SERUM APOLIPOPROTEINS IN THE PATIENTS OF MYOCARDIAL INFARCTION IN DIFFERENT AGE GROUPS

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ABSTRACT

The level of serum cholesterol (Ch), serum-high density lipoprotein cholesterol (HDLc), serum-low density lipoprotein cholesterol (LDLc), serum very low density lipoprotein cholesterol (VLDLc), Triglyceride (Tg), Apolipoprotein A-1, B and ratio of Apolipoprotein A1/B were observed in 151 survivors of myocardial infarction in different age groups. A significant increase was found in the level of triglyceride, LDLc, apolipoprotein-B and a significant decrease in apolipoprotein-A1 and the ratio of apolipoprotein A1/B. No significant alteration was found in serum cholesterol, HDLc except in the age group of 31-40 years and 41-50 years and VLDLc. Thus, serum Apo A-1 and Apo-B may be considerably better markers for coronary artery disease than traditional lipid parameters.

KEY WORDS : Coronary Artery Disease, Cholesterol, Apolipoprotein A-1, Apolipoprotein -B

INTRODUCTION

Myocardial Infarction is the leading cause of mortality and morbidity in industrialized countries of the world and now it is emerging as a prominent public health problem in developing countries with local differences in incidence severity and natural history. Myocardial Infarction is an important cause of disability and deaths in our country also (1 and 2). Mortality from this disease increases steeply with age and also causes many deaths in adults at the peak of their productive lives.

Apolipoprotein are the key lipoprotein components that serve both as enzymatic cofactors and as recognition elements that binds to specific receptors on the peripheral tissue including the vascular endothelial cells. Since evidences show, that serum apolipoprotein measurement can be useful indices for the risk of CAD (3 and 4). Therefore, present study was to assess the predictive power of apolipoprotein A-1 & B to discriminate between

patients of myocardial infarction and those without disease. The predictive ability was compared with that of traditional lipid measure to determine whether Apo A-1 and Apo -B provide any additional information to predict myocardial infarction.

MATERIALS AND METHODS

One fifty one patients of different age groups were included in this study. 15 patients were in the age group of 31-40 years, 30 patients in the 41-50 years of age group, 47 patients in 51-60 years, 37 patients in 61-70 years and 22 patients in 71 to above years of age group were included in this study, who had survived acute myocardial infarction, attending the Department of Medicine, L.L.R.M. Medical College Meerut.

After an overnight fasting, blood was collected from patients 3 weeks after the first episode of myocardial infarction. The blood was centrifuged at 2000 rpm and serum was used for analysis.

Serum Cholesterol (Ch) was estimated by the method of Zak et. al. (5) Triglyceride was estimated by the method of Fletchar (6). HDLc, LDLc and VLDLc were assayed according to the method of Burnstein

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et. al. (7). Apolipoprotein A-1 and B were measured by immunochemical assay (8). The data were analyzed using student 't' test.

RESULTS

In the present study the level of serum cholesterol was found to be increased in all the age groups of the patients of myocardial infarction. However this difference was not significant when compared with the respective control subjects. The level of serum HDLc was found to be decreased in all the age groups of the patients of myocardial infarction. However it was significant only in the age group of 31-40 years ($p<0.05$) and 41-50 years ($p<0.05$). Serum LDLc level was found to be significantly increased ($p<0.05$) in all the age groups of the patients of myocardial infarction. The level of serum VLDLc was somewhat higher in all the age groups of the patients of myocardial infarction although this difference was not statistically significant.

Serum triglyceride level was significant in the patients of myocardial infarction. It was highly significant ($p<0.001$) in the age group of 31-40 years, 41-50 years, 51-60 years whereas in the age group of 61-70 years and 71 to above years, it was slightly significant ($p<0.05$). The Level of serum apolipoprotein A-1 and Apo-B were found to be highly significant ($p<0.001$) in the patients of myocardial infarction. The level of serum apolipoprotein A-1 was decreased in the patients of myocardial infarction whereas the level of serum apolipoprotein B was significantly increased in the patients of myocardial infarction (Tables 1 and 2).

DISCUSSION

In the present study the level of serum cholesterol was insignificant in all the patients of myocardial infarction (Table 1). This is in accordance with the finding of Blackburn et.al. (9) which suggested that

Table 1. Level of lipoproteins and apolipoproteins in controls and patients of coronary artery disease

Age Group (In years)	Cholesterol mg/dl	HDLc mg/dl	LDLc mg/dl	VLDLc mg/dl	Tg mg/dl	ApoA-1 mg/dl	Apo-B mg/dl
STUDY GROUP							
31-40 n=15	189.7±31.1	45.9±13.9*	119.5±22.1*	31.1±10.7	160.4±26.3***	110.3±13.9***	135.9±18.2***
41-50 n=30	195.4±31.6	47.3±15.6*	122.9±26.6*	32.1±13.3	165.1±29.1***	113.1±15.8***	140.2±21.4***
51-60 n=47	202.4±32.5	44.9±13.6	127.2±24.6*	33.9±17.7	174.3±30.2***	107.9±18.6***	141.9±21.9***
61-70 n=37	200.1±31.5	48.1±14.7	124.9±25.4*	25.7±11.0	138.4±30.3*	106.7±19.5***	145.9±21.4***
71-Above n=22	206.8±31.4	50.4±13.9	129.5±25.4*	27.0±11.3	135.9±26.9*	100.2±17.7***	147.1±17.7***
CONTROL GROUP							
31-40 n=15	179.4±29.3	54.4±14.2	101.4±19.1	24.6±9.7	112.8±21.4	140.1±15.3	95.4±17.4
41-50 n=30	184.9±30.0	53.8±15.9	106.7±24.5	26.4±11.4	116.9±24.2	147.5±16.6	105.2±18.9
51-60 n=47	190.0±30.6	50.8±14.1	114.9±23.1	27.3±13.7	126.6±25.8	142.7±21.2	102.2±19.7
61-70 n=37	187.8±30.1	53.1±15.1	108.7±24.1	26.1±9.6	122.4±27.6	154.7±21.9	104.5±19.7
71-Above n=22	189.9±31.1	55.4±14.9	111.8±23.2	25.3±9.5	116.6±23.9	151.6±19.5	108.2±19.5

*** $P<0.001$, ** $P<0.01$, * $P<0.05$, n.No. of samples in each group, All values are expressed as Mean± S.D.

Table 2. Mean Ratio of lipoprotein and apolipoproteins in controls and patients of coronary artery disease

Age Group (In years)	TC/HDLc %	TC/LDLc %	TC/MLDLc %	LDLc/HDLc %	ApoA-1/Apo-B %
STUDY GROUP					
31-40 n=15	4.13±1.7	1.8±0.59	6.2±2.40	2.6±1.4	0.80±0.12***
41-50 n=30	4.13±2.6	1.7±0.57	6.1±2.46	2.6±1.8	0.80±0.13***
51-60 n=47	4.50±2.1	1.7±0.58	6.0±3.41	2.8±1.3	0.76±0.17***
61-70 n=37	4.16±1.7	1.7±0.61	7.8±2.62	2.6±1.2	0.73±0.15***
71-Above n=22	4.10±1.6	1.7±0.57	7.7±2.76	2.6±0.90	0.64±0.12***
CONTROL GROUP					
31-40 n=15	3.3±1.56	1.6±2.7	7.3±3.9	1.9±0.72	1.5±0.30
41-50 n=30	3.4±1.98	1.6±2.2	7.0±3.4	2.0±0.98	1.4±0.30
51-60 n=47	3.7±1.95	1.6±2.8	7.0±4.2	2.3±0.87	1.4±0.41
61-70 n=37	3.6±1.69	1.6±2.0	7.2±3.3	2.0±0.88	1.5±0.27
71-Above n=22	3.4±1.55	1.6±1.9	7.5±3.2	2.0±0.91	1.4±0.34

***P<0.001, **P<0.01, *P<0.05. n.No of samples in each group, All values are expressed as Mean±S.D.

more than three quarters of patients in whom CAD develops cannot be identified by their serum cholesterol concentration and that of those whose serum cholesterol exceeds 300 mg/dl only less than one tenth die prematurely due to CAD. Lamarche et.al. (10) reported that from clinical point of view independent variation of cholesterol may lead to misleading prediction of a low risk, as large proportions of CAD patients show a cluster of risk factors.

In the present study the level of serum HDLc was found to be decreased in all the age groups of the patients of myocardial infarction except in the age group of 31-40 years and 41-50 years (Table 1). These observations are in accordance with the findings of Maciejko. et. al.(11) who concluded that measurement of HDLc as sole indicator of CAD may give a misleading result, since the cholesterol composition of HDLc can vary in response to variety of physiologic and pathologic conditions.

Triglyceride level was better predictor of disease in middle aged patient patients as compared to patients of elder age group. On univariate analysis, the serum triglyceride levels were significantly different between patients with and without disease. However it was not found to be important predictive factor after multivariate analysis. Further, from a statistical point of view serum triglyceride level often is not a predictor of myocardial infarction in multivariate analysis because of large variation in triglyceride measurement.

In the present study the level of serum apolipoprotein A-1 and serum apolipoprotein B were found to be significant in the patients of myocardial infarction. The results of the present study confirm the finding of other workers (4,12 and 13) and our previous finding (14).

Kottke et .al. (13) suggested that since apolipoproteins level is not affected by age and lesions

in peripheral vessels, they have a consistent specialized value in the diagnosis of CAD. Srinivisan and Berenson (4) reported that as a screening test for detecting for increased LDL cholesterol, apo-B is superior to total cholesterol. Low values for apoA-1 concentration, the apoA-1 to apo B ratio and LDL cholesterol to apo-B are strongly related to parental incidence of myocardial infarction. No such relationship is seen with respect to lipoprotein cholesterol. Bahl et. al. (12) measured the apo A-1 and B in 201 Indian patients undergoing elective diagnostic coronary arteriography and found that overall apo B and triglyceride levels showed larger univariate difference between the normal group and the group with coronary artery disease and the variable with strongest predictive power for coronary artery disease was the ratio of apo A-1 to apo-B. Sharma et.al. (14) concluded that total cholesterol, triglycerides and HDL-cholesterol discriminated poorly between cases of myocardial infarction and controls and that the best combination of factors predicting myocardial infarction was apolipoprotein A-1 and apolipoprotein B.

The present study further suggests that

presumably apolipoprotein concentrations are more discriminating than lipids as they are able to reflect the genetic component of the risk as well, since their plasma concentration is to a certain extent genetically determined. Apolipoproteins and their ratio were highly significant in all the age groups of the patients of myocardial infarction and kept their discriminating power upto the oldest decade as compared to lipids and lipoproteins, which lost their discriminating power with advancing age.

The present study also indicated the superiority of apolipoproteins A-1 and B over HDLc and LDLc cholesterol in detecting the CAD. Furthermore, a linear discriminant analysis suggested that although HDLc and LDLc by themselves were a discriminator of CAD, they did not provide a substantial increase in discriminatory value over that provided by apolipoproteins A-1 and B. The present study further suggests that use of apolipoproteins A-1 and Apo-B in the prediction of myocardial infarction can be more useful than today's current laboratory assessment techniques i.e., total cholesterol, HDLc, LDLc, VLDLc and triglyceride.

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