



Co-Relation Of Carotid Intima Media Thickness (CIMT) With Risk Factors Of Coronary Artery Disease

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Abstract:

Introduction: Measurement of Carotid Intima Media Thickness (CIMT) is a risk free and cost effective investigation. CIMT may correlate with other risk factors of atherosclerosis and thus, coronary artery disease (CAD). However, the usefulness of CIMT as a risk factor of CAD in Indian scenario is not much studied.

Objective: The primary objective of our study was to determine utility of CIMT as a marker for risk of coronary artery disease.

Materials and Methods: This study was a case control study at a tertiary care institute which included 100 subjects which were divided into multiple groups as per CAD risk factors. A detailed history was taken. Subjects underwent investigations like blood sugars and lipid profile. CIMT was measured by carotid doppler study. Statistical analysis was undertaken.

Conclusions: There is increase in CIMT in patients of hypertension, diabetes and dyslipidemia and also in smokers. Age, sex and side of the vessel did not affect CIMT significantly. It was concluded that CIMT value has a direct correlation with risk factors of CAD. Thus, CIMT can be used as a predictor of future CAD.

Key words: Carotid Doppler, CIMT, CAD, Diabetes, Hypertension, Dyslipidaemia, Smoking

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INTRODUCTION:

Coronary Artery Diseases is the leading cause of death worldwide.¹

Coronary artery disease (CAD), also called coronary heart disease (CHD), ischemic heart disease (IHD), myocardial ischemia, involves the reduction of blood flow to the heart muscle due to build-up of plaque (atherosclerosis) in the arteries of the heart.²

Intima-media thickness (IMT) is measured by carotid doppler. Measuring carotid IMT is gaining acceptance as a non-invasive, inexpensive method to assess the extent of atherosclerosis.^{3,4}

Key advantages are:

1. Cheaper.

2. Safer.
3. Non Invasive.
4. Easier.

If possible CIMT can be used as an independent risk factor for CAD so that timely intervention can be done in patients to prevent CAD.⁵

Changes in carotid artery intima media thickness have also been adopted as a surrogate end point for determining the success of interventions that lower the levels of low-density lipoprotein cholesterol.^{6,7,8}

There are only a few studies showing an association between increased carotid intima media thickness and CAD.

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AIMS & OBJECTIVES:

The aim of the study was to evaluate role of CIMT in patients with risk factors of CAD.

MATERIALS AND METHODS:

This study was a case control study at a tertiary care institute. The study included hundred subjects of age more than 40 years with risk factors of Coronary Artery Disease. Written consent from all patients was taken before participating in this study and prior approval was obtained from the hospital ethical committee.

A detailed history was taken. Subjects underwent investigations like blood sugars and lipid profile. CIMT was measured by carotid doppler study. Statistical analysis was undertaken.. Cases with cardiac symptoms, ECG changes or past history of ischemic heart disease or valvular heart disease were subjected to echocardiogram. Bilateral common carotid arteries were studied. Intimal plaques were searched. Sites with intimal plaques were avoided during measurement of CIMT. Mean values of CIMT of two sites were used. The results were analysed using Pearson Chi-Square, Fisher's Exact Test, Unpaired t test, Oneway ANOVA test.

RESULTS

In this study 100 subjects were taken.

1. There is a higher CIMT in hypertensives as compared to non hypertensives. (Table 3 and Figure 1)
2. Diabetics have a higher CIMT than non diabetics. (Table 4 and Figure 2)
3. There is a positive correlation between CIMT and smoking. (Table 5 and Figure 3)
4. There is a higher CIMT in subjects with dyslipidemia. (Table 6 and Figure 4)

Table 1: Age distribution among Study groups

Age	Total
40 to 45 Yrs	4 4.0%
46 to 50 Yrs	15 15.0%
51 to 55 Yrs	22 22.0%
56 to 60 Yrs	19 19.0%
61 to 65 Yrs	22 22.0%
66 to 70 Yrs	10 10.0%
71 to 75 Yrs	8 8.0%
Total	100 100.0%

Table 2: Sex distribution among study group

Study Group		Sex		Total
		Male	Female	
Total	Count	60	40	100
	Percent	60.0%	40.0%	100.0%

Table 3: Comparison in CIMT among hypertensive and non hypertensive subjects in study group

CIMT(R)					
HTN	N	CIMT(R) Mean	Std. Dev	Unpaired T test	P value
No	73	0.729	0.2617	5.798	<0.01
Yes	27	1.052	0.2026	Difference is significant	

CIMT(L)					
HTN	N	CIMT(L) Mean	Std. Dev	Unpaired T test	P value
No	73	0.740	0.2470	7.012	<0.01
Yes	27	1.107	0.1859	Difference is significant	



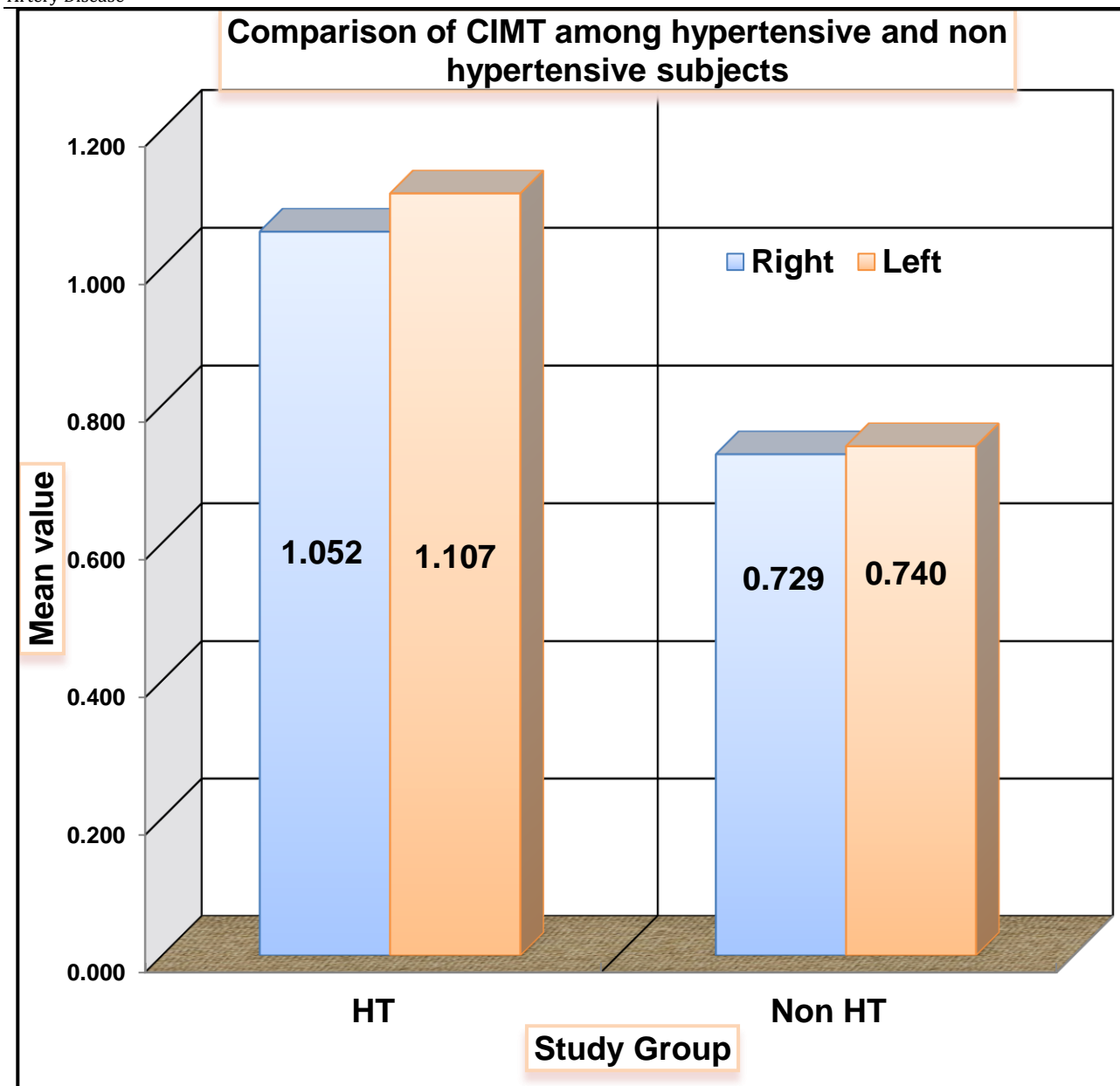


Figure 1: There is a higher CIMT in hypertensives as compared to non hypertensives.

Table 4: Comparison between CIMT in diabetic and non diabetic

CIMT(R)					
DM	N	CIMT(R) Mean	Std. Dev	Unpaired T test	P value
No	78	0.740	0.2595	5.806	<0.01
Yes	22	1.086	0.1959	Difference is significant	

CIMT(L)					
DM	N	CIMT(L) Mean	Std. Dev	Unpaired T test	P value
No	78	0.769	0.2640	5.324	<0.01
Yes	22	1.091	0.1950	Difference is significant	



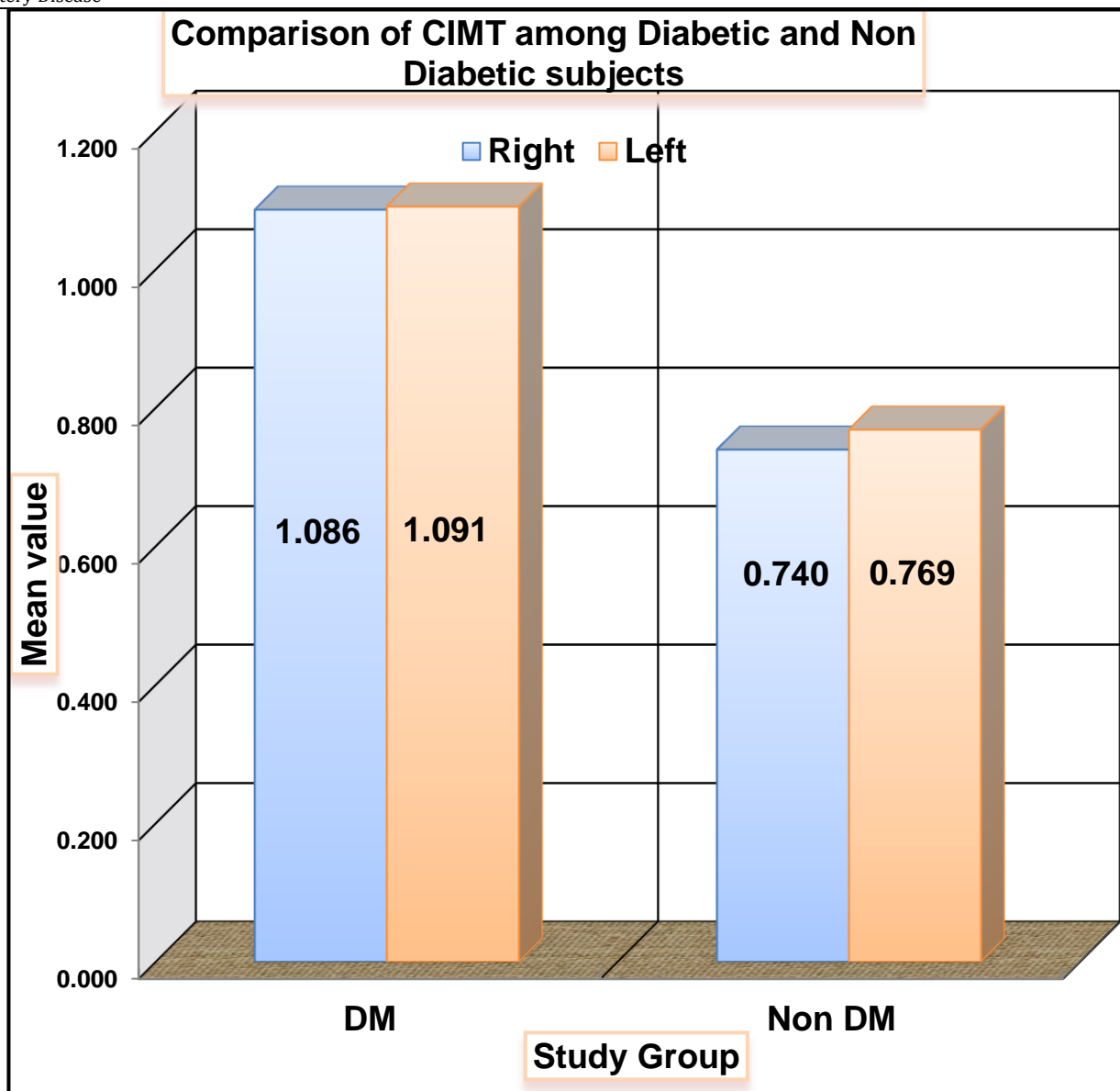


Figure 2: Diabetics have a higher CIMT than non diabetics.

Table 5: Comparison of CIMT in Smoker and Non Smoker CIMT(R)

SMOKE R	N	CIMT(R)Mean	Std. Dev	Unpaired T test	P value
No	91	0.792	0.2802	2.726	<0.01
Yes	9	1.056	0.2297	Difference is significant	

CIMT(L)

SMOKE R	N	CIMT(L) Mean	Std. Dev	Unpaired T test	P value
No	91	0.812	0.2769	3.290	<0.01
Yes	9	1.122	0.1787	Difference is significant	



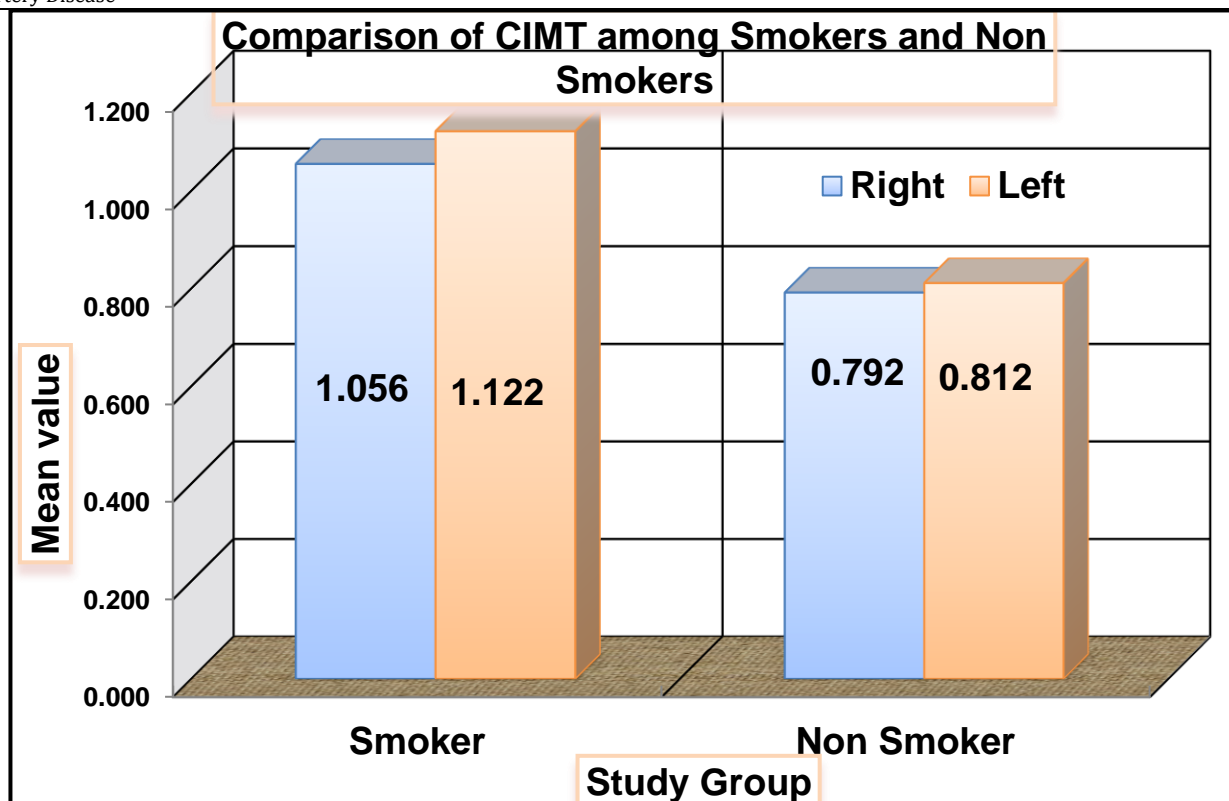


Figure 3: There is a positive correlation between CIMT and smoking.

Table 6: Correlation between CIMT and dyslipidemia

CIMT(R)					
Non HDL Cholesterol >130	N	CIMT(R) Mean	Std. Dev.	Unpaired T test	P value
No	76	0.73	0.25	6.449	<0.01
Yes	24	1.09	0.20	Difference is significant	

CIMT(L)					
Non HDL Cholesterol >130	N	CIMT(L) Mean	Std. Dev.	Unpaired T test	P value
No	76	0.76	0.26	5.820	<0.01
Yes	24	1.09	0.19	Difference is significant	

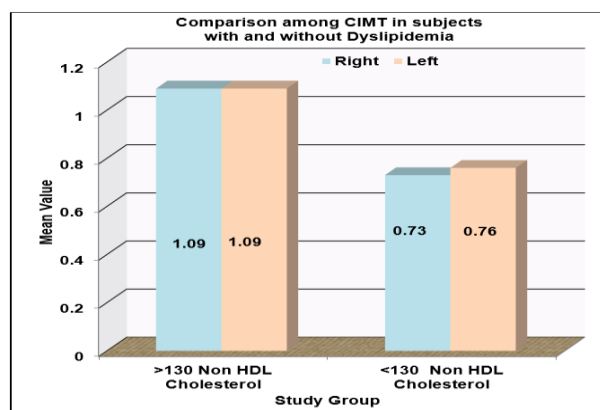


Figure 4: There is a higher CIMT in subjects with dyslipidemia.

DISCUSSION:

CAD is the second leading cause of death worldwide.¹

Intima-media thickness (IMT) is a measured by carotid doppler.

In this study, we evaluated CIMT in people with risk factors of CAD.

According to Lynne E. Wagenknecht, Ralph D'Agostino Jr, Peter J. Savage, Daniel H. O'Leary,⁹ Carotid intima media thickness among diabetic subjects is higher than non diabetics which is in accordance to the results obtained in this study.

There was a significant increase in CIMT in hypertensives as compared to non-hypertensives in this study which is in accordance to the study done by Honzikova N, Labrova R, Fiser B, Maderova E, et al.¹⁰

Smoking is associated with increased carotid intima media thickness as per George Howard, Gregory L. Burke, Moyses Szkló, Grethe S. Tell, John Eckfeldt, Gregory Evans, Gerardo Heiss which is same as the results obtained in this study.¹¹



CONCLUSIONS:

1. There is a higher CIMT in hypertensives as compared to non hypertensives.
2. Diabetics have a higher CIMT than non diabetics.
3. There is a positive correlation between CIMT and smoking.
4. There is a higher CIMT in subjects with dyslipidemia.

From above conclusions it was noted that CIMT value has a direct correlation with CAD Risk Factors

Carotid intima media thickness can be used as a non-invasive predictor of future ischemic events.

Common carotid artery intima media thickness can also be used in early identification of asymptomatic individuals at risk of developing complications of atherosclerosis but it requires further validation.

Increased intima media thickness may represent a way to detect and target immediate risk populations in which prevention could be more efficient.

As the burden of complications of atherosclerosis is ever increasing, especially in India, CIMT, as a non-invasive and bedside test can be really helpful in categorising atherosclerotic disease. Carotid intima media thickness can be considered as an independent risk factor in identifying people at increased risk of vascular events arising as a consequence of atherosclerosis.

The application of CIMT can be expanded to other vascular complications of atherosclerosis like ischemic stroke and peripheral vascular disease.

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