



## Serum Lipid Profile and Their Ratios in Patients with Acute Myocardial Infarction :- A Hospital Based Study.

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### ABSTRACT

The post myocardial infarction care includes the management of dyslipidemia as one of the important aspects. There is a recommendation for the detection of dyslipidemia in patients within 24 hrs after infarction. It is also reported that the lipids ratio do contribute to assess the severity of myocardial infarction. The present study was undertaken with an objective to frame out the use of lipid profile and their ratios in patients with acute myocardial infarction.. The study included two groups; the first group consisted of 66 patients who were admitted to the hospital with Acute Myocardial Infarction (AMI). The second group consisted 50 normal healthy controls. Serum levels of CPK-MB and Lipid profile were assessed within 24 hours once the patients admitted to BLDE hospital, with the presentation of chest pain, which was suggestive of MI whose diagnosis of acute MI was made on patient history, symptoms, abnormalities with ECG findings. The patients with AMI had shown significant rise in CPK MB and the lipid parameters like High density lipoprotein (HDL) shown significant decrease and the Very Low Density Lipoprotein (VLDL) and triglycerides (TG) shown significant increase in cases compared to normal healthy individuals. Total Cholesterol (TC) and Low Density Lipoprotein (LDL) in cases did not show much difference in their respective values and were found to be statistically not significant. The ratios between different lipids show a significant variations compared to controls and were found to be statistically significant and also indicative of the severity of the infarction. The study suggests to consider the assessing of lipids ratios in normal subjects also as it is one of the atherogenic factor for the development of MI and other coronary complications.

### KEYWORDS

Lipid profile, Myocardial infarction, Lipid fractions ratio.

### INTRODUCTION:

Acute myocardial infarction (AMI) commonly known as a heart attack, results from the interruption of blood supply to a part of the heart, causing heart cells to die. This is most commonly due to occlusion of a coronary artery following the rupture of vulnerable atherosclerotic plaque which is a collection of lipids in the walls of artery. In 1990 around 25% of deaths in India were attributed to CVD. Also it is predicted that the cases of CVD may increase from 2.9 crores in 2000 to as many as 6.4 crore in 2015<sup>(1)</sup> Few primary risk factors have been identified with the development of atherosclerotic coronary artery disease and MI: Dyslipidemia, diabetes mellitus, hypertension, male gender, and family history of atherosclerotic arterial disease. The presence of any risk factor is associated with doubling the relative risk of developing atherosclerotic coronary artery disease<sup>(2,3)</sup> Indians are four time more prone to AMI as compared to the people of other countries due to a combination of the genetic and lifestyle factors that promote metabolic dysfunction<sup>(4)</sup> The pathogenesis of AMI is multifactorial but studies have implicated that lipid metabolism as one of the significant factor in development of this disease.

The diagnosis of AMI is usually based on clinical symptoms and on electrocardiographic (ECG) findings of the patient and an increase of serum biochemical markers as per WHO recommendations<sup>(5)</sup> In evaluating the myocardial injury, biochemical markers play an essential role in assessment and treatment of the patients. The early appearance of a marker released into the bloodstream soon after an injury may facilitate early diagnosis. When developing the assays it is important that

they are sensitive, specific and have a short turnaround time, to allow results to be available within a clinically useful time-frame<sup>(6)</sup> CPK-MB isoenzyme (CK-MB) has been termed as gold standard for the diagnosis of MI<sup>(7)</sup>. Dyslipidemia characterized by elevated Total cholesterol, lowered HDL cholesterol is a conventional risk factor observed in myocardial infarction patients<sup>(8)(9)</sup>. The treatment of dyslipidemia after myocardial infarction is essential and beneficial because these patients are at the highest risk for future cardiac events<sup>(10)</sup>.

Along with the utilization of predictive information of lipid profile, the importance of lipoproteins ratios have been defined and various studies are done<sup>(11)</sup>. Some authors have reported that the Lipid profile ratio is a useful indicator in predicting the risk of myocardial infarction<sup>(12)</sup> The TG to HDL.C ratio is considered as the one of the atherogenic factors for the development of MI and other coronary complications.<sup>(13)(14)</sup> These ratios can provide vital information which may not be available by routine lipid profile analysis. The current study is undertaken to evaluate the variations in serum lipid profile and also including the ratio of T.Chol. to HDL.Chol, HDL.Chol to LDL.Chol. and Triglyceride to HDL.Chol in admitted patients within 24 hours after the myocardial infarction occurred.

### MATERIALS AND METHODS:

BLDE Hospital based IPD male and female patients form the core of this study. The patients presenting within 24 hrs with chest pain suggestive of MI whose diagnosis of acute MI was made on patient history, symptoms, abnormalities with ECG

findings were selected for the study.

Exclusion: Patients with sepsis, pericarditis, pulmonary embolism, end stage renal disease were excluded from the study.

**METHODS:**

Triglycerid:Triglyceride-Glycerol phosphate oxidase/peroxidise method.

T .Cholesterol:CHOD-PAP method.

HDL. Cholesterol:Precipitation method, Phosphotungstate magnesium acetate reagent

LDL & VLDL: Reported with calculation, using Friedwalds equation.

CK-MB: Immunoinhibition method.

These investigations were assayed with fasting blood samples, measuring on semi auto analyzer BTR-830. All the values were tabulated and statistical analysis was done. The P-value of <0.05 was considered to be statistically significant.

**OBSERVATIONS AND RESULTS:**

**TABLE:1**

MEAN AGE, NUMBER OF MALES AND FEMALES OF CASES AND CONTROLS AND CASES

PARAMETERS	CASES. (no=66) MEAN± SD .		CONTROLS.(no=50) MEAN±SD	
	M (48)	F (18)	M (36)	F (14)
AGE(YEARS)	52.6 ± 9.5	51.4 ± 5.2	50.2 ± 5.8	47.3 ± 4.9

**Table No-1 shows the distribution of cases and controls studied as per sex and Ages.**

**TABLE. NO .2  
LIPID PROFILE AND CPK-MB IN HEALTHY SUBJECTS AND MI PATIENTS.**

S.NO	INVESTIGATIONS	UNITS	CONTROLS(50) RESULTS	CASES (66) RESULTS	P value
01	Triglyceride	mg/dl	121.10±27.7	181.5 ± 18.6	0.001
02	T.Cholesterol	mg/dl	169.4±27.6	168.5 ± 15.6	0.850
03	HDL.Cholesterol	mg/dl	45.8± 7.5	33.1 ± 5.1	0.000
04	LDL.Cholesterol	mg/dl	99.3±26.3	101.2 ± 16.4	0.971
05	VLDL.Cholesterol	mg/dl	24.1±5.5	40.6 ±34.6	0.001
06	T.Chol to HDL.Chol ratio	--	3.7 ± 0.7	5.2 ± 0.8	0.000
07	LDL.Chol to HDL.Chol ratio	--	2.2 ± 0.6	3.1 ± 0.7	0.000
08	Triglyceride to HDL.Chol ratio	--	2.8 ± 0.9	5.6 ± 1.0	0.000
09	CPK.MB	IU/L	15.7 ± 6.0	57.1 ± 18.7	0.000

**Values are given as mean ± SD.**

It is evident from the Table 2, that CPK MB showed a significant increase(p<0.001) in cases compared to controls, as it is a good marker of AMI. The Total cholesterol and LDL cholesterol levels after comparing to controls were found to be statistically not significant. HDL cholesterol showed a marked decrease and VLDL cholesterol and Triglyceride showed a significant increase in cases

Compared to controls. The ratios between different lipids

show a marked variations compared to controls and also indicative of the severity of the infarction.

**TABLE:3  
THE RATIOS OF LIPIDS.**

Ratio	Ideal	High	V.High
Triglyceride/Hdl chol	2.0	4.0	6.0
T.Chol/Hdl chol	4.0	5.0	7.0
Ldl.Chol/Hdl.Chol	1.5	3.6	6.3

**It is observed that Statistically all the three(Triglyceride / Hdl.C, T.chol/Hdl.chol and Ldl chol / Hdl.Chol) ratios are found to be significant. But comparatively the Triglyceride/Hdl cholesterol ratio (5.6 ± 1.0) is close to 6.0 ( V.high ) as per the Table-3.**

**DISCUSSION:**

Cardiovascular disease (CVD) is a major cause of disability and premature death throughout the world. The underlying pathology is atherosclerosis, which develops over many years and is usually advanced by the time the symptoms occur, generally in middle age. Acute coronary events (heart attacks ) and cerebro vascular events (strokes) frequently occur suddenly, and are often fatal before medical care can be given. Risk factor modification can reduce clinical events and premature death in people with established cardiovascular disease as well as in those who are at high cardiovascular risk due to one or more risk factors. The treatment of dyslipidemia after myocardial infarction is an important task as far as post MI is considered. While starting the treatment to lower the lipids clinicians look at the LDL cholesterol values. As the LDL chol reported is a calculated, based on the T.chol, Hdl.chol, and Triglyceride which often may not be correct value.

So the LDL sub class small dense LDL chol is in the focus. The raised sdLDL chol is associated with 3-fold increase in the risk of myocardial infarction<sup>(15)</sup>

Many attempts have been made to improve its diagnosis. In our study the serum concentration of enzyme CPK MB was used as a biomarker which was the indicative of myocardial infarction. This is in accordance with earlier studies<sup>(16,17)</sup> In the present study there was a significant increase in Triglyceride and VLDL Cholesterol while the decrease is found in HDL Cholesterol in Myocardial infarction patients as compared to healthy controls. The role of low HDL.C in the CHD development has been widely accepted. The ratio of TG to HDL ratio has been proposed as an easily obtainable atherogenic marker<sup>(18)</sup> and showed a strongest association with extent of coronary disease<sup>(19)</sup> In a case control study, Gaziano reported that the ratio of TG to HDL-C strongly predicted risk of myocardial infarction, even stronger than Total C to HDL.C and LDL.C to HDL.C ratio <sup>(20)</sup> The Copenhagen male study showed Triglyceride on their own to be another strong risk factor but it found that stratifying triglyceride levels led to more accurate detection of increased risk of coronary disease<sup>(21)</sup> The relationship between TG to HDL C ratio and MI underlie the pathophysiologic mechanisms. The high plasma TG concentration and VLDL generate small dense LDL during lipid exchange and lipolysis<sup>(22)</sup> The ratio was found to be an independent determinant of arterial stiffness in adolescents and young adults, especially in obese youth<sup>(21)</sup> There are the methods for assessment of sdLDL particles such as gradient gel electrophoresis, density gradient ultracentrifugation and nuclear magnetic resonance. These methods can be expensive, time consuming and laborious and finds difficult to get adopted to use it routinely<sup>(23)</sup>

In our present study there is a significant increase in triglyceride and VLDL cholesterol while the decrease is found in HDL

cholesterol in myocardial infarcted patients as compared to healthy subjects. Thus, we found a significant association of lipid profiles with myocardial infarction. Our study shows that serum cholesterol level reveal no differences between persons with and without MI. The ratio of triglyceride to HDL.chol. has been proposed as an easily obtainable atherogenic marker and shown to be a strongest association with extent of coronary disease. Our study also indicate similar findings.(6) The assessment of small dense LDL particles by current methods are not easily adaptable in a routine clinical laboratory.Hence the estimation of lipid ratios will serve to assess the patients with MI to know the severity of the damage occurred.

## CONCLUSION:

These lipid ratios can give information about the risk factors and provide better information about metabolic and clinical interactions between lipids.(8) The study concludes the importance of assessing the lipid ratios even in normal subjects as it is one of the atherogenic factor for the development of MI and other coronary complications.

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