waist-hip ratio was <0.85 in 4 (12.5%) and >0.85 present 28 (87.5%) patients. A high WHR ratio was noted in females compared to males in this study. There were 75 (75%) patients with significant CAD i.e.> 50 % stenosis, and 25 (25%) patients with normal coronaries or Insignificant stenosis i.e. < 50 % stenosis of coronaries.

Table 1 shows the comparative analysis of established cardiovascular risk factors in patients with coronary artery disease (CAD, n=75) and a control group without CAD (n=25). A slightly higher smoking prevalence is observed in the CAD group (44%) compared to the non-CAD group (32%). However, the difference is not statistically significant. While traditional risk factors like hypertension and diabetes mellitus appear equally prevalent in both cohorts, the study design might lack sufficient power to detect potentially significant but subtle differences.

Table 1: Comparison of risk factors in the CAD and non-CAD groups

Risk factor	*CAD (n=75)*	*Non-CAD (n=25)*	*p-value*
Age (years)	49.21±9.83	49.08±9.53	0.8
Hypertension (%)	52%	52%	0.4
Diabetes mellitus (%)	32%	24%	0.2
BMI (kg/m$^{2)}$	23.69±3.74	23.74±3.75	0.9
FBS (mg/dl)	107.66±36.17	108.25±36.55	0.9
Total Cholesterol (mg/dl)	172.48±57.27	174.4±57.6	0.9
LDL (mg/dl)	99.98±46.91	101.44±47.16	0.9
HDL (mg/dl)	36.45±9.65	36.7±9.67	0.9
Smoking (%)	44%	32%	0.1

Table 2: Baseline characteristics of Group 1 (CAD patients) & Group 2 (Normal)

Risk factor	*Group 1 (CAD patients)*	*Group 2 (Normal patients)*	*p-value*
No of patients	86	14	
Age (years)	49.21±9.83	49.08±9.53	0.8
Male Sex	64	04	0.003*
Hypertension (%)	52%	52%	0.4
Diabetes mellitus (%)	32%	24%	0.2
BMI (kg/m$^{2)}$	23.69 ± 3.74	23.74 ± 3.75	0.9
FBS (mg/dl)	107.66 ± 36.17	108.25 ± 36.55	0.9
Total Cholesterol (mg/dl)	172.48 ± 57.27	174.4 ± 57.6	0.9
LDL (mg/dl)	99.98 ± 46.91	101.44 ± 47.16	0.9
HDL (mg/dl)	36.45 ± 9.65	36.7 ± 9.67	0.9
Smoking (%)	44%	32%	0.1

*Significant

In this study, only males were found to have significant risk factors with a P value of 0.003 (table 2).

Table 3: Mean CIMT Thickness of LICA and RICA

Branch	*IMT Thickness*			
	Left		*Right*	
	Mean ± SD	Max ± Range	Mean ± SD	Max ± Range
CCA	0.7917±0.22	1.3 & 0.82	0.7821±0.22	1.25 & 0.86

The Mean CIMT of LICA is 0.7917 ± 0.22 mm with Max and range of 1.3 and 0.82 mm. The mean CIMT of RICA is 0.782 ± 0.22 mm with Max and range of 1.25 & 0.86 mm.

Table 4: Different parameters vs mean IMT

Variable		*Mean IMT (mm) & Standard Deviation*	*p-value*
Age	<40 years	0.77±0.22	
	>40 years	0.78±0.21	0.8
Sex	Male	0.7821±0.22	
	Female	0.7827±0.22	0.9
Family History	Present	0.77±0.22	
	Absent	0.783±0.21	0.8
Hypertension	Hypertensives	0.779±0.216	
	Non-Hypertensives	0.783±0.217	0.9
Diabetes Mellitus	Yes	0.78±0.22	
	No	0.78±0.216	0.8
Smoking	Smokers	0.779±0.218	
	Nonsmokers	0.78±0.218	0.9
Total Cholesterol	>200 mg/dl	0.78±0.22	
	<200 mg/dl	0.78±0.21	0.8
Low-density lipoprotein	> 100 mg/dl	0.775±0.22	
(LDL)	<100 mg/dl	0.78±0.217	0.9
High Density lipoproteins	< 40mg/dl	0.78±0.217	
(HDL)	>40mg/dl	0.77±0.219	0.9

Table 4 shows the correlation of mean CIMT with different risk factors that were studied and showed no significant correlation. There was no correlation observed between the mean CIMT of patients with Significant CAD (n=75) and Normal or non-significant CAD (n=25) with a P value was 0.8.

Table 5: Distribution of patients according to Normal CIMT (<0.9 mm) or Abnormal CIMT(>0.9mm)

Mean Intia Media Thickness (IMT) in mm	*<0.9*	*>0.9*
Right common carotid artery	73 (73%)	27 (27%)
Left common carotid artery	75 (75%)	25 (25%)

Table 6: Means of variables compared between the groups

Variable	*Mean & Standard Deviation*		*p-value*
	IMT CCA < 0.9	*IMT CCA > 0.9*	
BMI ($Kg/m^{2)}$	23.68±3.75	23.69±3.68	0.9
W/H Ratio	0.96±0.05	0.96±0.05	1.04
FBS	107.45±36.30	105.78±35	0.8
TC	172.78±57.48	174.36±58.18	0.9
LDL	100.59±46.75	101.41±47.55	0.8
HDL	36.43±9.70	36.43±9.33	0.8
L/H Ratio	2.99±1.42	3±1.44	0.8

Coronary Angiography Findings: In total One hundred ACS patients studied, 14(14%) persons had normal coronaries, minimal disease in 11(11%) patients, SVD in 34 (34%)patients, DVD in 28 (28%)patients, TVD in 13 (13%)patients. The mean modified Gensini score was in minimal disease patients 29.68, SVD patients 30.92, DVD persons 29.37, in TVD patients 29.83 noted.

Table 7: Relationship between Normal or Abnormal CIMT in CAD and non-CAD groups

IMT	*CAD*	*Non-CAD*	*p-value*
<0.9	53 (70.6%)	20 (80%)	0.2
>0.9	22 (29.4%)	5 (20%)	
Total	75	25	

The normal or Abnormal CIMT also correlated with Significant or Non-significant CAD patients showed no correlation (Table 7). No significant correlation was observed between the severity of CAD and CIMT with a P value of 0.8 (Table 8).

Table 8: Correlation between Severity of CAD and IMT

Severity of CAD	*IMT thickness*		*p-value*
	<0.9	*>0.9*	
Normal	12	02	0.8
Minimal	08	03	
SVD	25	09	
DVD	19	09	
TVD	09	04	
Total	73	27	

Table 9: Correlation of Gensini score of CAD with IMT (n=75)

Gensini score (GS)	IMT (mm) Mean & SD	p-value
GS >20 (n=49)	0.78±0.21	0.7
GS <20 (n=26)	0.78±0.22	

In this study, a significant correlation was noted between the Presence of Carotid plaque and the severity of CAD with a P value of 0.04 (Table 10). In a total of 100 studied population, 64 (64%) had Carotid artery plaque irrespective of site and 36 (36%) patients showed no plaque. Out of a total of 86 patients who were found to have CAD, 59 (68.61%) persons had Carotid plaque, and 27 (31.39%) patients had no Carotid plaque. Out of 14 patients who are without coronary artery disease, 9 (14%) patients had No Carotid Plaque, and only 5 (37.71%) patients had Carotid Artery Plaque.

Table 10: Correlation between severity of CAD and Plaque formation

Severity of CAD	*Plaque formation*		*p-value*
	Yes	*No*	
Normal	5	09	0.04
Minimal	06	05	
SVD	21	13	
DVD	22	06	
TVD	10	03	
Total	64	36	

Out of 14 patients who are without coronary artery disease, 9 (14%) patients had No Carotid Plaque, and only 5 (37.71%) patients had Carotid Artery Plaque. In this study, Plaque was present in 64 (64%) patients, and no plaque was noted in 36(36%) patients. Bilateral carotid involvement was seen in 29 (45.31%) patients. Only one side carotid artery was involved in 35 (54.69%). Out of 86 CAD patients, Plaque was present in 59 (68.61%) patients, and Plaque was absent in 27 (31.39%) patients. In non-CAD patients of 14 persons, plaque was present in 5(37.71%) patients, and Plaque was absent in 9(64.29%) patients. There are 49 (76.56%) patients who have Carotid bulb involvement and only 15 (23.43%) patients have internal Carotid artery involvement. The external carotid artery was not involved in any patients.

Discussion

B-mode ultrasound imaging has been established as a valuable tool for measuring carotid intima-media thickness (CIMT) since the work of Pignoli et al. in 1987 [9]. This non-invasive approach, which allows the evaluation of arterial wall changes even without visible plaques, has been employed in numerous studies [10, 11]. This non-invasive approach is recommended for the preclinical diagnosis and follow-up of atherosclerosis. However, CIMT cannot distinguish lesions with a necrotic core, a key indicator of significant plaque advancement and lesion vulnerability [11]. CIMT and carotid plaque, though correlated, reflect different stages of atherosclerosis [12]. This study aims to assess the effects of traditional cardiovascular risk factors on CIMT and correlate CIMT or plaque with CAD severity using the Modified Gensini score. In this study of 100 randomly selected patients of ACS, the most common presenting complaint was Chest pain in 97 (97%) patients. The second most common presenting symptom was Shortness of breath in 64 (64%) patients. The third most common presenting complaint was palpitations noted in 14 (14%) patients. Next in order are Cough in 12 (12%) patients, Syncope in 5 (5%), and Orthopnea in 3 (3%) of patients. In this study, 67% were men, 33% were women, mean age was 49.21 ± 9.83 years, mostly 41-50 years old the upper age limit was 65 years. Mozaffarian et al. [13] reported that atherosclerosis and CAD prevalence increase with age. Studies have shown a strong link between cigarette smoke exposure and heart disease. Smoking more than 20 cigarettes daily increases heart disease risk 2- to 3-fold in both men and women [14, 15]. Begom R et al. [16] noted higher smoking rates in South Indian males (44.6%) and females (45.3%) than in North Indians. In this study, 41% of patients smoked, and 27% chewed tobacco, aligning with previous findings. Alcohol's impact on CAD risk varies: some studies show increased risk, others reduced. Ding et al. [17] found moderate drinking lowers CAD risk compared to abstainers and heavy drinkers. Lakshman et al. [18] reported heavy drinking doubled myocardial infarction risk, while moderate drinking halved it. In this study, 45% of patients consumed alcohol. Diabetes significantly increases CAD risk, with diabetics 2-8 times more likely to experience cardiovascular events than non-diabetics. The INTERHEART study identified diabetes as a major risk factor for myocardial infarction globally [19]. Shaw et al. [20] estimated India's adult diabetes prevalence at 6.4%. In this study, 30% of patients had diabetes.

The Framingham Heart Study found that prehypertension doubled cardiovascular disease risk. The INTERHEART study linked hypertension to myocardial infarction globally (OR 1.91) [19]. Mandal et al. [21] found hypertension in 47.2% of urban Siliguri subjects, significantly associating it with ischemic heart disease. In this study, 52% of patients had hypertension. Atherosclerosis develops gradually from childhood into adulthood, with varying susceptibility to complications. The first detectable change is increased IMT, which can result from nonatherosclerotic processes like smooth muscle cell hyperplasia and fibrocellular hypertrophy. These changes may be adaptive responses to flow, wall tension, or lumen diameter variations. Carotid ultrasound resolution (~0.3mm) limits measuring annual IMT change (~0.15mm) in meaningful time frames. Normal IMT values and reference ranges depend on age and sex, with men generally having higher IMT values. Determining abnormal IMT values is controversial due to the continuous relationship with cardiovascular risk [22]. The ESH/ESC hypertension guidelines confirm carotid IMT > 0.9 mm as a marker of asymptomatic organ damage. The American Society of Echography (ASE) suggests IMT ≥ 75th percentile indicates high cardiovascular risk, 25^{th}-75^{th} percentile as average risk, and ≤ 25th percentile as low risk [23]. Some recommend IMT ≥ age-adjusted 97.5th percentile as abnormal, as higher CCA-IMT values correlate with increased vascular risk [23]. In this study, CIMT didn't correlate significantly with age, sex, family history, DM, HTN, smoking, or dyslipidemia. Age-related CIMT increases were linked to declining diastolic function in women, while CIMT was similar in healthy South Asian and European men [23, 24]. Additionally, CIMT was associated positively with smoking and alcohol consumption in men. Aerobic exercise training for 8 weeks or 6 months may improve vascular structure and function in African Americans, with weight-adjusted maximal oxygen uptake capacity inversely correlating with CIMT.

In the MESA trial, P. Paramsothy et al. [24] found higher mean maximum common CIMT in combined hyperlipidemia (LDL-C and TG), hypercholesterolemia (only LDL-C), and low HDL compared with normolipemia (64). The ARIC study (2001) indicated hyperTG as a heart disease predictor in women, but NOMAS (2009) did not associate hyper-TG with carotid plaque formation (65, 66). This analysis suggests that vascular damage may be due more to confounding risk factors than biological differences in dyslipidemia-induced vasculopathy. Regarding the correlation of CIMT with CAD severity, this study found no significant correlation between CIMT and CAD or non-CAD patient groups (P = 0.2) (Table 15). Similarly, the severity of CAD did not significantly correlate with CIMT values (P = 0.8) (Table 16). Karaçalıoğlu et al. [25] found higher CIMT in CAD patients, but after age correction, significance diminished (p=0.131), and the CIMT-CAD correlation was weak (r=0.187, p=0.08). In contrast, other studies showed significant CIMT-CAD correlations. Shah Ebrahim et al. [26] found higher CIMT in men and Baldassarase D et al. [27] in CAD patients (67, 68). Abdushi et al. [28] concluded CIMT's utility in predicting coronary atherosclerosis. The present study values are similar to IMT data acquired in community-based studies; the disease-free group in Persson's ultrasound study had a mean IMT of 0.73±0.13 mm, and in the large ARIC database, the mean IMT in the distal CCA was approximately 0.73 mm for healthy 60-year-old men. It is likely, therefore, that our patients without important CAD are similar to age-matched unselected subjects, although they may have had a higher prevalence of traditional vascular risk factors. Lateef et al. [29] found higher mean IMT in CAD patients with Gensini score >20 compared to normal coronary patients (1.46 mm vs 0.73 mm, p < 0.05) (69). Bircan Alan et al. (2015) noted significantly higher CIMT in severe atherosclerosis vs mild (1.2±0.16 vs 0.97±0.07, p<0.01), correlating CIMT with Gensini score. In this study (Table No 18), a significant correlation was found between the presence of carotid plaque and CAD severity (p = 0.04). Among 86 CAD patients, 59 (68.61%) had carotid plaque, while 27 (31.39%) did not. Of the 14 non-CAD patients, 9 (64.29%) had no carotid plaque, and only 5 (37.71%) had a plaque. The study also noted bilateral carotid involvement in 29 (45.31%) patients, while 35 (54.69%) had involvement on only one side.

Recent studies emphasize carotid plaque evaluation over CIMT in predicting CAD. The Rotterdam Study found no difference between CIMT and carotid plaque as predictors of myocardial infarction [30, 31]. Subsequent studies and cohort studies confirmed plaque's superiority in cardiovascular risk prediction over CIMT [32, 33]. Though CIMT and plaque share mechanisms, CIMT may represent an adaptive response rather than atherosclerosis. This study supports that CIMT doesn't strongly correlate with plaque presence, suggesting different underlying processes. Screening for carotid plaque offers advantages in CV risk prediction and may motivate behavior change, warranting further investigation for its role as a non-invasive CAD detection tool.

Conclusion

This study investigated Carotid Intima-Media Thickness (CIMT) and carotid plaque as markers for CAD severity. Traditional risk factors and CIMT showed no significant correlation with CAD severity. However, the presence of carotid plaque was linked to more severe CAD. These findings suggest that a single CIMT measurement may not be useful for identifying CAD severity. In contrast, carotid plaque appears to be a promising indicator for higher CAD risk. This study highlights the potential advantages of assessing carotid plaque as a simpler and potentially more reliable approach compared to CIMT, particularly for evaluating CAD risk in asymptomatic patients.

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