

ORIGINAL ARTICLE**Assessment of atherosclerotic changes in carotid & coronary arteries in patients with cardiovascular diseases**

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ABSTRACT:

Background: Coronary artery disease (CAD) is a common type of heart disease. It occurs when the blood vessels that supply blood to the heart become narrowed or blocked due to the buildup of plaque—a mixture of fat, cholesterol, and other substances. The present study was conducted to assess atherosclerotic changes in carotid & coronary arteries in patients with cardiovascular diseases. **Materials & Methods:** 58 cardiac ailments and those symptomatic patients of both genders were classified into group I (asymptomatic) and group II (symptomatic). High resolution sonographic examination and MDCT examination were performed. Assessment of treadmill test (TMT), right common carotid intimal medial thickness (RTCCIMT), right internal carotid intimal medial thickness (RTICIMT), left common carotid intimal medial thickness (LTCCIMT), left internal carotid intimal medial thickness (LTICIMT) was done. **Results:** In group I, males were 19 and females were 10 and in group II, males were 20 and females were 9. TMT was positive in 15 patients in group II and pain in 17 patients in group II. RTCCIMT was 0.51 and 0.57, RTICIMT was 0.64 and 0.65, LTCCIMT was 0.55 and 0.60, and LTICIMT was 0.62 and 0.68 in group I and II respectively. The difference was significant ($P < 0.05$). In group I and group II, RCA score 0 was seen in 23 and 20, 1 in 4 and 6, and 2 in 2 and 3 patients in group I and group II respectively. RCA Pro0 was seen in 24 and 20, 1 in 3 and 5, 2 in 2 and 4 patients in group I and group II respectively. RCA-Mild0 was seen in 26 and 18, 1 in 2 and 5, and 2 in 1 and 6 patients in group I and group II respectively. RCA-Dist0 was seen in 27, and 21, 1 in 1 and 6, and 2 in 1 and 2 patients in group I and group II respectively. LCA0 was seen in 20 and 17, 1 in 9 and 12, patients in group I and group II respectively. AD Pro0 was seen in 23 and 21, 1 in 4 and 5, and 2 in 2 and 3 patients in group I and group II respectively. LAD-Mild0 was seen in 26 and 22, 1 in 2 and 5, and 2 in 1 and 2 patients in group I and group II respectively. LAD-Dist0 was seen in 24 and 25, 1 in 2 and 2, and 2 in 3 and 0 patients in group I and group II respectively. Cx-Pro0 was seen in 23 and 17, 1 in 4 and 6, 2 in 2 and 4 patients in group I and group II respectively. Cx-Dist0 was seen in 24 and 25, 1 in 2 and 1, and 2 in 1 and 1 patients in group I and group II respectively. The difference was significant ($P < 0.05$). **Conclusion:** Internal carotid arteries showed clear signs of atherosclerosis development. In the symptomatic group, a significant correlation was found between coronary disease and the IMT thickness of the right common carotid (RCC).

Keywords: Atherosclerosis, carotid intimal medial thickness, Coronary artery disease

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INTRODUCTION

Coronary artery disease (CAD) is a common type of heart disease. It occurs when the blood vessels that supply blood to the heart become narrowed or blocked due to the buildup of plaque—a mixture of fat, cholesterol, and other substances.¹ This restricts blood flow to the heart muscle, leading to various symptoms such as chest pain (angina), shortness of breath, and in severe cases, heart attack. Risk factors for coronary artery disease include high blood pressure, high cholesterol, smoking, diabetes, obesity, lack of physical activity, and family history of heart disease.² Carotid IMT refers to the thickness of the inner layers of the carotid artery wall, specifically the intima and media layers. In individuals with atherosclerosis, these layers may thicken due to the accumulation of plaque and inflammation. Thus, measuring carotid IMT using ultrasound imaging can provide valuable information about the extent of atherosclerosis and help assess cardiovascular risk.³ Carotid intimal medial thickness (IMT) is indeed used as an indicator

of atherosclerosis, particularly in the early stages. The carotid arteries are located in the neck and supply blood to the brain. Atherosclerosis is the buildup of plaque within the arteries, consisting of cholesterol, fat, calcium, and other substances. This buildup can lead to narrowing and stiffening of the arteries, restricting blood flow and increasing the risk of stroke and other cardiovascular events.⁴

Elevated carotid IMT has been associated with an increased risk of cardiovascular events such as heart attack and stroke, independent of traditional risk factors such as high blood pressure and cholesterol levels.⁵ Therefore, it is often used as a marker of subclinical atherosclerosis, allowing for early detection and intervention to prevent the progression of cardiovascular disease.⁶ The present study was conducted to assess atherosclerotic changes in carotid & coronary arteries in patients with cardiovascular diseases.

MATERIALS & METHODS

The present study consisted of 58 cardiac ailments and those symptomatic patients of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. All patients were examined for vital signs, blood pressure recording, laboratory assessment of biochemical profile. Patients were classified into group I (asymptomatic) and group II (symptomatic). High resolution sonographic examination and MDCT examination were performed. Imaging of coronary

arteries was done by plain and contrast angiography using MDCT- VCT 64 scanner. Assessment of treadmill test (TMT), right common carotid intimal medial thickness (RTCCIMT), right internal carotid intimal medial thickness (RTICIMT), left common carotid intimal medial thickness (LTCCIMT), left internal carotid intimal medial thickness (LTICIMT) was done. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Parameters	Group I	Group II	P value
M:F	19:10	20:9	0.17
TMT	0	15	0.02
Pain	0	17	0.04
RTCCIMT	0.51	0.57	0.94
RTICIMT	0.64	0.65	0.91
LTCCIMT	0.55	0.60	0.03
LTICIMT	0.62	0.68	0.04

Table I, graph I shows that in group I, males were 19 and females were 10 and in group II, males were 20 and females were 9. TMT was positive in 15 patients in group II and pain in 17 patients in group II. RTCCIMT was 0.51 and 0.57, RTICIMT was 0.64 and 0.65, LTCCIMT was 0.55 and 0.60, and LTICIMT was 0.62 and 0.68 in group I and II respectively. The difference was significant (P < 0.05).

Graph I Distribution of patients

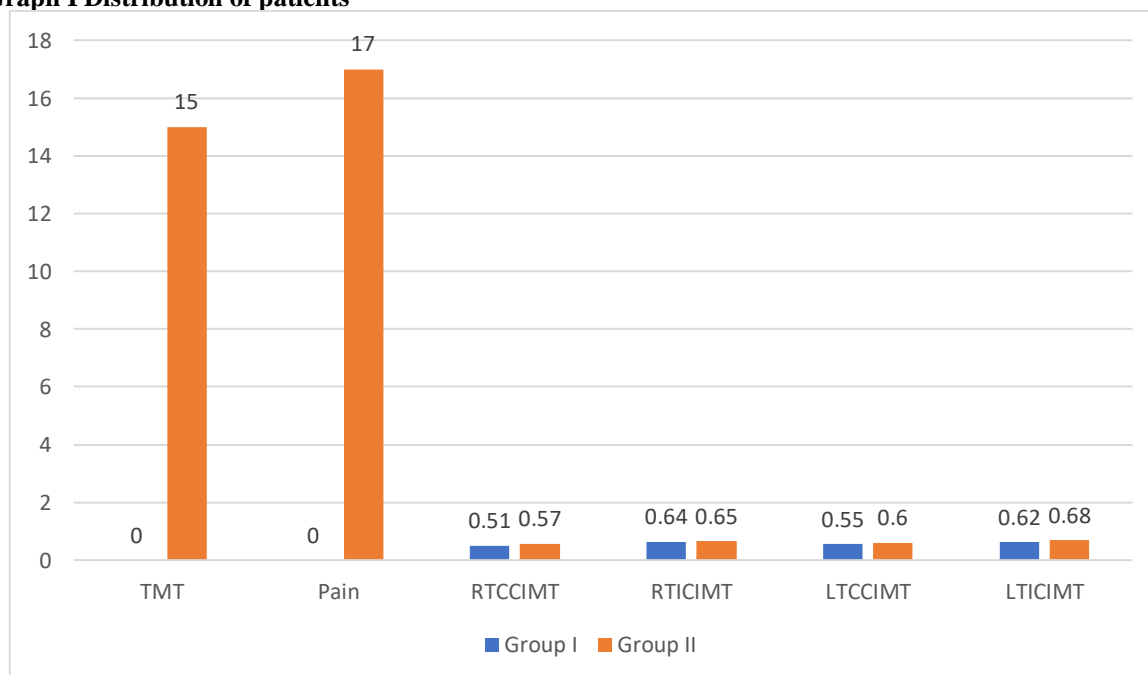


Table II Comparison of location of abnormality and disease severity in right and left coronary arteries

Parameters	Score	Group I	Group II	P value
RCA	0	23	20	0.05
	1	4	6	
	2	2	3	
RCA Pro	0	24	20	0.04
	1	3	5	
	2	2	4	

RCA- Mild	0	26	18	0.02
	1	2	5	
	2	1	6	
RCA-Dist	0	27	21	0.03
	1	1	6	
	2	1	2	
LCA	0	20	17	0.01
	1	9	12	
	2	0	0	
LAD Pro	0	23	21	0.02
	1	4	5	
	2	2	3	
LAD- Mild	0	26	22	0.05
	1	2	5	
	2	1	2	
LAD-Dist	0	24	25	0.04
	1	2	2	
	2	3	0	
Cx- Pro	0	23	17	0.02
	1	4	6	
	2	2	4	
Cx-Dist	0	24	25	0.04
	1	2	1	
	2	1	1	

Table II shows that in group I and group II, RCA score 0 was seen in 23 and 20, 1 in 4 and 6, and 2 in 2 and 3 patients in group I and group II respectively. RCA Pro0 was seen in 24 and 20, 1 in 3 and 5, 2 in 2 and 4 patients in group I and group II respectively. RCA- Mild0 was seen in 26 and 18, 1 in 2 and 5, and 2 in 1 and 6 patients in group I and group II respectively. RCA-Dist0 was seen in 27, and 21, 1 in 1 and 6, and 2 in 1 and 2 patients in group I and group II respectively. LCA0 was seen in 20 and 17, 1 in 9 and 12, patients in group I and group II respectively. AD Pro 0 was seen in 23 and 21, 1 in 4 and 5, and 2 in 2 and 3 patients in group I and group II respectively. LAD- Mild0 was seen in 26 and 22, 1 in 2 and 5, and 2 in 1 and 2 patients in group I and group II respectively. LAD-Dist0 was seen in 24 and 25, 1 in 2 and 2, and 2 in 3 and 0 patients in group I and group II respectively. Cx- Pro0 was seen in 23 and 17, 1 in 4 and 6, 2 in 2 and 4 patients in group I and group II respectively. Cx- Dist0 was seen in 24 and 25, 1 in 2 and 1, and 2 in 1 and 1 patients in group I and group II respectively. The difference was significant ($P < 0.05$).

DISCUSSION

Management and prevention strategies typically involve lifestyle changes such as adopting a heart-healthy diet, regular exercise, quitting smoking, and controlling other risk factors.⁷ In some cases, medications or medical procedures like angioplasty or bypass surgery may be necessary.⁸ Early detection and intervention are crucial in managing coronary artery disease and reducing the risk of complications.⁹ The present study was conducted to assess

atherosclerotic changes in carotid & coronary arteries in patients with cardiovascular diseases.

We found that in group I, males were 19 and females were 10 and in group II, males were 20 and females were 9. TMT was positive in 15 patients in group II and pain in 17 patients in group II. RTCCIMT was 0.51 and 0.57, RTICIMT was 0.64 and 0.65, LTCCIMT was 0.55 and 0.60, and LTICIMT was 0.62 and 0.68 in group I and II respectively. Bhat et al¹⁰ performed assessment of intimal-medial-thickness (IMT) in carotid arteries using multidetector CT (MDCT) in both clinically asymptomatic and symptomatic patients with luminal alterations in coronaries. The carotid bifurcation's HRUS scan was carried out in 151 people in asymptomatic and sick groups to test IMT. Within a week of each other, the coronary arteries of the same patients were assessed using MDCT. There was a linear correlation between IMT and advancing age. 50% of patients between the ages of 51 and 56 had an IMT of 0.5-0.69 mm, and there were more symptomatic individuals in this group. Changes in the coronary arteries were shown to rise linearly more prevalent in diabetic, hypertensive, treadmill test (TMT) positive and clinically symptomatic patients.

We found that in group I and group II, RCA score 0 was seen in 23 and 20, 1 in 4 and 6, and 2 in 2 and 3 patients in group I and group II respectively. RCA Pro0 was seen in 24 and 20, 1 in 3 and 5, 2 in 2 and 4 patients in group I and group II respectively. RCA- Mild0 was seen in 26 and 18, 1 in 2 and 5, and 2 in 1 and 6 patients in group I and group II respectively. RCA-Dist0 was seen in 27, and 21, 1 in 1 and 6, and 2 in 1 and 2 patients in group I and group II

respectively. LCA0 was seen in 20 and 17, 1 in 9 and 12, patients in group I and group II respectively. AD Pro0 was seen in 23 and 21, 1 in 4 and 5, and 2 in 2 and 3 patients in group I and group II respectively. LAD- Mild0 was seen in 26 and 22, 1 in 2 and 5, and 2 in 1 and 2 patients in group I and group II respectively. LAD-Dist0 was seen in 24 and 25, 1 in 2 and 2, and 2 in 3 and 0 patients in group I and group II respectively. Cx- Pro0 was seen in 23 and 17, 1 in 4 and 6, 2 in 2 and 4 patients in group I and group II respectively. Cx- Dist0 was seen in 24 and 25, 1 in 2 and 1, and 2 in 1 and 1 patients in group I and group II respectively. Coskun et al¹¹ investigated relationship of CIMT with the presence and extent of significant coronary artery narrowing in patients evaluated by coronary angiography for stable angina pectoris. One hundred consecutive patients with stable angina pectoris and documented ischemia on a stress test were included in the study. 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.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that internal carotid arteries showed clear signs of atherosclerosis development. In the symptomatic group, a significant correlation was found between coronary disease and the IMT thickness of the right common carotid (RCC).

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