Cardiovascular risk factors analysis in young patients with proven coronary artery disease with special reference to dyslipidemia

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Abstract— Dyslipidemia is a primary, widely established as an independent major risk factor for coronary artery disease (CAD). Hence, this study was conducted with objective to find out associating risk factors in young CAD patients with special reference to dyslipidemia and its correlation of dyslipidemias & the type of obesity. A hospital Based observational descriptive study conducted on 30 patients of acute myocardial infarction below 40 years of age at department of medicine and Department of Cardiology. R.N.T. Medical College, Udaipur. To infer the association, Chi Square test in qualitative data and ANOVA & Unpaired 't' test for quantitative data was used. Most common symptoms in young patients with acute myocardial infarction were chest pain (93.33%), Amongst risk factors smoking was most common (66.66%). The most common type of myocardial injury in ECG was anterior type of infarction in 66.66% cases. Single risk factor for myocardial infarction was present in 23.33% of patients. Two risk factors were present in 20% of patients whereas 49.9% patients had three or more risk factors. 6.6% patients had no apparent risk factors. Both BMI and waist hip ratio were abnormal in 16.66%. Dyslipidemias were observed in 46.66% cases. Hypercholesterolemia and LDL dyslipidemia was the commonest abnormality detected in both overweight and centrally obese groups.

Keywords: Coronary Artery Disease, Dyslipidemia, Risk Factors.

I. INTRODUCTION

Coronary artery disease (CAD) is the leading cause of morbidity and mortality in both developing and developed countries. Coronary artery disease in young is defined as a cardiac event occurring in the patients of age of 40 years and below.[1]

Myocardial infarction is one of the most common diagnoses in hospitalized patients in Westerns countries. Of all cases of CAD in West, only 2% to 5% occur in young in contrast to 12% to 16% in India[2]. Even the overseas emigrant Indians are having more risk than native population which is related to environmental factors and changes in life style which are magnified in genetically susceptible patients.

Dyslipidemia is a primary, widely established as an independent major risk factor for coronary artery disease (CAD) and may even be a prerequisite for CAD, occurring before other major risk factors come into play.[3] Studies have reported higher prevalence of lipid abnormalities among Asians compared with non-Asians.[4,5] Low HDL cholesterol and high TG concentrations have been implicated as possible independent predictors of CVD[6,7] and the combination of these two conditions are called as atherogenic dyslipidemia.

The relationship of number of factors to subsequent development of cardiovascular disease. Study

showed increasing risk of CAD with increasing serum cholesterol levels and association between smoking and sudden death from CAD. Other risk factors found by the study were male sex, age, high BP, diabetes mellitus, obesity and low vital capacity.[3-7]

Studies have been done in Indian setup analyzing association of young CAD with Metabolic Syndrome type of obesities, dyslipidemias are scare. So this present study was aimed to find out associating risk factors in young CAD patients with special reference to dyslipidemia.

II.   METHODOLOGY

This present study was conducted in the Department of Medicine and Department of Cardiology. R.N.T.Medical College and Associated Group of Hospitals, Udaipur. Total 30 Patients of acute myocardial infarction of age of 40 or below of either sex were studied.

After taking written informed consent detailed information regarding demographic characteristics were taken. Detailed clinical history was taken including onset, duration of progression of symptom e.g. chest pain, breathlessness, vomiting etc. Detailed H/o risk factors were also inquired via detailing of life style pattern related factors like smoking habits, tobacco chewing. Sedentary habits, alcohol consumption and taking oral contraceptive pills etc.

These cases were examined and investigated specially for lipid profile. Results were recorded. BMI was calculated by using the formula of weight (kg)/height (m^2). For biochemical investigation blood samples were taken after an overnight fasting from each patient. CBC, blood sugar, urea, creatinine, lipid profile, urine analysis were done using standard methods.

Data thus collected from each individual were complied and analyzed to get inferences. Association was inferred by chi-square test in qualitative data and by unpaired 't' test in quantitative data.

III.   RESULT

Out of total 30 cases,13 patients (43.35%) all males were in the age group 31-35 years and I 0 patients (33.32%) 8 males, 2 females were in the age group 36-40 years, 4. patients (13.33%) and 3 patients (10%) were in age group 26-30 years and 20-25 years respectively. Male to female ratio was 9:1. Mean age of patients was 33.5±4.37 (25 to 38) years. (Table 1)

The most common symptoms in patients with myocardial infarction in these cases was chest pain (93.33%) followed by uneasiness, sweating, vomiting, breathlessness and palpitation. Symptoms of extreme fatigue and syncope were not present in any of the patients. (Table 1)

The important risk factors identified in young patients in the present study were smoking and sedentary habits, followed by dyslipidemias and hypertension. (Table 1)

Smoking was the most prevalent risk factor in patients of myocardial infarction below 40 years of age. It was present in 20 patients (66.66%), followed by sedentary habits in 19 patients (63.66%), dyslipidemia in 14 patients (46.66%) and hypertension in 8 patients (26.66%). Past history of IHD was present in 6 patients (20%) whereas flintily history of premature CAD was present in 4 patients (13.33%). Five patients (16.66%) were overweight and diabetes was present in 2 patients (6:66%). Seven patients (23.33%) patients had more than three risk factors, while 8 patients (26.66%) had three risk factors and 6 patients (20%) had two risk factors while 7 patients (23.3%) had only one risk factor for myocardial infarction.2 patients (6.66%) had no apparent risk factors for MI. (Table 1)

Table 1
Characteristics of Study Population

Variables		Male(N=27)		Female(N=3)		Total(N=30)	
		No.	(%)	No.	(%)	No.	(%)
Age	20-25	3	11.11	0	0.00	3	10.00
	26-30	3	11.11	1	33.33	4	13.33
	31-35	13	48.15	0	0.00	13	43.33
	36-40	8	29.63	2	66.67	10	33.33
Symptom	Chest Pain	25	92.59	3	100.00	28	93.33
	Breathlessness	4	14.81	0	0.00	4	13.33
	Palpitation	2	7.41	0	0.00	2	6.67
	Syncope	0	0.00	0	0.00	0	0.00
	Extreme Fatigue	0	0.00	0	0.00	0	0.00
	Vomiting	6	22.22	1	33.33	7	23.33
	Uneasiness	9	33.33	2	66.67	11	36.67
	Sweating	8	29.63	8	266.67		
Risk factors	Family history of CAD	4	14.81	0	0.00	4	13.33
	Past history	6	22.22	0	0.00	6	20.00
	Smoking	19	70.37	1	33.33	20	66.67
	Sedentary habits	17	62.96	2	66.67	19	63.33
	Hypertension	6	22.22	2	66.67	8	26.67
	Over weigh)	4	14.81	1	33.33	5	16.67
	Diabetics	1	3.70	1	33.33	2	6.67
	Dyslipidemia	12	44.44	2	66.67	14	46.67
Number of risk factors	One risk factor	7	25.93	0	0.00	7	23.33
	Two risk factors	6	22.22	0	0.00	6	20.00
	Three risk factors	8	29.63	0	0.00	8	26.67
	More than three risk factors	5	18.52	2	66.67	7	23.33
Physical Signs	Anemia	20	74.07	2	66.67	22	73.33
	Cyanosis	0	0.00	0	0.00	0	0.00
Pulse	Tachy	6	22.22	1	33.33	7	23.33
	Brady	1	3.70	0	0.00	1	3.33
	Irregular pulse	1	3.70	0	0.00	1	3.33
B. P		7	25.93	1	33.33	3	10.00
Respiration		2	7.41	1	33.33	3	10.00
Signs of heart failure	JVP	4	14.81	0	0.00	4	13.33
	Hepatomegaly	3	11.11	0	0.00	3	10.00
	Edema feet	1	3.70	0	0.00	1	3.33
	Gallop	1	3.70	2	66.67	7	23.33
	Basal Crepts	6	22.22	1	33.33	7	23.33

On clinical examination, anaemia was present in 22 patients (7333%), cyanosis was not present in any patient tachycardia was present in 7 patients (23.33% Bradycardia in 1 patient (3.33%). While irregular pulse was present in 1 patient (3.33%). Hypertension was present in S patients (26.66%) and tachyponea in 3 patients (10%).(Table 1)

Signs of heart failure in the form of raised JVP were present in 4 patients (13.33%), hepatomegaly gallop rhythm in 7 patients (23.33%) and basal crepts in 7 patients (23.33%). (Table 1)

On investigations, abnormal haemoglobin was found in 28 patients (93.36%), ESR in 18 patients (60%) while TLC was within normal limit in all patients. Blood sugar and blood urea was found abnormal in 2 patients (6.66%) while serum creatinine was abnormal in 3 patients (10%). Serum Na$^+$ was abnormal in 5 patients (16.66%) and serum K$^+$ in 3 patients (10%). SGOT was abnormal in 16 patients (53.34%). SGPT in 8 patients (26.66%) while CPK-MB was abnormal in 20 patients (66.66%). (Figure 1)
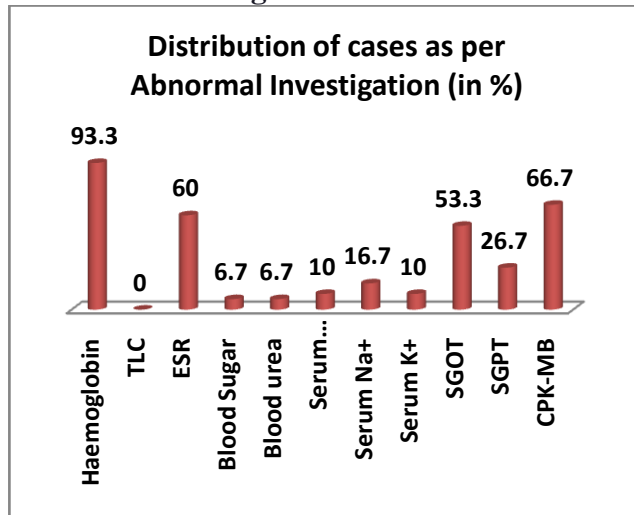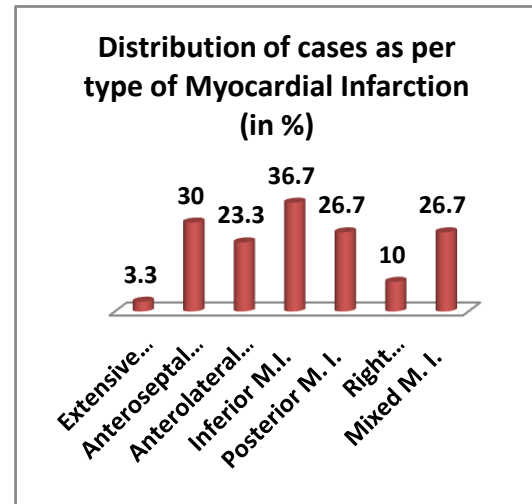

Figure 1

Distribution of cases as per Abnormal Investigation (in %)

Figure 2

Distribution of cases as per type of Myocardial Infarction (in %)

Electrocardiogram (E.C.G.) shows that anterior wall myocardial infarction was most common (30% anteroseptal, 23.33% anterolateral, 3.33% extensive anterior i.e. total 66.66%), followed by inferior wall myocardial infarction in (36.66%) cases. Posterior wall myocardial infarction was present in 26.66% patients and 10% patients had right ventricular myocardial infarction whereas 26.66% patient's had mixed wall involvement. (Figure 2)

In young MI patients the central obesity was measured and expressed as waist-hip ratio (WHR) was twice as common that of general obesity measured and expressed as body mass index (BMI) alone. Five patients (16.66%) were overweight included 4 males and 1 female. 25 patients (83.34%) had normal BMI. None of the patients were underweight in our study. Ten patients (33.33%) including 8 males and 2 females were centrally obese and 20 patients (66.67%) had normal waist-hip ratio. (Table 2)

Table 2
Relation of Sex with BMI and Waist hip ratio

Variables		Male		Female		Total	
		No	%	No	%	No	%
BMI (kg/m^2)	<18.5	0	0.00	0	0.00	0	0.0
	18.5 – 24.9	23	85.19	2	66.67	25	83.3
	≥ 25	4	14.81	1	33.33	5	16.7
Waist Hip Ratio	<0.88 in males, < 0.85 in females	19	70.37	1	33.33	20	66.7
	> 0.88 in males, > 0.85 in females	8	29.63	2	66.67	10	33.3
Both BMI and Waist Hip ratio abnormal (BMI > 25 kg/m^2 and waist hip ratio >0.88 in males, and > 0.85 in females)		4	14.81	1	33.33	5	16.7
Alone BMI abnormal (BMI>25 kg/m^2)		0	0.00	0	0.00	0	0.0
Alone waist hip ratio abnormal (Waist hip ratio > 0.88 in males and >0.85 in females)		4	14.81	1	33.33	5	16.7

Five patients (16.66%) were overweight and centrally obese both (4 males and 1 female), but waist hip-ratio alone was abnormal in 16.66% patients (4 males and 1female). BMI alone was not abnormal in any patient. Mean cholesterol levels were 184.6±32.48 mg/d1. Mean triglyceride levels were 135.92±50.31 mg/dl. Mean LDL cholesterol levels were 107.85±27.6 mg/dl. Mean HDL cholesterol levels were 47.82±6.93 mg/dl. Mean total cholesterol, mean triglyceride and mean LDL levels were higher and mean HDL cholesterol levels were low in overweight patients and centrally obese patients as compared to patients with normal anthropometric measurement and centrally non-obese patients. Lipid profile was not found associated with sex (p>0.05). (Table 3)

Table 3
Sex wise distribution of lipid profile status

S. No.	Lipid Profile	Male (N=27)	Female (N=3)	Total	P Value
1	Total cholesterol (Mean±SD)	183.96±31.26	190.33±33.7	184.6±32.48	0.742
2	Triglyceride (Mean±SD)	129.85 ± 48.32	142.9±52.3	135.92±50.3	0.663
3	LDL (Mean±SD)	105.74 ±38.9	112±19.3	107.85±27.6	0.788
4	HDL (Mean±SD)	51.13±6.36	50.16±7.5	47.82 ±6.93	0.807

Mean cholesterol levels were higher in overweight patients as compared to that in patients with normal anthropometric measurement. Similarly mean cholesterol levels were higher in patients with abnormal waist-hip ratio as compared to that in patients with normal waist hip ratio. Cholesterol level was found significantly more in obese and cases with more W/H ratio. (Table 4&5)

Table 4
BMI wise distribution of lipid profile status

S. No.	Lipid Profile	BMI			P Value
		<18.5	18.5-25 (N=23)	>25 (N=4)	
1	Total cholesterol (Mean±SD)	-	176.57±28.25	224.84±20.8	**0.003**
2	Triglyceride (Mean±SD)	-	123.67±37.02	197.20±67.8	**0.004**
3	LDL (Mean±SD)	-	102.01±37.02	137.04± 6.1	**0.075**
4	HDL (Mean±SD)	-	48.73± 6.54	43.28± 7.8	**0.146**

Mean triglyceride levels were higher in overweight patients as compared to that in patients with normal anthropometric measurements. Similarly mean triglyceride levels were higher in patients with abnormal waist-hip ratio as compared to that in patients with normal waist-hip ratio. Triglyceride level was found significantly more in obese but not found to be associated with W/H ratio. ((Table 4&5)

Table 5
Waist Hip Ratio wise distribution of lipid profile status

S. No.	Lipid Profile	Waist Hip Ratio		P Value
		<0.88 in males, <0.85 in females (N=19)	>0.88 in males, >0.85 in females (N=8)	
1	Total cholesterol (Mean±SD)	177.9±29.67	209.43±25.17	**0.015**
2	Triglyceride (Mean±SD)	128.38± 36.89	153.52±72.68	**0.240**
3	LDL (Mean±SD)	97.98± 25.53	131.09±16.21	**0.002**
4	HDL (Mean±SD)	49.71± 6.27	43.40± 6.68	**0.027**

Mean LDL levels were higher in overweight patients as compared to that in patients with normal anthropometric measurements: Similarly mean LDL levels were higher in patients with abnormal waist-hip ratio as compared to that in patients with normal waist-hip ratio. LDL was found significantly more in cases with higher W/H ratio but not found to be associated with obesity. ((Table 4&5)

Mean HDL levels were lower (43.28±7.8 mg/dl) in overweight patients as compared to that (48.73±6.54 mg/dl) in patients with normal anthropometric measurements. Similarly mean HDL levels (43.4±6.68 mg/dl) were lower in patients with abnormal waist-hip ratio as compared to that (49.71±6.27 mg/dl) in patients with normal waist-hip ratio. HDL was found significantly more in cases with higher W/H ratio but not found to be associated with obesity. (Table 4&5)

IV. DISCUSSION

In this present study, among 30 young cases of AMI (age of 40 year and below), 13 patients (43.35%) were in age group 31-35 years whereas 10 patients (33.33%) were in age group 36-40 years. The M:F ratio was found 9:1. Almost similar to those observed by Samel et al. 1999,[8] they observed from among 163 cases of AMI admitted, 32 were found to young comprising 30 males and 2 females: Male to female ratio was also similar to that observed in a study Katyal et al (1999)[9] Mean age of patients was 34.2 range (14-40 years) 95.7% of them were males and only 4.3% were females. This male preponderance may be explained as endogenous estrogen appears to play a major role in reducing the risk of CAD in women. In addition, there appears to be a protective effect on vascular functions, as well as apparent estrogen gene related protection of LDL from oxidation.

In the present study, type of infarction in ECG was anterior in 56.66% Cases (anteroseptal in 30%, anterolateral in 23.33% & extensive anterior in 3.33%), and inferior in 36.66% cases. Well comparable observations were made by Milan et al,[10] Katyal et al[9] and Garg et al[11] who also observed that in ECG anterior wall MI was most common.

In the present study, smoking as a risk was found in 20 patients (66.66%) Similarly smoking was the commonest risk factor in the study of Kedar et al[12] (62.2%), Franklin et al[13] (52.1%), Katyal et al[9] (50%). Smoking is an important risk factor of CAD as it lowers HDL cholesterol, increases fibrinogen, platelet aggregation and decreases the oxygen carrying capacity of blood and causes release of catecholamines making the myocardium more irritable.[14]

In the present study dyslipidemia was present in 14 (46.60%) patients (According to recommendations made by National Cholesterol Education Programme, ATP III, 2001). Hadded et al[15] also observed dyslipidemia as a important risk factor in 40.6% patients in their study. Similarly Milan et al[13] in their study observed dyslipidemia in 36.2% in AMI cases.

In present study, hypertension (systolic blood pressure >140 mmHg, diastolic blood pressure >90 mmHg) was observed in 8 patients (26.66%). Almost similar observation made by Andrew et al[16] (26.31%), Haddad et al[15] (34.1 %), Usha et al[17] (21%) and Kedar et al[12] (25.4%). Thus hypertension is a well acknowledged risk factor for CAD and the systolic blood pressure is atleast as important as diastolic blood pressure. Isolated systolic blood pressure is also now established as a major hazard for coronary artery disease.

In present study 16.6% patients were overweight (BMI >25 kg/m^2). Garg et al[11] reported 11% patients overweight. However Samel et al[8] observed only 6% patients were overweight. Katyal et al[9] also observed low prevalence of obesity in young AMI patients. The reason could be that most of the patients of above study belonged to rural population of low socio-economic group and 95% of them were engaged in heavy manual work whereas in our study most of the patients (63.61%) had sedentary habits.

In this study 33.33% patients had truncal obesity (WHR >0.88 in males>0.85 in females). Milan Gupta

et al[13] observed that among 2,212 patients truncal obesity was present in 22% patients but criteria of abnormal WHR was >0.95.

In present study family history of IHD was present in 13.33% patients. Well comparable observations were made by Katyal et al[9] (9.2%) and in a study done at Bombay Hospital[18] Mumbai (13%).

In the present study, the proportion of smokers (66.66%) were higher in younger patients of Ml. Similar observations have been reported by Hadded et al[15], Usha et al[17], Kedar at al[12] and Garg et al[11]. However, family history of IHD was an important associated risk factor in these patients as reported by Hadded et al[15], Kedar et al[12] and Garg et al[11] whereas, in the present study we have observed sedentary habits (63.62%) as an important risk factor in young MI patients. However, study sample in present study was small.

In present study, mean total cholesterol levels in 30 patients with acute myocardial infarction were 184.6±32.45 mg/dl. Andrew et al[16] found mean total cholesterol levels of 200.9 mg/dl in their study. Philip et al[19] assessed the relation of lipid profile of 125 men, and 72 women in the angiographically proven CAD. Total mean cholesterol levels in their study were 213±3mg/dl, which was well in resonance to present study.

In the present study, mean triglyceride levels in 30 patients with Acute MI were 135.92±50.31 mg/dl. Similarly Hughes[20] observed that mean TG levels in Asian Indian patients were 169.92 mg/dl.

In the present study mean LDL-C levels observed were 107.85±27.6 mg/dl. Kwame et at[21] observed mean LDL levels of 135 mg/dl in their study which was quite similar to this study. Similarly, Philip et al[19] found mean LDL levels of 147±4 mg dl in their study on 197 patients with angiographic ally proven CAD.

In the present study, mean HDL-C levels observed were 47.82±6.93 mg/dl. McKeigue etal[22] observed in their studies mean HDL-C levels was 44.85mg/dl and Andrew et al[16] observed in their study of 197 young acute MI patients that mean HDL-C levels were 44.2 mg/dl. These observations were well in resonance with present study.

In the present study Cholesterol level was found significantly more in obese and cases with more W/H ratio. However BMI and WHR was not considered mean total cholesterol levels in studies of Andrew et al[16] Kwame et al[21] and Philip et al.[19]

In the present study, Triglyceride level was found significantly more in obese but not found to be associated with W/H ratio. Madhuri et al[23] in their study of centrally obese patients found mean triglyceride levels of 136.29 mg/dl.

In the present study, HDL and LDL was found significantly more in cases with higher W/H ratio but not found to be associated with obesity. These observations were similar to Andrew et al[16].They observed that mean HDL-C levels were 44.2 mg/dl in patients with abnormal BMI. Similarly our observation was similar to that of Madhuri as al[23] they observed that mean HDL-C levels were 44.85 mg/dl in patients with central obesity.

V.   CONCLUSION

It was concluded from this study that most common symptoms in young patients with acute myocardial infarction were chest pain (93.33%), Amongst risk factors smoking was most common (66.66%). The

most common type of myocardial injury in ECG was anterior type of infarction in 66.66% cases. Single risk factor for myocardial infarction was present in 23.33% of patients. Two risk factors were present in 20% of patients whereas 49.9% patients had three or more risk factors. 6.6% patients had no apparent risk factors. Dyslipidemias were observed in 46.66% cases. Hypercholesterolemia and LDL dyslipidemia was the commonest abnormality detected in both overweight and centrally obese groups.

CONFLICT OF INTEREST

None declared till now.

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