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### RESEARCH ARTICLE

## CORRELATION OF LIPID PROFILE WITH CAROTID INTIMA MEDIA THICKNESS IN NEWLY DIAGNOSED CORONARY ARTERY DISEASE PATIENTS.

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#### Manuscript Info

#### Abstract

#### Manuscript History

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#### Project Summary:-

- Coronary Artery Disease (CAD) is a major health problem with considerable morbidity and mortality and has been long eluding our efforts for an effective control. Knowledge of risk factors with early indicators will help to prevent the occurrence of CAD.
- Carotid-wall intima-media thickness (CMT) is a surrogate measure of atherosclerosis associated with Cardiovascular risk factors and outcomes.
- The intima-media thickness is the distance from the lumen-intima interface to the media-adventitia interface of the artery wall, as measured on noninvasively acquired ultrasonographic images of carotid arteries.
- Increased intima-media thickness of the common carotid artery represents a form of atherosclerosis that is manifested as diffuse arterial-wall thickening whereas increased intima-media thickness of the proximal internal carotid artery is a surrogate for focal atherosclerotic plaque.
- The mean intima-media thickness of the common carotid artery is a more reproducible measure than the intima-media thickness of the internal carotid artery and is believed to be better suited for cardiovascular risk assessment and intervention studies.
- There is overwhelming amount of evidence relating to high levels of serum, Total and LDL Cholesterol and low levels of cholesterol with coronary atherosclerosis, the relation between serum lipids, lipoproteins Coronary atherosclerosis is less clear.

#### Objectives Of Study:-

Thus this study is intended to correlate lipid profile Total cholesterol with LDL:HDL ratio and Triglycerides CMT thickness in newly diagnosed coronary artery disease patient.

#### Review Of Literature:-

- Caie Yang *et al* did a study on the correlation between serum lipid profile with carotid intima media thickness and plaque in 2014 and concluded that the serum LDL-C/HDL-C ratio represents as an independent index associate with increased carotid IMT and LDL-C combined with HDL-C levels may be useful markers for predicting the presence of carotid plaque in the Chinese general population.

- Samia Perwaiz *et al* conducted a study in 2008 on the variations in Carotid intima media thickness in familial Hypercholesterolemia patients and its use as predictive marker for premature cardiovascular disease. In this study CIMT was found to be significantly increased in familial Hypercholesterolemia and it correlated with raised LDL-cholesterol. Both were predictors of premature cardiovascular disease.
- Debalina Sengupta *et al* conducted a study in 2014 on correlation between lipid profile and carotid intima media thickness in cerebral ischaemia and concluded that the altered lipid profile is associated with cerebral ischaemia by increasing carotid intima media thickness (IMT) .
- Preetha *et al* conducted a study on lipid profile and carotid intima thickness in diabetic and non diabetic ischaemic stroke patients in 2017 and concluded that the lipid parameters including TC ,TG,LDL and VLDL were significantly raised in diabetic stroke patients and had positive correlation with the risk of stroke.

### Materials & Methods:-

- ❖ Study Design : Observational Study
- ❖ Study Setting : Yenepoya Medical College Hospital
- ❖ Study Duration : 20th Oct 2017 - 20th Nov 2017
- ❖ Source of Data : Patients admitted in YMCH
- ❖ Sample Size : 50 cases which meet inclusion criteria
- ❖ The present study will be carried out after obtaining the Ethical committee clearance. Relevant clinical data (demographic- age, sex, place, occupation) including history will be obtained from patients and detailed clinical examination will be performed.
- ❖ The risk and complications of coronary angiogram will be explained to the patient like reperfusion arrhythmias, artery rupture, bleeding, infections.
- ❖ Subsequently patient with established Coronary Artery Disease had undergone **CAROTID DOPPLER** to estimate the carotid intima media thickness.
- ❖ Patient were examined in supine position with head tilted backward. After the carotid arteries will be located by B mode ultrasonography Equipped with 7.5mhz linear array transducer. The probe was rotated right angle to obtain and record a longitudinal image of anterior and posterior walls. The measurement can vary from one observer to another.
- ❖ The maximum IMT will be measured at the near and far wall of common carotid artery, the bifurcation and the internal carotid arteries and were expressed as a mean aggregated value.
- ❖ Lipid profile after 12 hours of overnight fasting will be done and total cholesterol will be measured by pap method, Triglycerides by Pap method LDL:HDL ratio (HDL by PEG Precipitation method and LDL by Friedewald's formula).

### Inclusion Criteria:-

- ❖ Newly diagnosed coronary artery disease patients by coronary angiogram
- ❖ Age between 40-70 age group

### Exclusion Criteria:-

- ❖ Patient with H/ CAD, Stroke
- ❖ Patients already on statins
- ❖ Other chronic inflammatory conditions, chronic kidney disease

### Statistical Analysis:-

- ❖ Chi-Square test
- ❖ Student T- tests

### Results:-

Correlations		AGE	CIMT	Total cholesterol	Triglycerides	HDL	LDL
AGE	Pearson Correlation	1	.176	.156	.186	.037	.126
	Sig. (2-tailed)		.223	.279	.196	.799	.382

	N	50	50	50	50	50	50
CIMT	Pearson Correlation	.176	1	<b>.868**</b>	<b>.433**</b>	.043	<b>.909**</b>
	Sig. (2-tailed)	.223		<b>.000</b>	<b>.002</b>	.768	<b>.000</b>
Total cholesterol	N	50	50	<b>50</b>	<b>50</b>	50	<b>50</b>
	Pearson Correlation	.156	<b>.868**</b>	1	<b>.294*</b>	.223	<b>.937**</b>
	Sig. (2-tailed)	.279	<b>.000</b>		<b>.038</b>	.120	<b>.000</b>
	N	50	<b>50</b>	50	<b>50</b>	50	<b>50</b>
Triglycerides	Pearson Correlation	.186	<b>.433**</b>	<b>.294*</b>	1	-.095	<b>.389**</b>
	Sig. (2-tailed)	.196	<b>.002</b>	<b>.038</b>		.510	<b>.005</b>
	N	50	<b>50</b>	<b>50</b>	50	50	<b>50</b>
HDL	Pearson Correlation	.037	.043	.223	-.095	1	.040
	Sig. (2-tailed)	.799	.768	.120	.510		.783
	N	50	50	50	50	50	50
LDL	Pearson Correlation	.126	<b>.909**</b>	<b>.937**</b>	<b>.389**</b>	.040	1
	Sig. (2-tailed)	.382	<b>.000</b>	<b>.000</b>	<b>.005</b>	.783	
	N	50	<b>50</b>	<b>50</b>	<b>50</b>	50	50

\*. Correlation is significant at the 0.05 level (2-tailed).

**Correlation interpretation:**

**0 to .3 – weak positive correlation ; 0 to -.3 -weak negative correlation**  
**.4 to .7 – moderate positive correlation ; -0.4 to -0.7 – moderate negative correlation**  
**>.7 – strong positive correlation ; >-0.7 - strong negative correlation**

Linear correlation between carotid Intima media thickness with lipid parameters and clinical characteristics were evaluated by Pearson correlation or Spearman rank correlation as appropriate and student T test was applied to find comparison of lipid profiles with risk factors and normal groups.

There was significant correlation between carotid intima media thickness with LDL, total cholesterol, triglycerides ( $p < 0.05$ )

No significant correlation was seen between Carotid intima media thickness with HDL, Age.

The mean Age in Diabetic group was 53.67, Diabetic with Hypertension group was 52.26, Hypertensive group was 57.5 and No risk factor group was 52.3

**Comparison of lipid profiles between the risk factors**

		N	Mean	Std. Deviation	Minimum	Maximum
AGE	DM	9	53.67	8.718	45	73
	DM/HTN	23	52.26	6.870	40	69
	HTN	6	57.50	4.370	50	62
	NORMAL	12	52.33	6.597	40	63
CIMT	DM	9	1.022	.1856	.8	1.3
	DM/HTN	23	1.003	.2164	.7	1.4
	HTN	6	.950	.1517	.8	1.2
	NORMAL	12	.975	.2137	.7	1.4
Total cholesterol	DM	9	180.00	41.533	130	250
	DM/HTN	23	196.96	65.466	120	350

	HTN	6	183.33	42.269	150	260
	NORMAL	12	201.67	81.110	150	350
<b>Triglycerides</b>	<b>DM</b>	<b>9</b>	<b>338.89</b>	<b>183.333</b>	<b>200</b>	<b>700</b>
	<b>DM/HTN</b>	<b>23</b>	<b>420.87</b>	<b>135.409</b>	<b>180</b>	<b>700</b>
	<b>HTN</b>	<b>6</b>	<b>195.00</b>	<b>23.452</b>	<b>150</b>	<b>220</b>
	<b>NORMAL</b>	<b>12</b>	<b>182.50</b>	<b>71.621</b>	<b>150</b>	<b>400</b>
HDL	DM	9	35.56	5.270	30	40
	DM/HTN	23	36.17	7.284	30	50
	HTN	6	40.00	6.325	30	50
	NORMAL	12	40.00	9.535	30	60
LDL	DM	9	145.56	58.547	80	250
	DM/HTN	23	145.65	57.826	70	300
	HTN	6	133.33	37.238	100	200
	NORMAL	12	145.00	65.989	90	290

<b>ANOVA</b>						
		Sum of Squares	df	Mean Square	F	Sig.
AGE	Between Groups	142.119	3	47.373	.981	.410
	Within Groups	2220.601	46	48.274		
	Total	2362.720	49			
CIMT	Between Groups	.025	3	.008	.201	.895
	Within Groups	1.923	46	.042		
	Total	1.948	49			
Total cholesterol	Between Groups	3335.043	3	1111.681	.270	.847
	Within Groups	189386.957	46	4117.108		
	Total	192722.000	49			
<b>Triglycerides</b>	<b>Between Groups</b>	<b>557691.502</b>	<b>3</b>	<b>185897.167</b>	<b>11.691</b>	<b>.000</b>
	<b>Within Groups</b>	<b>731446.498</b>	<b>46</b>	<b>15901.011</b>		
	<b>Total</b>	<b>1289138.000</b>	<b>49</b>			
HDL	Between Groups	186.793	3	62.264	1.106	.356
	Within Groups	2589.527	46	56.294		
	Total	2776.320	49			
LDL	Between Groups	779.227	3	259.742	.077	.972
	Within Groups	155820.773	46	3387.408		
	Total	156600.000	49			

**Comparison of lipid profiles between the presence/ absence of risk factors:**

<b>Group Statistics</b>								
	RF Y_N	N	Mean	Std. Deviation	Mean difference	T	df	p-value
AGE	0	12	52.33	6.597	-1.088	-.469	48	.641
	1	38	53.42	7.115				
CIMT	0	12	.975	.2137	-.0245	-.367	48	.715
	1	38	.999	.1973				
Total cholesterol	0	12	201.67	81.110	10.877	.520	48	.606
	1	38	190.79	56.777				
Triglycerides	0	12	182.50	71.621	-183.289	-3.868	48	.000
	1	38	365.79	158.227				

HDL	0	12	40.00	9.535	3.368	1.363	48	.179
	1	38	36.63	6.724				
LDL	0	12	145.00	65.989	1.316	.070	48	.945
	1	38	143.68	54.198				

Independent Samples Test							
		T-test for Equality of Means					
		T	Df	p-value	Mean Difference	Std. Error Difference	
AGE		-.469	48	.641	-1.088	2.318	
CIMT		-.367	48	.715	-.0245	.0666	
Total cholesterol		.520	48	.606	10.877	20.923	
Triglycerides		<b>-3.868</b>	<b>48</b>	<b>.000</b>	<b>-183.289</b>	<b>47.381</b>	
HDL		1.363	48	.179	3.368	2.471	
LDL		.070	48	.945	1.316	18.913	

When Student T test was applied to find comparison between lipid profile with presence /Absence of risk factors it is found that cases with risk factors had a higher triglycerides level compared to cases with no risk factors

### Discussion:-

Although preventable atherosclerotic cardiovascular disease remains a leading global cause of death and disability. Causal risk factors for cardiovascular disease constitute important therapeutic targets, but their usefulness as predictors for the disease developing is limited.

Therefore, the only effective approach to restrict the health burden is to prevent the diseases from developing at the earliest possible stage of atherosclerosis.

Thus, screening for biomarkers for detecting early stage asymptomatic vascular atherosclerosis are needed.

Carotid intima-media thickness is a valuable research tool that can be used as surrogate end points in clinical trials<sup>1</sup>

This study was conducted on 50 patients at Yenepoya medical college, Mangalore.

All the patients were newly diagnosed coronary artery disease. CIMT was measured by B mode ultrasonography and fasting lipid profile were measured.

The mean age in Diabetic (n=9 53.67), Diabetic with hypertensive group (n=23 52.26), Hypertensive group(n=6 57.50) and no risk factor group (n=12 52.33).

Mean carotid intima media in diabetic group (1.02mm),Diabetic with Hypertensive group(1.003 mm),Hypertensive group were (0.95mm) and no risk factor group( 0.975 mm)

This study showed there was positive correlation of carotid intima media thickness with LDL, Total cholesterol and triglycerides.

Similar studies were done by Sengupta Debalina *et al*<sup>2</sup> where CIMT had a positive correlation between LDL, Total cholesterol and Triglycerides.

Study also showed that patients with risk factors had higher triglycerides compared to patients with no-risk factors similar to study conducted by Khan SP *et al*<sup>3</sup>.

Age, Gender did not show any significant correlation. In clinical practice, measurement of CIMT greater than 1.0mm in the common carotid artery or presence of plaque may support an early intervention therapy. CIMT can also be used to assess safety and efficacy of cardiovascular medicines.<sup>4</sup>

### Conclusion:-

Carotid intima media thickness measured through Mode ultrasonography was found to be significantly correlated with lipid profile. Thus, it can be used to assess the risk of cardiovascular diseases as it also correlated to increase LDL-CHOLESTEROL and total cholesterol and thus both are predictive markers for premature cardiovascular diseases.

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