Original Research Article

Correlation between Carotid Intima Media Thickness in Type Two Diabetes Mellitus with dyslipidemia in Central India

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Abstract: Dyslipidemia is major cause for atherosclerosis. There is synergistic effect of dyslipidemia & type II DM with carotid intimal thickening, which is self has high correlation with cardio-vascular mortality & morbidity objectives We have performed study in index medical college and research center in total period of one and half year taken 50 diabetic patients with dyslipidemia in medicine department with their written consent form. High CMT was noted older age group patients (86.6%). Obese patients, Smoking and Hypertension have high CMT values 83.3 % 85.7% and 80% respectively. Diabetes patients with higher HBA1c level have higher chances of raised CMT values. Also Higher cholesterol level in diabetic patient have more chance of high CMT values. Atheroscerosis is important culprit for Carotid intima media thickening and other risk factors like hypertension, obesity type II DM smoking and dyslipidemia are also play important role in the same. Our study shows a direct correlation of increased level of LDL cholesterol associated with increased CMT.

Keywords: CMT, Carotid Intima Media Thickness, Diabetes Mellitus (DM Type 2), Lipid Profile, Ultra sono graphy. HDL, LDL.

INTRODUCTION

Atherosclerosis is the primary cause of mortality and morbidity in cardiovascular disease (CVD) [1]. Dyslipidemia is the most important risk factor for atherosclerosis and contributes to increased risk to develop CVD. Previous studies have demonstrated that low density lipoprotein (LDL) is the primary atherogenic lipoprotein [2,3] and that high-density lipoprotein (HDL) is the predominant anti-atherosclerotic lipoprotein [4].Therefore, measurements of total cholesterol (TC), HDL cholesterol (HDL-C), and LDL cholesterol (LDL-C) are widely recommended [5]. Even within a particular arterial bed, stenosis due to atherosclerosis tend to occur focally, typically in certain predisposed regions, in the extra cranial circulation to the brain, the carotid bifurcation. Indeed, atherosclerotic lesions often form at branching points of arteries which are regions of disturbed blood flow [6]. Male gender, older age, smoking, hypertension, diabetes, and hypercholesterolemia are risk factors for carotid disease, as they are for stroke in general. Carotid atherosclerosis produces an estimated 10% of ischemic stroke [6]. Diabetes causes microvascular diseases, such as nephropathy, neuropathy, and retinopathy, and macrovascular disease (e.g., atherosclerosis). Atherosclerosis of the coronary, cerebral, and peripheral arteries accounts for approximately 80 percent of mortality and for 75 percent of hospitalizations in persons with diabetes [7]. The abnormal lipoprotein profile associated with insulin resistance, known as *diabetic dyslipidemia*, accounts for part of the elevated cardiovascular risk in patients with type 2 diabetes. 6 Atherosclerosis develops silently over decades before symptoms eventually occur. Carotid ultra sono graphy can be used to noninvasively identify early-stage atherosclerotic changes in arterial wall. Measurements of intima-media thickness (IMT) and detection of plaque formation have been used as early and sensitive indicators for early-stage atherosclerosis [8, 9]. For every 0.1-mm increase in carotid IMT, the relative risk of ischemic heart disease increases by 15% and that of cerebro vascular disease by 18% [10].

In our study, we observed associations between lipid parameters in diabetic patient with carotid IMT and plaque in central India.

Aims & Objectives
- To assess the carotid intima media thickness (CMT) in the type 2 DM patients with dyslipidemia.
- To study additive effect of diabetes on lipid profile & CMT.
- Correlation of CMT with other parameters

MATERIAL AND METHODS

We have performed study in index medical college and research center in total period of one and half year from June 2015 to Nov 2016. We have taken 50 diabetic patients with dyslipidemia in medicine department with their written consent form. All the selected patients are thoroughly examined medically. Their family histories of DM & Dyslipidaemia, clinical assessment, personal history were taken. Thorough general as well as systemic examination has been done. Regarding biochemical, Hematological, Radiological investigations complete blood count, fasting blood sugar, post prandial blood sugar, Glycosylatead haemoglobin, urine routine microscopy, lipid profile, chest x-ray, ECG & carotid ultra-sonography for intimal thickening has been done for all the selected patients.

Group
- A group of 50 type 2 Diabetes mellitus with Dyslipidemia patients.
- A control group of 50 Non DM patients with Dyslipidemia.

Inclusion Criteria

Age >40 yrs 2. Type 2 DM patients with dyslipidemia. 3. Dyslipidemia patients with Non DM in control group.

Exclusion Criteria

Age < 40 years 2. Type I diabetes mellitus 3.Gestational diabetes mellitus. 4. Drug Induce DM.

Table 1: Gender Wise Distribution

Gender	CMT VALUE IN MM	
	≤0.8	>0.8 (%)
Male	20	30 (60%)
Female	16	34(68%)

We have found Female preponderance with high CMT values in our study, as female patients of higher age group were more.

Table-2: Age Wise Correlation with CMT

Age	CMT VALUE IN MM	
	≤0.8	>0.8
40-50	09	15 (71.4%)
50-60	15	20(57.1%)
60-70	10	16(61.5%)
70-80	02	13(86.6%)

High CMT was noted among 70 to 80 age group patients (86.6%) and about 61.5 % in age group of 60 to 70 yrs. it shows more in older age groups

Table-3: Correlation CMT with BMI, Smoking & HT

PARAMETERS	CMT VALUE IN MM	
	≤0.8	>0.8
≤25 BMI	24	04 (14.2%)
>25 BMI	12	60(83.3%)
Non-smoker	32	40(55.5%)
Smoker	04	24(85.7%)
Non-hypertensive	25	20(44.4%)
Hypertensive	11	44(80.0%)

This table reveals obese patients have high CMT values (83.3% %). Smoking and Hypertension is also associated with high CMT values 85.7% and 80% respectively.

Table-4: Correlation CMT with Type II DM

Status	CMT VALUE IN MM	
	≤0.8	>0.8
Non-diabetic	30	20(40%)
Diabetic	06	44(88%)

In our study, diabetes patients have higher chances of raised CMT values in comparison to non diabetics.

Table-5: Correlation CMT with HBA1c

HBA1c	CMT VALUE IN MM	
	≤0.8	>0.8
7.0-7.5	30	28 (48.2%)
7.6-7.9	6	36 (85.7%)

We found positive correlation between the higher HBA1c level & CMT.

Table-6: Correlation between type II DM with Cholesterol level

Total cholesterol	150-200	>200
DM Present	**15**	**35** (70%)
DM Absent	36	14(28%)

Higher cholesterol level is more found in type 2 DM patient (70%).

Table-7: Correlation between CMT and lipid profile in DM and Control Group

Total cholesterol	CMT VALUE IN MM	
	≤0.8	>0.8
150-200	**3**	4(57.1%)
>200	**3**	40(93.0%)
150-200	**26**	10(27.8%)
>200	**4**	10(71.4%)

In our study, DM type II patient with higher value of total cholesterol is associated with high CMT values in comparison to non diabetic patients.
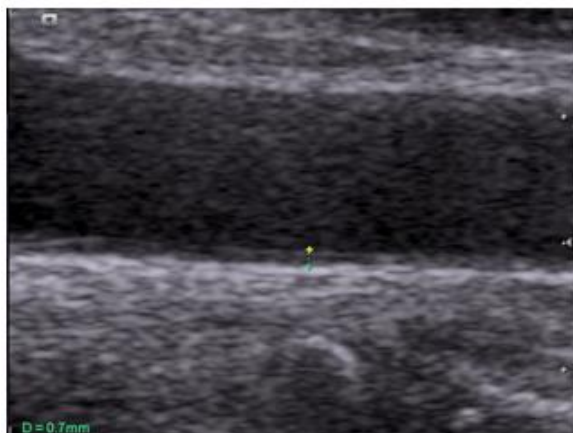

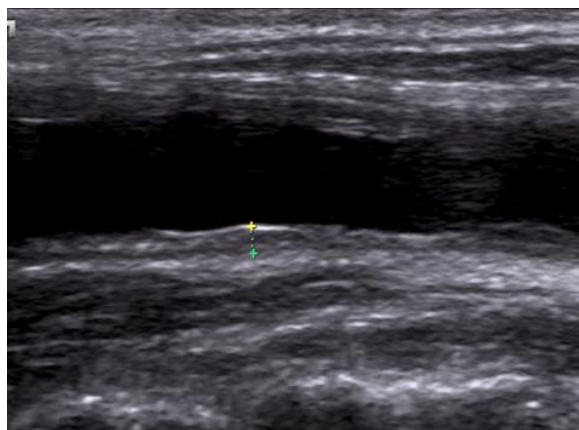**Fig-1: HRUS reveals normal CMT of 7 mm in control group patient**

Fig-2: HRUS reveals higher CMTof 11mm in DM with dyslipidemia
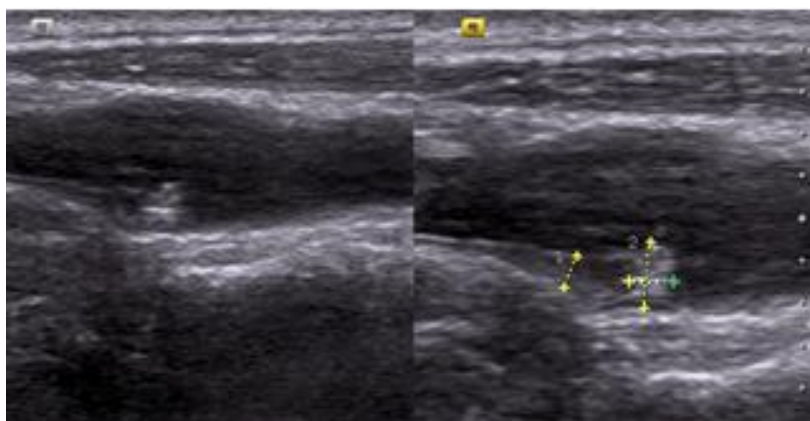

Fig-3: HRUS reveals higher CMT of 14 mm with plaque formation measuring 3.2x2.1mm in hypertensive Diabetic patient.

DISCUSSION

DM with Dyslipidemia is causing atherosclerosis, which is the leading cause of morbidity & mortality. Other multiple risk factors for atherosclerosis are hypertension, obesity and smoking. So there is more risk of coronary artery & cerebro vascular diseases up to 2 to 4 fold higher than in normal population. Most heart attacks and strokes occur in people at average risk-factor level, who are misclassified by traditional risk factor scoring, as low or intermediate risk [11]. In our study, we correlate between lipid profile & CMT in type 2 DM and non

diabetic. DM type II patient with higher value of total cholesterol is associated with high CMT values in comparison to non diabetic patients. Further more in our study, LDL Cholesterol level is more important. Rader DJ *et al.* [12] also shown that increased levels of LDL-cholesterol in patients have positive correlation to progress in carotid intima-media thickness. In our study obese patients, Smoking and Hypertension is associated with high CMT values 83.3%, 85.7% and 80% respectively. It would appear that going by the results in this study, the cases of DM had a greater cardiovascular disease burden. Their burden of cardiovascular disease risk factors surpassed that of Hypertension in most cases especially dyslipidemias, waist hip ratio, cigarette smoking, alcohol abuse, physical inactivity, and serum creatinine. This is in accord with the work of Weiss and Sumpio [13], where it was found that diabetes caused higher morbidity and mortality from vascular diseases. Modifiable cardiovascular risk factors in DM should therefore be treated aggressively to reduce complications arising from cardiovascular diseases. Of all traditional risk factors for cardiovascular diseases, hypertension is said to have the greatest effect on IMT via medial hypertrophy, a process specifically related to the disease [14].

CONCLUSION

Atheroscerosis is important culprit for Carotid intima media thickening and other risk factors like hypertension, obesity type II DM smoking and dyslipidemia are also play important role in the same. The risk of increased CMT in DM type II is about 2 to 4 fold than in control group. Our study shows a direct correlation of increased level of LDL cholesterol associated with increased CMT. In smokers the chance of CMT is more than in non smokers. Type II DM patients with dyslipidemia, the rate of rise of intimal thickening are higher than in non-diabetic dyslipidemic subject.

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