Gender Difference of Lipid Profile in a South Indian Population with Acute Coronary Syndrome - A Cross Sectional Study

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Abstract
Background: *Dyslipidemia is one of the most important modifiable and treatable risk factor for coronary heart disease (CHD). Gender difference in lipid profile of patient with acute coronary syndrome (ACS) is not studied before in south Indian population.*
Objective: *To evaluate co-gender variation of lipid profile in patients with ACS and to find out its association with other risk factors of ACS.*
Methods*: A cross sectional study conducted among 100 male and 100 female patients above the age 18 years and alive after 48 hrs admission, admitted with signs and symptoms of unstable angina (UA), non ST evaluation myocardial Infarction (NSTEMI) and ST Elevation Myocardial Infarction (STEMI) are selected. Results: - incidence of Diabetes Mellitus (DM) in study was 31%. Diabetic patients had higher mean total cholesterol, higher mean LDL Cholesterol (LDL-C), lower mean HDL- Cholesterol (HDL-C) than patients without diabetes. Males had higher T-C while females had higher HDL-C and higher TG. Over weight and obese patients had higher TC, higher mean LDL-C and TG and lower mean HDL.*
Conclusions
1) Elevated TC, LDL-C and TG and a lower HDL-C is observed in the study group.
2) Females had higher HDL-C and TG while males had Higher TC and LDL-C.
3) Physical inactivity positive family history of ACS DM, HTN, Smoking and high BMI had a strong correlation with FLP.
Keywords: *Coronary Heart Disease, Acute Coronary Syndrome, Myocardial Infarction, Cardiovascular Disease.*

Introduction

The prevalence of Coronary Artery Disease (CAD), the commonest and most lethal cardio vascular disease, has increased 4 fold in India during last 40 years[1], while its incidence has doubled in the past 25 years. The highest

incidence of CAD in India was recorded in South India, due to an underlying generate susceptibility [2]. Hypercholesterolemia remains one of the major modifiable risk factor of CAD even in those over 65 years old [3].

Heart disease is the most important cause of death in women and men. There is a gender difference in lipid profile observed in studies. Endogenous estrogen reduces the risk of heart disease in women. The indene of CAD is lower in females ≤ 65 years, where as after 65 years, it is equal in both males and females. Risk factors like Diabetes Mellitus (DM), Low HDL-C, high TG and smoking are more harmful to females than to males. DM increases the risk of CAD to a greater extends. The stronger effects of DM on the risk of CAD in women compared with men is explained by atherogenic dyslipidemia in diabetic women.

Gender associated difference in lipid profile may be of potential relevance for diagnosis, therapy and prevention of atherosclerosis[5].

Materials & Methods

Study setting: This was a 6 month single centre cross sectional study of 100 male and 100 female patients admitted with symptoms and signs of ACS in a tertiary care centre in the state of Kerala, India.

Patients admitted with signs and symptoms of unstable Angina (UA), Non ST Elevation myocardial Infarction (NSTEMI) and ST elevation myocardial Infarction (STEMI), which were above the age of 18 and alive after 48 hours of admission are included in the study.

Angina Pectoris is defined as chest pain or arm discomfort that may or may not be described as pain, but its reproducibility associated with physical exertion or stress and is relived within 5-10 minutes of rest or sublingual nitroglycerine.

Unstable angina (UA) is defend as angina pectoris with at least one of the following feature

1) Occurring at rest or with minimal exertion and lasting more than 10 minutes.
2) More severe, newer onset
3) Occurring with a crescendo pattern

Non ST Elevation Myocardial Infarction (NSTEMI)

Patients with clinical features of U.A and elevated cardiac biomarker (CK- MB, Troponin T & Troponin I)

ST Elevation Myocardial Infarction (STEMI)

Defined with ECG criteria; ST elevation of 0.1mVolt in at least 2 contiguous leads or new onset left Bundle Branch Block.

Hypertension- is diagnosed to be present if patient was on anti hypertensive medication or B.P during hospital stay was found to be more than 140mm of Hg systolic or Diastolic more than 90mm of Hg according to JNC VII definition.

DM- The patient was considered to be diabetic if he was diagnosed earlier or was on Anti diabetic treatment or on admission found have to fasting plasma glucose more than 126mg % or post prandial of more than 200mg %

Obesity- The patient was considered to be obese if his/ her Body mass index calculated by Quetlet formula:- wt(kg)/ Ht(m^2) x 100 was more then 23

Smoking - A subject was considered smoker if he gave a history of smoking within the past 20yr. Persons who had quit smoking completely before 20 yrs were not included.

Family history of CAD- Family history for CAD was considered to be positive if there was a history of CAD in first degree relatives of the patient or there was a sudden death among first degree relatives ascribed to CAD.

Patterns with secondary dyslipidemia as thyroid dysfunction, Nephrotic syndrome, chronic Kidney disease, Cushing Syndrome, oral contraceptives, Connective tissue disorders, those on β Blockers, diuretics, statins and fibrates were excluded.

Patients were examined clinically and blood sample for Fasting lipid profile (FLP) were taken on the same day of admission after 12 hours of fasting.

Information on demographic variables and risk factors are collected using a structured interview schedule including age, gender, working group, life style, risk factors like smoking, alcoholism,

drugs, history of hypertension, DM, CAD, Cerebrovascular disease and family history of CAD were noted. Physical examination included pulse rate, Blood pressure, Body Mass Index and Waist Circumference.

Laboratory investigation was done within 24 hours of admission. Standard 12 lead ECG was taken.

An Informed written consent was obtained from each patient as per standard protocol followed in the institution

Ethics: The study protocol was approved by the research Ethics committee of the institution.

Statistical Analysis

The collected data was analyzed using SPSS software version12 for windows. Chi Square text was used for text of significance. The data were compared with published literature.

Results

A total of 200 patients, 100 male and female each with acute coronary syndrome were matched with equal number of control population mean age of the study group 53.9$\pm$ 11.59 year. 62.5% of the ACS patients were nonsmokers. None of the female patients smoked. Incidence of diabetes mellitus in study population was 31% and that a control 19%. Incidence of hypertensions in the study group was 38.5% while that of control group was 10%. 32% of the study population was overweight &45.5% were obese, while 22% had normal body weight while in control group, 78% were of normal body weight. 27.5% were physically inactive while on control group it was 21.5%. 18% had family hearty of CAD while in the central group if was 3%. The study group had higher mean TC($p<0.001$), higher mean LDL C($p<0.0001$), higher mean TG($p<0.0001$) and lower mean HDL C($p<0.001$) than control population.

Table 1 Lipid profile of study and control group

Parameter	Study				Control				'p'
	Range	Median	Mean	S.D.	Range	Median	Mean	S.D.	
TC	106-348	202	201.13	49.936	1-260	188	186.54	25.84	0.001
LDL	44-250	139	137.30	38.698	91-137	113.7	114	14.25	0.0001
HDL	16-76	40	44.05	12.89	37-62	46.76	47	7.47	0.001

Diabetic patients had higher mean TC ($p<0.05$), higher mean LDL C($p<0.05$), and lower HDL C($p<0.05$) compared with non diabetic population

Table 2 showing DM and Lipid profile of study population

	TC		LDL		HDL		TGL	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Diabetic	210.34	44.56	146.78	42.87	38.75	11.76	145.24	49.231
Not Diabetic	195.67	33.78	133.73	30.602	43.01	12.706	170.91	80.799
	2.31*		2.16*		2.32*		2.76*	
P value	P<.05		P<.05		P;<.05		P<.05	

Over weight and obese patients had higher TC ($p<0.002$), higher LDL-C($p<0.034$), higher TG($p<0.002$) and lower HDL- C($p<0.002$)

Table 3 Showing BMI and lipid profile of study group

		TC		LDL		HDL		TG	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Normal	45	182.00	41.565	130.20	28.997	47.89	10.616	136.00	34.702
Obese/over wt	155	213.91	49.393	143.32	39.204	40.11	13.035	181.34	94.122
t		4.33		2.45		4.10		4.94	
p		0.002*		.034*		.002*		.002*	

Male had higher TC (p<0.001), higher LDL C(p<0.001) compared with females while females had higher HDL-C(p<0.001)

Table 4 Gender and lipid profile

	TC		LDL		HDL		TG	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	215.99	47.846	147.04	35.617	39.42	7.537	156.37	41.352
Female	186.26	47.715	127.56	39.369	48.67	15.295	167.53	95.184
P value	0.001		0.001		0.001		0.003	

Figure 1: Clustered cylinder diagram showing gender and lipid profile distribution
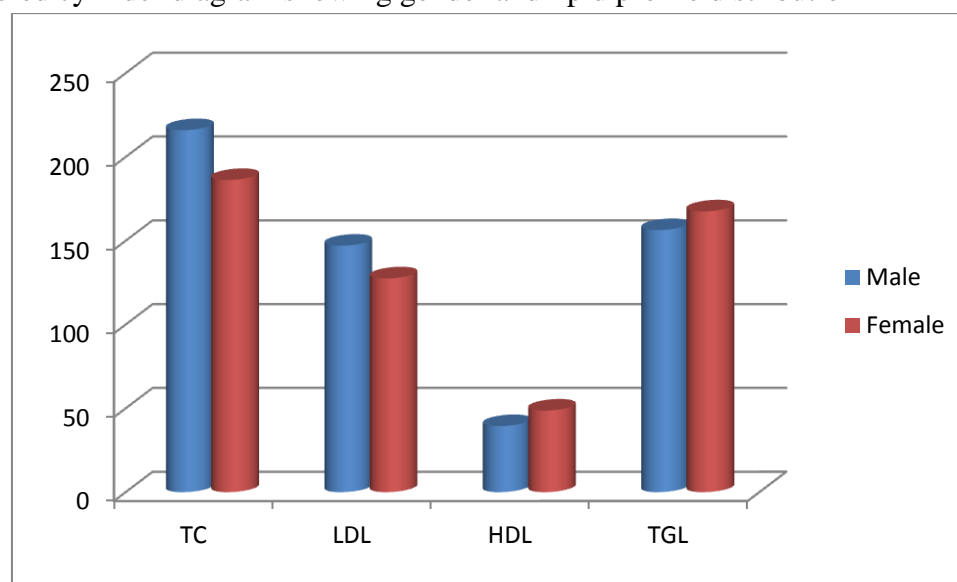
Discussion

The mean age of ACS in the study group was 53.9 Year. This is similar to Gupta et.al[6] with mean of 53.4; While it was 48.6 in the study by S.S. Binu et al[7]. This change may be due to the difference in the directory pattern and ethnicity. Males having age >35 and females having age >45 is considered as coronary risk factors for Asian Indians[8]. Equal numbers of male and females were selected in each study group. In Gupta et al, males contributed 82%[6], while in S.S.Binu et al [7], it was 61.8.Smokers formed 37.5%of the study group. Only males were smoker. In Gupta et al [6], 24.3% were smokers while 2.6% of females also smoked.

Incidence of Diabetes in the study group was 31%. This is different from Gupta et al [6], where it was 21%. The change may be due to the difference in the dietary pattern and ethnicity.

The incidence of hypertension in study group was 38.5% which is different from 32.6% obtained by Gupta et al[6]. The difference in the dietary pattern, lifestyle changes, smoking and ethnicity.

BMI in the study group was 24.22. There was a marked difference from Frolich et al [9] where it was 27.7. The Difference may be due to the fact that the study population were ethnically different and an applying weight criteria by WHO on both group, both of them fell into overweight group, Huangz et al [10] has shown that a modest weight gain is associated with a marked increase in the incidence of hypertension and CAD.

27.55% of the study group were physically inactive. It is similar to S.S. Binu et al [7] where it was 28.4%

The mean T.C in the study group was 201.13mg%. Similar results were obtained by S.S. Binu et al [7]. Joseph et al [11] had a higher TC of 223mg%. The difference may be due to the fact that Joseph et al studied only the urban population. The mean LDL_C in the study was 137.3. S.S.Binu et al[7] had a similar value of 138,

while Joseph et al [11] had a higher value of 154. Mean HDL-C in our study was 44.5, which is similar to 41.4 observed by S.S. Binu et al [7]. Mean TG in this study group was 162.95 while observation of et S.S Binu ad a lower value of 152. The difference may be due to the fact that patients with DM were not included in the study of S.S.Binu et al [7].

Diabetic patients had a statistically significant higher mean TC than non-diabetic patients. DM patients have higher mean LDL-C compared to non DM (133.73±30.60) which was statistically significant.

Over weight and obese patients had a higher mean TC, higher mean LDL-C,

Higher mean TG and lower mean HDL compared with normal population

TC and LDL-C were higher in males, while females had higher mean TG and HDL-C.

Conclusions

1) Elevated TC, CDL-C&TG as well as decreased HDL-C were observed in the study
2) Female had higher HDL-C &TG while males had higher TC& LDL-C
3) Physical inactivity, DM, HTN, smoking High BMI had strong co-relation and positive family history of ACS.with FLP.

Limitations

1) Effects of other risk factors like CRP, Homoysteime, Lipoprotein(a) are not considered
2) Effects of al Coho is lipid profile were not considered
3) Patients on admission received high dose statins, whose effect in FLP is not considered.

References

1. Krishnan MN: Coronary Heart Disease and risk factors in India - On the brink of an epidemic. Ind.Heart J. 2012 July; 64(4):364-367.
2. Inder S Anand, Shibba Takkar Chhabra: Ischaemic heart disease,YP. Munjal, API text book of medicine , API,2012,ninth ed;p;666
3. Manolio TA, Pearson TA, Wenger NK, et al. Cholesterol and heart disease in older persons and women. Review of an NHLBI workshop. Ann Epidemiol 1992; 2:161.
4. Chowta et al. (2012). Gender difference of lipid profile in type 2 diabetes mellitus .instasci.j.of med.sci.
5. Terres W, Becker P, Rosenberg A. Changes in cardiovascular risk profile . Am J Med 1994; 97:242.
6. Rajeev Gupta, Vijay Kaul, H.Prakash et al, Lipid Abnormalities in Coronary Heart disease, A population based case control study Indian Heart J 2001; 53: 332-336.
7. SS Binu, TN Vidyasagar, KR Santosh et al, A Hospital Based Study of serum Lipid Levels In A South Kerala Population.
8. Inder S Anand, Shibba Takkar Chhabra: Ischemic heart disease , YP Munjal, API text book of medicine , API,2012,ninth ed p; 667
9. J Frolich, M.Dubiasiva, L. Adler et al, Gender Differences in Plasma Level of Lipoprotein (a) in patients with angiographically proven Coronary Artery Disease, Physical Res.53: 481-486, 2004.
10. Huang Z Willet WC, Manson JA: Body Wt, Weight change and risk for hypertension and coronary heart disease. Ann intern Med 1978; 128:81.