

Assessment of relationship between carotid intima-media thickness and coronary angiographic findings

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Abstract

Background: To assess relationship between carotid intima-media thickness and coronary angiographic findings. **Methodology:** One hundred ten patients with stable angina pectoris of either gender was selected and were subjected to coronary angiography. Based on it, patients were divided into 2 groups. Group I was patients without a noncritical coronary lesion, and group II was patients having at least one lesion more than 50% within the main branches of the coronary arteries. **Results:** Out of 110 patients, males were 60 (54.5%) and females were 50 (45.5%). Diabetes was present in 12% in group I and 28% in group II. Hypertension was seen in 38% in group I and 60% in group II. Smoking was present in 56% in group I and 62% in group II and hyperlipidemia was seen in 17% in group I and 48% in group II. The difference was significant ($P < 0.05$). The mean carotid artery thickness in group I was 0.72 mm, in group II was 1.5 mm, in group IIa was 1.3 mm, in group IIb was 1.7 mm and in group IIc was 1.8 mm. The difference was significant ($P < 0.05$). The major risk factors for coronary artery disease was CIMT (>1 mm) ($P = 0.01$) and hypertension ($P = 0.04$). **Conclusion:** Increase in CIMT was associated with the presence and extent of CAD.

Keywords: Coronary Artery Disease, Hypertension, Intima.

INTRODUCTION

Cardiovascular-related deaths are the leading cause of death worldwide. At the time of onset of clinical findings, an advanced stage of involvement is often present in atherosclerotic disease.¹ Many significant changes occur in the arterial wall, including endothelial dysfunction and an increase in intima-media thickness, before the onset of clinical findings, and these changes can be useful in the early diagnosis of atherosclerosis.²

Carotid intima-media thickness (CIMT) measurements have increasingly been used in observational and intervention studies.³ CIMT has been applied as an outcome variable in studies on the determinants of atherosclerosis, and it has been employed as an exposure variable in studies on the prognostic value of CIMT in order to predict coronary artery disease (CAD) and stroke. Change in CIMT over time act as a marker for atherosclerosis progression.⁴

Many recent studies have substantiated the direct correlation between carotid IMT and coronary atherosclerosis in general population and in patients with diabetes utilizing carotid sonography and coronary angiography.⁵ We performed this study to assess relationship between carotid intima-media thickness and coronary angiographic findings.

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METHODS

A sum total of one hundred ten patients with stable angina pectoris of either gender was selected. We obtained approval from ethical review committee. Patients' written consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. All patients were subjected to coronary angiography. Based on it, patients were divided into 2 groups. Group I was patients without a noncritical coronary lesion, and group II was patients having at least one lesion more than 50% within the main branches of the coronary arteries. All of the patients underwent carotid doppler ultrasound examination for measurement of the CIMT. The CIMT was measured 1 cm distal to the bulbous over a length of 1 cm of both carotid arteries. Manual measurements in five different locations on the far-wall were taken and the maximum value was taken for each carotid artery. The final CIMT was evaluated as the average of right and left carotid arteries. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Table 1: Patients distribution.

Total- 110		
Gender	Males	Female
Number (%)	60 (54.5%)	50 (45.5%)

Out of 110 patients, males were 60 (54.5%) and females were 50 (45.5%) (Table 1).

Table 2: Baseline characteristics

Parameters	Group I	Group II	P value
Diabetes	12%	28%	0.05
Hypertension	38%	60%	0.02
Smoking	56%	62%	0.14
Hyperlipidemia	17%	48%	0.01

Table 3: Assessment of carotid artery media thickness

Groups	Mean	P value
Group I	0.72	0.05
Group II	1.5	
Group II a (single vessel)	1.3	
Group II b (multi vessel)	1.7	
Group II c (left main CAD)	1.6	

Table 4: Risk factors predicting coronary artery disease.

Parameters	P value	Odds ratio
CIMT (>1 mm)	0.01	4.2
Diabetes	0.76	0.94
Hypertension	0.04	2.1
Hyperlipidemia	0.54	1.7

Diabetes was present in 12% in group I and 28% in group II. Hypertension was seen in 38% in group I and 60% in group II. Smoking was present in 56% in group I and 62% in group II and hyperlipidemia was seen in 17% in group I and 48% in group II. The difference was significant ($P < 0.05$) (Table 2).

The mean carotid artery thickness in group I was 0.72 mm, in group II was 1.5 mm, in group IIa was 1.3 mm, in group IIb was 1.7 mm and in group IIc was 1.8 mm. The difference was significant ($P < 0.05$) (Table 3).

The major risk factors for coronary artery disease was CIMT (>1 mm) ($P = 0.01$) and hypertension ($P = 0.04$) (Table 4).

DISCUSSION

High prevalence rates of premature coronary artery disease (CAD) have been reported in western literature in migrant Asian Indians.⁶ Many studies support the observation that IMT assessed by B-mode ultrasound in extracranial carotid arteries, either in a single segment (common carotid) or in multiple segments (aggregate of measures in common carotids, bifurcations, and internal carotids), is a valuable indication of coronary risk status and a predictor of subsequent coronary heart disease (CHD).^{7,8} CHD constitutes a leading source of cardiovascular death, morbidity and healthcare expenditure.⁹ Most studies have evaluated carotid IMT thickness either with coronary angiography or multiple surrogate clinical parameters of CAD. There are scanty studies relating carotid IMT with observations on CT coronary angiography.^{10,11} We performed this study to assess relationship between carotid intima-media thickness and coronary angiographic findings.

Our results showed that out of 110 patients, males were 60

(54.5%) and females were 50 (45.5%). Bhat et al¹² in their study high resolution ultra-sonographic (HRUS) evaluation of intimal-medial-thickness (IMT) in carotid with luminal changes in coronaries on multidetector-CT (MDCT) in clinically asymptomatic and symptomatic individuals was performed in 151 individuals. A linear association of IMT was observed with increasing age. IMT of 0.5-0.69 mm was noted in 50 per cent of patients between 51-56 years with higher number of symptomatic patients in this group. Linear increases in coronary vascular changes were noted with increasing IMT thickness. Changes were more prevalent in diabetic, hypertensive, treadmill test (TMT) positive and clinically symptomatic patients.

Our results showed that diabetes was present in 12% in group I and 28% in group II. Hypertension was seen in 38% in group I and 60% in group II. Smoking was present in 56% in group I and 62% in group II and hyperlipidemia was seen in 17% in group I and 48% in group II. Coskun et al¹³ in their study one hundred consecutive patients with stable angina pectoris were included. The patients were divided into two groups according to the result of the coronary angiography: group 1 (39 patients) without a noncritical coronary lesion, and group 2 (61 patients) having at least one lesion more than 50% within the main branches of the coronary arteries. All of the patients underwent carotid Doppler ultrasound examination for measurement of the CIMT by a radiologist blinded to the angiographic data. The mean CIMT was 0.78 ± 0.21 mm in Group 1, while it was 1.48 ± 0.28 mm in Group 2 ($p = 0.001$). The mean CIMT in patients with single vessel disease, multi-vessel disease, and left main coronary artery disease were significantly higher compared to Group 1 (1.2 ± 0.34 mm, $p = 0.02$; 1.6 ± 0.32 mm, $p = 0.001$; and 1.8 ± 0.31 mm, $p = 0.0001$, respectively). Logistic regression analysis identified CIMT (OR 4.3, $p < 0.001$) and hypertension (OR 2.4, $p = 0.04$) as the most important factors for predicting CAD.

We observed that the mean carotid artery thickness in group I was 0.72 mm, in group II was 1.5 mm, in group IIa was 1.3 mm, in group IIb was 1.7 mm and in group IIc was 1.8 mm. Our results showed that the major risk factors for coronary artery disease was CIMT (>1 mm) ($P = 0.01$) and hypertension ($P = 0.04$). Bots et al¹⁴ observed that of the 34 studies on the relation of CIMT with coronary atherosclerosis, as assessed by angiography ($n = 33$) or intravascular ultrasound ($n = 1$), 30 showed a modest positive relationship; the magnitude of which was similar to that found in autopsy studies. Of all studies on CIMT and future CV events ($n = 18$), 17 showed graded positive relationships. At present, only one study has provided evidence on the relation of change in CIMT and future CV events, showing an increased risk with CIMT progression.

CONCLUSION

Increase in CIMT was associated with the presence and extent of CAD.

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