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Original Article

High Density Lipoprotein Cholesterol (HDL-C) Status in Patient's of Acute ST–Elevation Myocardial Infarction (STEMI)

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Abstract

Background : Decrease plasma High Density Lipoprotein Cholesterol (HDL-C) and increase triglyceride are major dyslipidemia in our country due to effects of carbohydrate rich diet. The relationship of low level of HDL –C in patient's of AMI and its extents of severity in coronary artery disease will be very important for future management as well as prevention of Coronary Artery Disease (CAD). **Objective :** The aim of this study is to assess the level of serum HDL-C in AMI patient and to assess whether low serum HDL-C level is an independent risk factor for acute ST elevation MI. **Methods :** It is a hospital based cross sectional observational study. 280 patients of acute STEMI who are admitted in coronary care unit selected for study. After estimation of serum lipid profile of these patients their serum level of HDL-C were used to detect the relationship between serum HDL-C and acute ST elevation MI. **Results :** In our study, among the case group (280 patiens) lipid profile estimation showed that about 64% patients of acute STEMI have low level of serum HDL-C. The other lipid fractions like triglyceride, low density lipoprotein cholesterol as well as total cholesterol were high in about 24%,39% & 44% but normal in 76%, 61% & 56% respectively. **Conclusion :** There is an independent inverse association of serum HDL-C in patients of acute STEMI and its an important indepedent risk factor.

Key words : HDL-C; STEMI; CAD.

INTRODUCTION

Coronary heart disease is the most common cardiovascular disease and the major cause of death in middle age and older people. Dyslipidemia is known as major cardiovascular risk factor and is responsible for most coronary artery disease. One of the major predisposing factors to atherosclerosis is an abnormal lipoprotein metabolism and it may be present in over 70% of patient with premature CAD[1]. High concentration of LDL cholesterol and low level of HDL cholesterol are able to promote atheroma formation and are recognized as particularly important risk factor for atherosclerosis and CAD[2].

About 40% of coronary heart disease patients do not have elevated levels of LDL-cholesterol and many of them have low levels of HDL cholesterol as their primary lipid abnormality. Overall, about 25% of patients with coronary heart disease have low level HDL cholesterol in the absence of elevated LDL-cholesterol[3].

About 58% of patients with myocardial infraction were found to have hyper cholesterolemia in contrast only with 10% among normal individual[4]. Incidence of IHD is increasing in developing countries including Bangladesh with the improvement of socioeconomic status, urbanization and changes of dietary habits and lifestyle[5].

Low HDL is present in 35% of men and 15% of women. In one study, low HDL occurred in approximately 63% of patients with CAD. Reducing cholesterol level in the healthy middle aged men without CHD reduce their risk in proportion to the reduction in LDL cholesterol and the increasing in HDL cholesterol as a result rates of myocardial infarction will be reduce significantly[6,7].

Transport of cholesterol from peripheral tissues to the liver, for subsequent catabolism and excretion is a function of plasma High Density Lipoprotein Cholesterol (HDL-C).Reduction of plasma HDL-C accelerates the development of atherosclerosis. Recent studies indicate that the antioxidants and anti-inflammatory properties of HDL-C also inhibits atherogenesis[8].

Low level of HDL-C made a three fold greater contribution to the presence of future Coronary Heart Disease (CHD) than other lipoprotein[9]. 2 to 3 percent decrease in CHD risk for each 1mg/dl increase in HDL-C level, after adjustment to control for other risk factor[10]. HDL-C inversely related to the risk of Myocardial Infarction might be explained by the potential major protective role of HDL–C in state of acute inflammation and its antithrombotic properties[11].

Severity of the CAD is inversely related with level of HDL- C in both man and women. It is estimated that for each 1mg/dl increase in HDL-C, risk for a CAD event is reduced by 2%in men and 3%in women[12].

This study was carried out to observe the status of serum HDL-C level in acute ST elevation MI and the impact of plasma low HDL – C on extend and severity of CAD in patients of AMI.

MATERIALS AND METHODS

The present study was a hospital based, prospective observational study. The study was conducted in the Department of Coronary Care Unit, Chittagong Medical College Hospital, Chittagong, between 1st November 2008 to 30th November 2009.

The study population consisted of diagnosed case of Acute MI admitted in the Department of Cardiology, Chittagong Medical College Hospital, Chittagong during study period were selected as cases by the process of purposive sampling.

RESULTS

Table 1 : Distribution of the study subjects by clinical diagnoses (n = 280).

Clinical Diagnosis	Frequency	Percentage (%)
AMI (Inferior)	101	36.1
AMI (Antero-septal)	55	19.6
AMI (Extensive Anterior)	54	19.3
AMI (Anterior)	52	18.6
AMI (Infero-lateral)	5	1.8
Others	13	4.7
Total	**280**	**100.0**

Table 1 shows that AMI (Inferior) was detected among maximum patients about 36%), while AMI (Antero-septal) was the second (About 20%). Among the study subjects significant numbevr of patient developed extensive anterior MI which was about 19.3% .

Table 2 : Distribution of the study subjects by biochemical levels (n = 280).

Biochemical Variables	Mean	± SD	Median	Range
Total Cholesterol (mg/dl)	195.50	42.73	192.00	115 – 330
Triglyceride (mg/dl)	165.22	103.22	140.00	60 – 743
LDL- Cholesterol (mg/dl)	122.71	38.03	120.00	51 – 248
HDL- Cholesterol (mg/dl)	39.59	8.68	38.00	22 – 65

Table 2 showed that the biochemical values among the study subject where mean total cholesterol was 195.5 ± 42.73 and the range was 115 to 330 mg/dl. The mean triglyceride level was 165.2 ± 103.2 ,where the highest value was 743 mg/dl .The mean HDL-C was 39.59 ± 8.68 mg/dl.

Table 3 : Distribution of the study subject by biochemical levels (n = 280).

Biochemical Levels		Frequency	Percentage (%)
Total Cholesterol Level	Normal	157	56.1
	Elevated (> 200 mg/dl)	123	43.9
Triglyceride Level	Normal	213	76.1
	Elevated (> 200 mg/dl)	67	23.9
LDL-C Level	Normal	172	61.4
	Elevated (> 130 mg/dl)	108	38.6
HDL-C Level	Normal	102	36.4
	Low (< 40 mg/dl)	178	63.6

Table 3 shows biochemical profile of the study population revealed that 44% subjects had total cholesterol >200 mg/dl , about 24% of subjects had higher TG level. The level of serum LDL-C which was elevated in 38.6% subjects .The most important parameter and centre of total study is serum HDL-C level which was low in 63.6% of subject. .

Table 4 : Distribution of biochemical variables by clinical diagnoses (n = 280).

Clinical Diagnosis	LDL-Cholesterol		HDL-Cholesterol	
	Normal	Elevated	Normal	Low
AMI (Inferior)	63 (62.4%)	38 (37.6%)	26 (25.7%)	75 (74.3%)
AMI (Antero-septal)	39 (70.9%)	16 (29.1%)	25 (45.5%)	30 (54.5%)
AMI (Extensive Anterior)	30 (55.6%)	24 (44.4%)	19 (35.2%)	35 (64.8%)
AMI (Anterior)	29 (55.8%)	23 (44.2%)	23 (44.2%)	29 (55.8%)
AMI (Infero-lateral)	05 (100.0%)	00 (0.0%)	02 (40.0%)	03 (60.0%)
AMI (Antero-inferior)	00 (0.0%)	04 (100.0%)	04 (100.0%)	00 (0.0%)
AMI (High Lateral)	03 (100.0%)	00 (0.0%)	00 (0.0%)	03 (100.0%)
AMI (Anterior with Posterior Extension)	03 (100.0%)	00 (0.0%)	03 (100.0%)	00 (0.0%)
AMI (Inferior with Posterior Extension)	00 (0.0%)	03 (100.0%)	00 (0.0%)	03 (100.0%)
	$\chi^2 = 21.669$. Highly significant	$p < 0.01$.	$\chi^2 = 23.999$. Highly significant	$p < 0.01$.

Table 4 shows the distribution of clinical diagnosis by biochemical levels. In inferior AMI patient 75% of subjects had low level of serum HDL-C and level of serum LDL-cholesterol was elevated which were 34.7% 37.6%.In other types of AMI serum HDL-C level were lowered and LDL-cholesterol was elevated.Chi square test were done to evaluated the association which was highly significant ($p<0.01$)

Table 5 : Distribution of HDL-C/LDL-C ratio by HDL-C and LDL-C levels (n = 280) with independent t- test significances.

HDL-C Level	Mean	± SD	Median	Range
Normal	0.42	0.15	0.40	0.17 – 0.83
Low	0.31	0.08	0.30	0.18 – 0.57

t = 7.380. df = 278. p = 0.000. Very highly significant. p < 0.001.

LDL-C Level	Mean	± SD	Median	Range
Normal	0.40	0.12	0.38	0.23 – 0.83
Elevated	0.26	0.06	0.24	0.17 – 0.45

t = 11.131. df = 278. p = 0.000. Very highly significant. p < 0.001.

Table 5 shows the evident that the ratio of HDL-C/LDL-C. When HDL-C level is normal the mean ratio is 0.42 ± 0.15 SD in comparison to low HDL-C where mean ratio 0.31± 0.08 SD. The t test of significance was done which is very highly significant $p<0.001$. On the contrary when LDL-C level is normal the mean ratio was 0.40 ± 0.12 SD in comparison to elevated LDL-C where mean ratio was 0.26± 0.06 SD. Here t test of significance was done which is very highly significant $p<0.001$.

DISCUSSION

Multivariate analysis shown that HDL-C was a strong and independent predictor of acute ST elevation of MI. Considering lipid profile, mean serum HDL-C level was 39.59 ±8.68 SD ($p<0.01$) and was statistically significant. Only 36.4% of subjects have had their normal level of serum HDL-C .63.6% patient had their serum HDL-C below 40 mg/dl .These data support that low serum HDL-C is an important and independent risk factor for acute ST elevation MI .Our observations were also similar with Gordon et al (1989) Rahman et al (2001) where they found STEMI was most common clinical diagnosis in low HDL-C patients[5]. Besides that serum HDL-C level were low 74.3% in inferior MI cases and also low in 64.8%, 60%, 55.8%, 54.5%, cases of extensive anterior ,inferolateral, anterior, anteroseptal MI respectively. Correlated with cases of similar clinical diagnosis having normal serum HDL-C, χ^2 test was done (χ^2=23.99, $p< 0.01$) which was highly significant. Similar result of serum HDL-C was found by Ballantyne et al (1999)[12].

CONCLUSION

We found that most of the patients with acute STEMI have low serum HDL-C. Most patients with acute STEMI do not have substantially elevated total or LDL-C. Instead, low serum HDL-C is frequently the predominant abnormality. It means there is an independent inverse association of serum HDL-C in patients of acute STEMI and it is an important independent risk factor. So, it should be controlled properly.

DISCLOSURE

All the authors declared no competing interests

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