ROLE OF LIPOPROTEINS IN MYOCARDIAL INFARCTION

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ABSTRACT... Coronary Heart Disease (CHD) is the foremost cause of death in women as well as in men, although the onset of the CHD is earlier on the average in men. Objective: The aim of this study was the evaluation of serum lipids and lipoproteins levels in male and female survivor of first attack of myocardial infarction of various age groups. Place and duration of study: cardiology ward at B.V.H. Bahawalpur 1989 to 1990. Materials and Methods: A total number of 128 patients of myocardial infarction (108 males, 20 females) were selected for study from those who were admitted in coronary care unit. Serum lipids, lipoproteins, relative body weight and blood pressure were assessed in 108 male and 20 female survivors of first attack of myocardial infarction of various age groups. Results: The majority of patients fall in middle aged category. The mean age and weights were almost similar for patient groups and controls. Generally, there was a significant rise in the mean values of blood pressure, serum cholesterol, triglyceride, VLDL and LDL. The patients of various age groups were also found to have significantly higher levels of VLDL-cholesterol, LDL cholesterol and significantly lower levels of HDL-cholesterol than those of control groups Conclusion: HDL-C can be inferred as a marker or predictor of risk of CHD in woman .It has an inverse association with the incidence of CHD in both men and women. It was also conclusion in patients with acute myocardial infarction age was a powerful independent predictor of in-hospital mortality and complications. Suggestion: It is suggested that work may be extended by the comparative study of Troponin with Myoglobin. Which may be used as marker for acute myocardial.

Keywords: Lipoproteins, Myocardial Infarction, Troponin, Myoglobin.

INTRODUCTION

Coronary heart disease (CHD) is the foremost cause of death in women as well as in men, although the onset of the CHD is earlier on the average in men1. Men and women appear to be equally susceptible to the effect of risk factors such as elevated B.P .increased plasma LDL-C and low levels of plasma HDL-C1 .A lot of difference has been noted in the of CHD between men and women of reproductive age2 .Acute coronary syndrome has evolved as a

useful operational term to refer to any constellation of clinical symptoms that are compatible with acute myocardial ischemia. It encompasses acute myocardial infarction (ST-segment elevation and depression, Q wave and non-Q wave) as well as unstable angina3 Myocardial infarction is a common and serious medical emergency. It was once regarded as a disease of sophisticated and modernized world mostly affecting people of advance age. During the last few years, there has been a tremendous increase in the incidence of myocardial infarction in our country and it is affecting more and more people at the prime of their life and working capacity. This shift of the epidemic of Ischemic Heart Disease (IDH) from developed countries to under-developed countries is alarming and needs a comprehensive long-term preventive and rehabilitative measures. During past few years, considerable efforts have been spent on the search for predictors of survival and the risk factors determining the occurrence of myocardial infarction. In countries like U.S.A the epidemic of IHD has been on decline since the mid I9604. This has been attributed to change in medical practice, surgical practice, in public health education by the government and in people life style. Similar trends have also been noted in other advanced countries[5].

It has been observed that major established risk factors for coronary heart disease (CHD) are age, sex, heredity hypercholesterolemia, hypertension, cigarette smoking, diabetes mellitus while less well established risk factors are obesity, hypertriglyceridemia, personality type and lake of physical activity. Branwood study has shown that hypercholesterolemia, predisposes to the CHD in men and has provided evidences of gradient of increasing risk from a low to high serum cholesterol levels in young men with I.H.D[6]. Raised serum triglycerideconcentration have also been connected with IHD[7]. No doubt these lipids are important clinically, are not present as such in the blood stream but are incorporated together with lipoproteins for their transport in human being from tissues to tissues. It is now recognized that lipid disorders are in fact related to abnormalities in the metabolism of lipoproteins. Low density and high density lipoproteins are the subject of increasing interest., Hypercholesterolemia commonly present in CHD is correlated with an increased LDL or LDL-cholesterol and decreased HDL-cholesterol concentration[8]. HDL is a good cholesterol[9]. and has an inverse relationship with CHD[9] .It has been suggested that transport of cholesterol from peripheral tissue to liver for subsequent catabolism and excretion ,is the function of plasma HDL-C.A reduction of HDL-C may impair the normal clearance of cholesterol from arterial wall and there by accelerate the development of atherosclerosis[10]. Various forms of tobacco use is seen in Pakistan (Subcontinent) such as rolled tobacco leaves (bidi), in Indian pipes (hookahs-hubble bubble), in cigarettes and as chewing tobacco (naswarr and paan)[11]. Active smoking kills a third often men aged 35 to 69 years of age[12].

A study by Shabita et al[13], had suggested a strong association between female hormones and serum lipids metabolism. Richteret al, had inferred from their study that between ages of 50-70 years mean total cholesterol level in women exceeds those of men[14] .The possible mechanism is that transport of cholesterol from peripheral tissues to the liver for subsequent catabolism and excretion is the function of plasma.

For every tOmg/dl change in HDL-C there is a corresponding 50%change in CHD risk[15]. Preliminary studies [16,17,18] of serum lipids including certain other factors in CHD have been carried out. Relatively little interest was given to serum lipoproteins profile in patients of CHD. The aim of this study was the evaluation of serum lipids and lipoproteins levels in male and female survivor of first attack of myocardial infarction of various age groups.

MATERIALS AND METHODS

A total number of 128 patients of myocardial infarction (108 males, 20 females) were selected for study from those who were admitted in coronary care unit. Diagnosis of the disease was made on the basis of following criteria: The typical history of constricting chest pain., elevation of serum enzymes SCOT ,LDH and CPK, ECG changes ie; S.T segment elevation followed by T wave and appearance of Q wave.

The male patients were divided in to three age groups;

Group   25-40 years
Group   41-61 years
Group   61-80 years

A control group of 80 men matched for the age, weight and socioeconomic status, was selected from the attendants of the patients. Control group was also divided into three similar age groups. There were only a few number of female patients under age of 40 years and above 60 years, hence they were excluded from calculations while the results of 20 female patients, falling in middle age group (40-60 years), were compared with 20 age matched normal women.

Blood pressure and weight were recorded. Blood samples were obtained from patients soon after or within first 48 hours of attack of myocardial infarction. Serum was separated and analyzed for total cholesterol by modified Lieberman Burchord reaction19, triglycerides by the method of Giegel et al20, HDL cholesterol by Lopes-Virella technique LDL-cholesterol by Burstein and Smaille's method[21], VLDL-cholesterol by Wilson's formula[22]. Total LDL and VLDL by BLF "Eiken" kit method. Statistical significance of the results was assessed by student's t test.

RESULTS

Table-l shows the age distribution, mean age and percentage of male cases of myocardial infarction and respectively control groups. It is apparent from the table that the mean age was similar statistically for the patient groups and controls and majority of patients fell in the middle age (41-60 years).

Table-l. Age distribution, mean age and percentage of male patients and controls						
Age groups (years)	Mean age		No of patients		No of patients	
	Patients	Controls	Patients	%age	Controls	%age
25-40	32	34	23	21.3	15	18.8
41-60	53	52	60	55.6	45	56.2
61-80	69	71	25	23,1	20	25
Overall	52	54	108	100	80	100

Table-ll shows the difference in mean values for weight between the groups of male patients and the controls, were also found to be identical but the rise in blood
pressure values, both systolic and diastolic was almost significant.

Table-ll. Values (mean+SD) of weight and blood pressure in male patients and controls						
Age groups (years)	Weight (Kg)		Blood pressure systolic		(mm Hg) Diastolic	
	Patients	Control	Patients	Control	Patients	Control
25-40	68±5.8	66±5.6	135±5.6	122±12.3	79±9.4	78±8.2
41-60	74±5.5	70±5.4	144±16.3	148±15.0	84±10.3	69±7.8
61-80	67±5.2	67±5.7	148±14.7	142±13.6	80±9.6	72±8.1
Overall	72±5.5	69±5.2	149±16.8	142±14.1	82±9.9	66±8.0
Level of significance P*< 0.05, P**< 0.02 and P***< 0.01						

Table-Ill indicates the appropriates lipid and lipoprotein levels (mean S.D) in male patients and normal controls. Significantly increased values of serum total cholesterol,
total LDL, total VLDL and triglycerides were observed in groups of myocardial infarction cases as compared to those of control subjects.

Table-Ill. Serum lipids and lipoproteins in male patients and control group. Value are in mg% mean ± S.D								
Age group	Total cholesterol		Total LDL		Total VLDL		Triglycerides	
	Cases	Control	Cases	Control	Cases	Control	Cases	Control
25-40	251 ±47.5***	174+38.8	398±55.2*	355±42.4	176+21.1**	100±15.6	135±32.7***	95±23.1
41-60	268+54.4**	202±36.8	446±83.5***	361±65.7	188±22.2**	147±16.9	155±35.9**	112±26.5
61-80	235±43.4**	170±31.9	415±38.4*	390±36.2	212±25.3**	128±14.8***	115±23.4	70±16.8
Total	257±50.42***	189±36.0	429±69.4***	367154.1	192+20.7***	133±16.1	142±32*	98+23.4
Level of significance * P< 0,05, **P<0.02, ***P< 0.01								

Table-IV: shows Cholesterol components of lipoprotein in male patients and their control groups. It has been found that the cases of myocardial infarction have significantly
higher levels of VLDL-Cholesterol, LDL-Cholesterol and significantly lower levels of HDL- Cholesterol than the control subjects.

Table-IV. Cholesterol and component of lipoproteins in male patients and controls. Value are in mg% mean ± S.D						
Age group	VLDL Cases	Cholesterol Control	LDL Cases	Cholesterol Control	Hdl Cases	Cholesterol Control
25-41	27±55***	19±3.4	218±41.5***	125+25.9	58+8.5*	62+8.2
41-60	31±5.9***	22±3.7	251±57.8***	138±29.8	48±9.6***	69±8.5
61-80	23+4.1**	14±2.5	196±38.6**	125±22.8	59±7.3*	59±7.6
Total	28±5.4***	20±3.4	231 ±49.9**	132+27.1	50±8.8***	64+8.4
Level of significance * P<0. 05, **P<0. 02, ***<0. 01.						

Table-V shows the general characteristics and serum lipids fractions in female patients and control group. There was not significant difference for mean age between the two groups. Increased values of weight, systolic blood pressure and serum LDL female cases were also almost comparable statistically (P<. 1 ,>0.05) to the control group. However, diastolic blood pressure, serum cholesterol, triglycerides, VLDL, VLDL-cholesterol and LDL cholesterol was significantly higher whereas HDL-Cholesterol in female cases was found to be significantly lower than in control group (Table V).

their first attack of myocardial infarction, shows that the age distribution is similar to most of the other reported series where the majority of patients fall in the middle aged group.[22-23]:

Some studies have shown a clear association between excessive body weights and an increased incidence of ischemic heart disease but several others have not confirmed this.[6,25,26] The rise in weights remained nonsignificant in male and female patients as compared to theircontrol groups. Hiqh blood pressure3s were observed in patients in myocardial infarction with support the previous results.[27,28].

Table-V. General parameters including number, age weight, blood pressure and serum lipids and lipoproteins in females patients and control group.				
Parameters	Cases	Control	Level of Significance	
Number (n)	20	20	-	-
Age (year)	59	60	-	N.S.
Weight (KG)	65±7.2	63+7.0	P>.05	N.S.
BP Systolic	135±14.7	124+13.5	P>.05	N.S.
Diastolic	78±8.6	70+6.4	P<,05	S.
Cholesterol (mg%)	225±38.2	188+32.6	P<.05	S.

Triglycerides (mg%)	127±40.3	90+22.6	P<.02	S.
VLDL (mg%)	110±12.7	86+9.2	P<01	N.S.
LDL (mg%)	340+60+5	296+53.3	P>.05	S.
VLDL Cholesterol (mg%)	25+5.2	18+3.2	P<.02	S.
LDL Cholesterol (mg%)	150+23.4	108+17.3	P<.01	S.
HDL Cholesterol (mg%)	55+6.8	64+9.4	P<05	S.
N. S- Not Significant: S. Significant Note: Age range in both groups was 40-60 years.				

Hypercholesterolemia is a common finding in our groups of male patients which confirm the studies uniformly done in the past that raised serum cholesterol is one of the major risk factor associate with CHD[29,7,21]. Some workers showed that increased serum triglycerides levels have negligible connection with the incidence of CHD[22] while others found a significant correlation between elevated concentrations of triglycerides and the risk of C.H.D[721]. Most of the cholesterol in blood exists as a component of LDL and in fasting state triglycerides exists predominantly as a component of VLDL. Lipids and lipoprotein studies in the past have generally emphasized the positive relationship of total cholesterol, LDL, VLDL and triglycerides to the risk CHD[721'39]. The higher the concentration of any one of these blood lipids the greater is the risk of disease. On the other hand, HDL which approximately carries about 20% of total blood cholesterol appeared to have inverse relation to the risk of CHD[8]; the lower their concentration the greater is the risk of disease. Miller and Miller reviewed epidemiological facts and proposed that HDL serves a carrier function and clearing cholesterol from the peripheral tissues[31].

Recent studies have confirmed that the low levels of HDL is an independent risk factor for CHD and more important is the inverse HDL-CHD relationship which persists strongly after adjustment for the major CHD risk factors. In this study in both males and females, the levels of HDL-Cholesterol were found to be risk indicator and there was an inverse correlation between total cholesterol and HDL-Cholesterol; Total cholesterol is increased with decreasing HDL-Cholesterol suggests that the reduction in serum HDL may impair the normal clearance of cholesterol from arterial wall and thereby accelerate the development of CHD. Food and Drug Agency (PDA) approved the Albumin Cobalt-binding (ACB) test from ischemia technologies (Arvada, Colo) an ischemia assay that measures Ischemia-Modified Albumin (IMA) in the blood. (For optimal usefulness the cardiac marker should be present in a high concentration in the myocardium and absent from non-myocardial tissue. It should be rapidly released into the blood after myocardial injury with a direct proportional relationship between the extent of myocardial injury and the measured level of the marker. The marker should persist in blood for a sufficient length of time to provide a convenient diagnostic time window with an easy, inexpensive, and rapid assay technique. Such an ideal cardiac marker has not yet been discovered. The currently available cardiac biochemical markers include CK-MB, Myoglobin and the cardiac specific troponins. The earliest marker of myocardial necrosis, myoglobin is a sensitive test but lacks cardiac specificity[32].

CONCLUSION

Indicates that there is a highly significant correlation of increased total cholesterol and decreased HDL-cholesterol concentrations to the risk of CHD, independent of each other and their inverse relationship carries the highest risk for the disease. HDL-C can be inferred as a better marker or predictor of risk of CHD both in male and female subjects. It is suggested that work may be extended by the comparative study of Troponin with Myoglobin which may be used as marker for acute myocardial infarction.

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