

# A STUDY OF BODY MASS INDEX, LIPID PROFILE, AND FREE RADICAL STATUS IN CORONARY ARTERY DISEASE

DR.VEMULA BHANU PRAKASH, DR.S.VENKATA RAO

s\_vrao11@yahoo.co.in

**Abstract**— Coronary artery disease(CAD) possess a number of risk factors,hypercholesterolemia and obesity are the main ones. The basic pathology of CAD is the deposition of altered lipid on endothelium. Low density lipoproteins (LDL) are one such altered lipid which is oxidatively modified. Lipid peroxidation has been estimated by several methods. Malondialdehyde (MDA) is estimated by thiobarbituric acid (TBA) method clinically. In this study of 80 cases of CAD were selected for evaluation. The body mass index (BMI), lipid profile and level of free radicals (MDA) were measured .Thirty four cases (42.5%) were with normal BMI(20-25),40 case (50%) were in the overweight range of BMI (26-30), and only 6 cases(7.5%) were in the obesity group with BMI more than 30. BMI correlated well with the level of total cholesterol(Tc),low density lipoprotein cholesterol (LDL-c) and MDA.BMI did not show any correlation with triglyceride (Tg) or high density lipoprotein cholesterol (HDL-c). MDA level correlated well with Tc,Tg levels and BMI,poorly with LDL-c and inversely with HDL-c.

**Keywords**- Obesity,Lipid peroxidation,Free radicals,Altered lipid.

## I. INTRODUCTION

Coronary artery disease is a raising problem in India and other developing countries. It is the leading cause of death in worldwide (1). It is the most common cause of sudden death (2). The incidence is more in urban than in the rural population. Obesity is the main risk factor of CAD. It is measured by body mass index (BMI).BMI more than 28 in female and 30 or more in males indicates obesity. Though very low density lipoprotein (VLDL), HDL, and LDL are all vehicles for peroxidation, LDL gets the maximum load.The free radical reactions may have a primary role in the patho-mechanism of atherogenesis.[3].Oxidatively modified LDL (OxLDL) are taken up by monocytes and macrophages at a faster rate than the native LDL leading to generation of foam cells, the initiator of atherosclerosis. The assessment of Ox-LDL gives the better idea about the atherogenic potential of an individual. Several methods are there to estimate Ox-LDL; quantitation of MDA by thiobarbituric acid (TBA) method is the commonly used method to estimate indices of lipid peroxidation.

## II. MATERIALS AND METHODS

Cases of acute Myocardial infarction(MI) diagnosed by ECG or enzymatically were taken up for the study.Diabetes and renal impairment cases were excluded from the study of different age groups and of both sexes.BMI was calculated by weight in Kilograms to height in centimetres squared. Thiobarbituric acid reactive substances was estimated in plasma, described by K. Satoh [4] using MDA as reference standard, expressed as n mol/ml of plasma. Total cholesterol (CHOD-PAP-Method),[5-8] -HDL (HDL Precipitating method),[5-8] LDL (Friedwald formula), and triacylglycerol (TAG) (GPO-PAP Method)[5-8] were measured on Merck MicroLab 200 semi auto analyzer in all the subjects.Eighty age and sex matched controls were tested in fasting state for comparison.Their lipid profile, BMI, and MDA status were assessed by as for the test cases. Statistical significance was calculated.

## III. OBSERVATION

There were 80 cases, 72 male and 8 females. Age is between 45-70 years. The mean SD for Tc, Tg, LDL-c, HDL-c, MDA in the control group were 180.2±12.7mg/dl,130.1±20.5mg/dl, 102.2±14.2mg/dl,47.2±5.1mg/dl, 2.8±0.9n mol/ml are respectively. These values in patients were 249.2±22.13mg/dl,207.1±38.2mg/dl,161.2±24.1mg/dl, 35.2±7.8mg/dl,5.82±1.2nmol/ml respectively. The BMI in the control group was 22.5±1.4 and while that of in the patient group was 24.6±1.82.(Table-2).The lipid fractions and MDA levels for male and female patients as against controls were shown in Table-3.Statistical analysis indicated the mean±SD values of the lipid fraction and MDA between the patients and controls to be significantly different. According to BMI, cases were differentiated into three groups, i.e., BMI between 20-25(normal), between 26-30(overweight), and more than 30 (obese).Tc, Tg,HDL-c, MDA were 240.2±10.4mg/dl, 186.4±25.1 mg/dl,38.4±4.4 mg/dland 6.12±0.28 nmol/ml respectively. These respective values in the overweight category were 252.2±20mg/dl, 215.5±24.2 mg/dl, 36.9±4.3 mg/dl and 6.82±0.6 nmol/ml. In obese group 302.1±2.2mg/dl, 324.2±8.2mg/dl, 27.1±2.3mg/dl and 8.1±0.5 nmol/ml respectively(Table-4).

Table-1: Age and Sex Distribution of Cases of Controls

Age in year	Controls	Total	cases	Total
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	Male	Female		Male	Female	
41-50	24	6	30	6	-	6
51-60	16	8	24	24	2	26
61-70	10	6	16	34	6	40
>70	10	-	10	8	-	8
Total	60	20	80	72	8	80

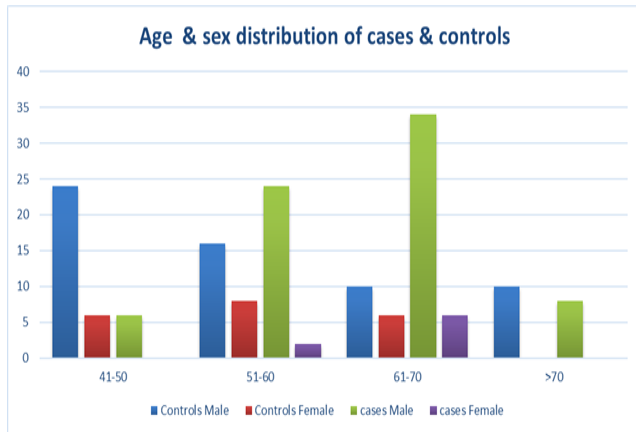
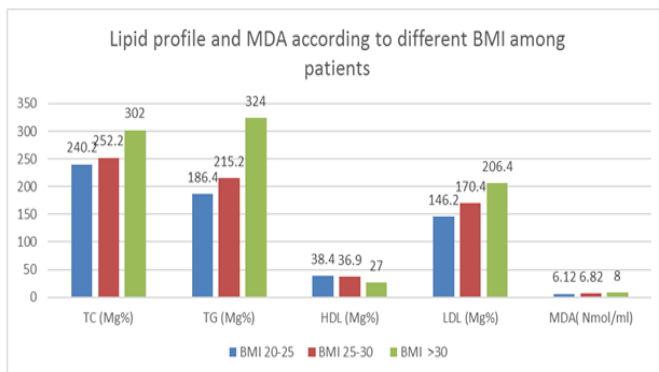


Table-2: BMI, Lipid Profile and MDA Among Patients and Controls

Group	Male		Female	
	Case n=72	Control n=60	Case n=8	Control n=20
BMI	24.2 ±1.92	21.5 ±1.8	25.6 ±0.7	23.2 ±1.2
TC (Mg%)	249 ± 24.2	180.2 ±16.4	241.5 ±5.12	165.6 ±16.4
TG (Mg%)	197 ±38.1	132.6 ±19.4	246.8 ±18.2	122.3 ±12.4
HDL (Mg%)	34.2 ±7.4	46.2 ±5.4	40.2 ±3.4	50.4 ±4.4
LDL (Mg%)	168.2 ±20.4	104.2 ±16.6	156.4 ±16.5	102.3 ±11.6
MDA (Nmol/ml)	6.88	3.2 ±0.43	5.67 ±0.23	2.78 ±0.34

Table-4: Lipid Profile and MDA According to Different BMI Among Patients

Lipid Profile	BMI 20-25 (n=34)	BMI 25-30 (n=40)	BMI >30 (n=6)
TC (Mg%)	240.2 ±10.4	252.2 ±20	302 ±2
TG (Mg%)	186.4 ±25.1	215.2 ±24.2	324 ±8.2
HDL (Mg%)	38.4 ±4.4	36.9 ±4.3	27 ±2.3
LDL (Mg%)	146.2 ±9.6	170.4 ±23.1	206.4 ±6.4
MDA (Nmol/ml)	6.12 ±0.28	6.82 ±0.6	8 ±0.5



#### IV. DISCUSSION

In this study we have observed a positive correlation between the Tc and lipid peroxidation status as assessed from MDA level. Hypertriglyceridemia is also a risk factor of atherogenesis. Positive correlation between MDA and Tg and poor correlation between LDL-c and MDA. Between HDL and MDA a negative correlation was observed. Tc, Tg and LDL-c correlated well with BMI. MDA correlated well with BMI. Atherogenic potential as assessed by measurement of MDA increases with increase in BMI.

#### V. CONCLUSION

Body habitus is not an independent risk factor. Increased levels of MDA, total cholesterol will certainly lead to atherogenic changes and cardiovascular risks, though BMI is normal.

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