Lipid Profiles in Atherosclerosis

Dr. Deepti Agnihotri[1], Dr. Shreya Nigoskar[2*], Dr. Kapil Shrivastava[3]
[1]Owner of Agnihotris Path Lab, Indore, India
[2]Assoc. Prof Dept. of Biochemistry, Index Medical College Hospital & Research Centre, Indore, India
[3]Senior Resident Gajara Raja Medical College, Gwalior, India

Abstract: A study on lipoprotein oxidation and its significance for atherosclerosis: a mathematical approach. Atherosclerosis is a chronic disease which involves the buildup of cholesterol and fatty deposits within the arterial wall. This results in the narrowing of the vessel lumen, which eventually restricts blood flow to vital organs such as the heart and lungs. These events may culminate in a heart attack or stroke, the commonest causes of atherosclerosis which include the buildup of cholesterol within sub endothelial cells to form what is known as a fatty streak, the earliest identifiable evidence of atherosclerosis. Study on lipid profile levels on the second day of acute myocardial infarction; is it the right time for estimation? The main objective of this study is to note the changes that occur in the lipid profile levels following an acute myocardial ischemic attack. The lipid parameters like High density lipoprotein (HDL) had shown significant decrease and the Very low density lipoprotein (VLDL) and triglycerides (TG) had shown significant increases in cases compared to normal healthy individuals. Total cholesterol (TC) and low density lipoprotein (LDL) in cases had shown decreases compare to controls but not significant statistically. The cTnI showed a significant negative correlation with decreases in the TC and HDL and LDL. The AST showed significant negative correlation with TC and LDL only. So routine diagnosis of lipid parameter for assessing the clinical risk should be reliably assessed within 24 hours and the lipid parameters assessed after 24 hours are invalid for risk assessment for patients with AMI. Study on Atherosclerosis –an inflammatory disease. They said that atherosclerosis is an inflammatory disease. Because high plasma concentration of cholesterol, in particular those of low-density lipoprotein (LDL) cholesterol, are one of the principal those risk factors for atherosclerosis, the process of thermogenesis has been considered by many to consist largely of the accumulation of lipid within the artery wall, Study on plasma lipoproteins, lipid transport, and atherosclerosis. They said that subjects of normal and disordered lipid metabolism were reviewed comprehensively in a multiauthor supplement to this journal in 1973 (McGowan and Walters, eds). Since that time considerable progress has been made in our understanding of the pathophysiology of plasma lipoproteins and their relationship to atherosclerosis. Two particularly notable developments have been the identification and characterization of a receptor-mediated mechanism, present in all peripheral tissues so far examined, for the uptake and catabolism of low density lipoprotein (LDL), and the recognition of the predictive power of the plasma high density lipoprotein (HDL) cholesterol concentration in relation to coronary heart disease (CHD).
Keywords: Atherosclerosis, Triglycerides, HDL, LDL, VLDC, Cholesterol

INTRODUCTION

Atherosclerosis, also called hardening or blockage of the arteries, is a very common condition affection the arteries, the thick-walled, high-pressure blood vessels that carry fresh oxygen-rich blood from the heart to the rest of the body. In atherosclerosis, a fatty substance called plaque builds up in the walls of arteries, causing thickening and loss of elasticity [1-4].

Atherosclerosis is emerging as an important complication of coronary artery disease (CAD) being the major cause of mortality in these patients [5].

In India, the burden of chronic non-communicable like atherosclerosis is on the rise, and increasingly efforts need to be focused on their early detection and treatment. Asian Indians are an ethnically vulnerable race for developing metabolic syndrome and

diabetes, both of which are well-known contributors to the pathogenesis of atherosclerotic vascular disease [6]. Sub-clinical diabetes is an important vascular risk for Asian Indians [7].

Atherosclerosis begins early in life and is the major underlying cause of cardiovascular morbidity and death. Yet, population-based information on age and sex differences in the extent and morphology of atherosclerosis throughout life is scarce. In ours study, we monitoring lipid profile with better management may delay atherosclerosis.

Atherosclerosis occurs more frequently in men than in women. The present study shows, however, that the sex gap in plaque prevalence is strongly influenced by age.

MATERIALS AND METHODS
Study design
Prospective consecutive study of atherosclerosis patients are attended in outpatient department or admitted in the department of medicine ward of Index Medical College Hospital, Indore from date of the Dean permission.

Inclusion criteria
Atherosclerosis patients are including in study criteria.
Exclusion criteria

There are not includes disease such as diabetes, heart attack, strokes etc.

MATERIALS AND METHODS
The clinical materials for present study entitled "Analysis of lipid profiles in atherosclerosis" comprised 53 patients are attended in outpatient department and admitted in the department of medicine ward of Index Medical College Hospital, Indore (M.P.) and 50 ages matched male female healthy individual control groups.

Blood sample collecting
Blood sample were collected from the patients and male and female healthy individual controls under all aseptic condition. 3ml of venous fasting blood samples were collected from each subject by using disposable syringe. This blood used for separation of serum used for estimation of lipid profile.

Separation of serum
Blood samples taken in plain vial were incubated at 37^0C for 45 minutes in winter or 20 minutes in hot climate (From Feb 2012 – May, 2013). After incubation, sample was taken in centrifuge test tube. This sample centrifuged at 3000 rpm for 10 to 20 minutes. Supernatant collected in clean and dry serum test tube for analysis of lipid profile.

Clinical investigation performed for various parameters by using their ideal methodology.

Table-1: Preservation of sample for analysis of lipid profile

S. No.	Parameters	Sample Storage At ^{0}C	Analysis duration (Time/Days)
1	Cholesterol	2-8	7 days
2	HDL-Cholesterol	2-8	7 days
3	LDL-Cholesterol	By Friedewald eqation	
4	Triglyceride	2-8	7 days

OBSERVATIONS AND RESULTS

Table-1: Population percentage of normal healthy controls And Atherosclerosis patients

S.No.	Age Range	Normal healthy control groups					Atherosclerosis patients				
		Total N.C.	Male	%	Female	%	Total N.C.	Male	%	Female	%
1	30-50	26	14	53.85	12	46.15	24	13	54.16	11	45.83
2	51-70	24	13	54.16	11	45.83	29	17	58.62	12	43.39
Total		50	27	54.00	23	46.00	53	30	56..60	23	43.39

Note: NC: Number of cases.

From the above table, it can be clearly seen that while in normal healthy controls 54% control are males and 46% controls are females.

On the other hand, in atherosclerotic patients group 56.6% are males and 43.39% are females. In

atherosclerotic groups of 30-50 years 54.16% are males and 45.83% are females. The other atherosclerotic group of 51-70 years 58.62% are males and 41.39% are females.

Table-2: Biochemical parameters range values for normal healthy controls and Atherosclerosis patients (age: 30-50 year)

S.No.	Biochemical parameter (In serum/Plasma)	Normal healthy controls		Atherosclerosis patients	
		Biochemical rang		Biochemical rang	
		Male	Female	Male	Female
1	Cholesterol (mg/dl)	155-210	148-190	275-330	276-331
2	HDL-Cholesterol (mg/dl)	38-56	35-52	22-26	23-27
3	LDL-Cholesterol (mg/dl)	72-134	78-133	156-172	157-174
4	Triglyceride (mg/dl)	60-114	65-138	160-175	164-177
5	Body Mass Index (kg/m^2)	19-33	20-35	36-41	37-42

From the above table, it can be clearly seen that in age group of 30-50 years.

Range of total cholesterol level in NHC groups is within normal limits for males 155-210 and for females 148-190 mg/dl. Range of this in atherosclerotic group is tremendously high, 275-330 in males and 276-331 in females.

HDL cholesterol range is normal in NHC group 938-56 in males and 35-52 in females), while it is low in atherosclerotic group 922-26 in males and 23-27 in females).

LDL cholesterol range is normal in NHC group (72-134 in males and 78-138 in females), while it is high in atherosclerotic group (156-172 in males and 157-174 in females).

Same as other, TG range also normal in NHC group (60-114 in males and 65-138 in females), while in atherosclerotic group, it is high (160-175 in males and 164-177 in females).

Atherosclerotic patients show high BMI (>36) than NHC (>35).

Table 3: Biochemical parameters values for normal healthy control and Atherosclerosis patients (age: 51-70 year)

S.No.	Biochemical parameter (In serum/Plasma)	Normal healthy controls		Atherosclerosis patients	
		Biochemical range		Biochemical range	
		Male	Female	Male	Female
1	Cholesterol (mg/dl)	157-215	155-210	280-332	279-333
2	HDL-Cholesterol (mg/dl)	48-58	38-56	24-28	23-28
3	LDL-Cholesterol (mg/dl)	76-144	72-34	158-175	157-174
4	Triglyceride (mg/dl)	65-118	60-114	165-178	166-179
5	Body Mass Index (kg/M^2)	18-32	21-34	38-43	37-42

From the above table, it can be clearly seen that in range group of 51-70 years;

Range of total cholesterol level in NHC group is with in normal limits –for males 157-215 and for females 155-210 mg/dl. Range of this in atherosclerotic group is tremendously high 280-332 in males and 279-333 in females.

HDL cholesterol range is normal in NHC group (48-58 in males and 38-56 in females), while it is low in atherosclerotic group (24-28 in males and 23-28 in females).

LDL cholesterol range is normal in NHC group (76-144 in males and 72-134 in females), while is high in atherosclerotic group (158-175 in males and 157-174 in females).

Same as other, TG range also normal in NHC group (65-118 in males and 60-114 in females), while in atherosclerotic group, it is high (165-178 in males and 166-179 in females).

Atherosclerotic patients show high BMI (>37) that (<34) groups.

CONCLUSION

Though the incidence of atherosclerosis is more in males as compare to females, but in both sexes it is alarming.

This study highlights the importance of atherosclerosis risk factor lipoproteins profiles screening from early ages of fourth to fifth decades.

In this study, we conclude that:
- In compare to normal healthy controls, atherosclerotic patients have higher serum values of TC, LDL, and TG.
- In compare to normal healthy control atherosclerotic patients have lower serum values of HDL cholesterol.
- So decrease level of good cholesterol like HDL is a one of the feature of development of atherosclerosis.
- Lipid profile parameters (TC, HDL, LDL, and TG) all show extremely significant variation in both

males and females B/W atherosclerotic patients and normal healthy controls.

- In both males and females, all lipid parameters (TC, HDL, LDL, and TG) also shows extremely significant variation in both age groups (30-50 years and 51-70 years) between atherosclerotic patients and normal healthy controls.

REFERENCES

1. Cobbold CA, Sherratt JA, Maxwell SRJ. Lipoprotein Oxidation and its Significance for Atherosclerosis: a Mathematical Approach Bulletin of Mathematical Biology 2002,64:65-95.
2. Reddy RK, Reddy S, Kumar AM. Lipid Profile levels on the second day of Acute Myocardial Infarction, is it the right time for estimation? Internet Journal of Medical Update 2012Jan, 7 (1) :52-5
3. Ross R. Atherosclerosis-an inflammatory disease. NEJM 2005 Sep 21.
4. Miller NE. Plasma Lipoprotein, lipid transport, and atherosclerosis: Recent developments. J Clin Pathol 1979,32:639-650.
5. Mahajan V, Handa R, Kumar U, Sharma S, Gulati G. Assessment of atherosclerosis by Carotid Intimomedial Thickness in Patients with Rheumatoid Arthritis, JAPI 2008 956).
6. Joshi SR. Indian diabetes risk score. J Assoc Physicians Indian 2005, 53:755-57.
7. Joshi SR. Sub clinical diabetes-vascular threat to Asian Indians. J Assoc Physicians India 2003:756-757.