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A Study On Lipid Profile In Acute Coronary Syndrome In Patients.

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ABSTRACT

One of the most significant modifiable risk factors for coronary artery disease (CAD) is dyslipidemia. Acute coronary syndromes (ACS) were shown to be a key contributing factor to patients being admitted to the Coronary Care Unit To analyze lipid profile in patients with ACS who present at G.L Hospital, Karaikal, Puducherry India, and its clinical and complications pattern. This study involved 100 patients above 18 years old diagnosed with ACS. Patients were classified into 3 groups; ST-elevation MI (STEMI), non-ST-elevation MI (NSTEMI), and unstable angina (UA) group. All participants were subjected to history taking, clinical assessment, and measuring complete lipid profile values. STEMI group has higher significant total cholesterol (TC), low-density lipoprotein cholesterol LDL-C ($P < 0.001$), Triglycerides (TG) ($P = 0.022$), TC/HDL ($P = 0.027$), and TG/HDL levels ($P = 0.001$) and lower significant high-density lipoprotein cholesterol (HDL-C) ($p=0.006$) than other groups. There was a significant correlation between age groups and TC ($P<0.001$), LDL-c ($P=0.009$), very low-density lipoprotein cholesterol (VLDL-c) ($P=0.016$), HDL ($P=0.001$), Triglycerides ($P=0.008$), TC/HDL ($P<0.001$) and TG/HDL ($P=0.040$). Furthermore, there was no significant correlation between gender and TC, LDL-c, VLDL, HDL, TG, TC/HDL, and TG/HDL ($P>0.05$). Patients with ACS have a significant prevalence of dyslipidemia as a risk factor. These individuals are more likely to have low HDL than high LDL values; nevertheless, they aremore likely to have high TG values than low HDL values.

Keywords: Acute Coronary Syndrome; Dyslipidemia; Coronary artery disease.

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INTRODUCTION

Metabolic syndrome (Mets) is defined as a cluster of metabolic abnormalities characterized by abdominal obesity, hypertension, dyslipidemia, abnormal glucose metabolism, or previously diagnosed type 2 diabetes Cardiometabolic abnormalities that are associated with the Mets can increase the risk of cardiovascular disease and type 2 diabetes mellitus [1]. coronary artery disease (CAD) is theleading cause of mortality in both genders. At least one main risk factor is present in the vast majority of individuals with Acute Coronary Syndrome (ACS) [2]. In comparison to nonsmokers, male smokers had a risk of CAD that was four and three times more than that of femaleACS was shown to be a key contributing factor to patients. Dyslipidemia has been recognized asone of the most significant risk factors for CAD [3]. Primary and secondary prevention of CAD in both sexes may be greatly improved by treating dyslipidemia. There is a strong association between dyslipidemia, including an increasein total cholesterol (TC), low-density lipoprotein (LDL-C), triglycerides (TG), very low-density lipoprotein cholesterol (VLDL-C), and a reduction in high-density lipoprotein cholesterol (HDL-C) with the occurrence of coronary heart diseases (CHD) and ischemic stroke Dyslipidemia is the leading risk factor for mortality in the hospital [4].

MATERIALS AND METHODS

It is a cross-sectional study conducted in the Department of General Medicine,G.L Hospital, Karaikal, Puducherry, India, Hospital during the period from January 2022 to January 2023. Informed consent was obtained from all patients. The current study involved 100 patients above 18 years old diagnosed with ACS. Patients with chronic coronary syndrome (CCS) and familial dyslipidemia were excluded. All participants were subjected to history taking, clinical assessment, Laboratory investigation (TC, HDL-C, LDL-C, and TG), and 12 lead electrocardiograms (ECG). Body mass index is calculated by a person's weight in kilograms divided by the square of height in meters. According to the NCEP ATP III criteria (2002), dyslipidemia was defined as the presence of any one of the followingfasting lipid profile levels within 24 hours ofthe occurrence: TC ≥ 200 mg/dl, TG ≥ 150 mg/dl, LDL ≥ 130 mg/dl and HDL ≤40 mg/dl, or those currently on therapy for dyslipidemia, should be evaluated. ACS cases were divided into 3 categories considering clinicalmanifestations, electrocardiogram (ECG),and cardiac troponin level results. ST-elevation ACS (STE-ACS): patients presented with acute chest pain, persistent (>20 minutes) ST-segment elevation, and elevation of troponin levels [ST-elevation MI (STEMI)]. Non-ST-elevation ACS (NSTE-ACS): patients presented with acute chestpain but without persistent ST-segment elevation. The ECG shows persistent or transient ST-segment depression or T-wave inversion, flat T waves, pseudo-normalization of T waves, or no ECG changes at presentation. NSTE-ACS is further classified into; unstable angina (UA): with normal troponin levels and non-ST-elevation MI (NSTEMI): with anelevation of troponin levels.

Statistical analysis

Statistical analyses were performed using SPSS software for Windows, version 21.0. Data are given as mean ± standard deviation and percent. The Kolmogorov- Smirnov test was used to verify the normality of distribution. We used the student t-test, Chi-Square test, Kruskal– Wallis test, and Mann-Whitney test to compare the different groups. Values of $p < 0.05$ were considered statisticallysignificant.

RESULTS

A total of 100 patients with ACS enrolled in this work were divided into 2 groups; STEMI (N=64) and NSTE-ACS group (N=36) that included two subdivisions; unstable angina (N=22) and NSTEMI (N=14). Their mean age was 58.76± 11.35 years (ranging from 29 to 90 years). The most common age group represented was the age group ≥ 60 years (49%). There were 73 males and 27 females with a male: female ratio was 2.70:1. Fifty-four patients were eating unhealthy meals;11 patients were obese and 43% of patients were smokers. There was no statistically significant difference among groups considering age and gender ($P > 0.05$), (Table 1) Regarding lipid profile, The STEMI group has statistically significantly higher TC, LDL-C, TG, TC/HDL, and TG/HDL levels ($p < 0.001$, 0.022, 0.027, and 0.001, respectively) and statistically significant lower HDL-C ($p=0.006$) than other groups. However, there was no significant difference in VLDL-c through comparing the three groups. There was a significant correlation between age groups and TC ($P<0.001$), LDL-c ($P=0.009$), VLDL ($P=0.016$), HDL ($P=0.001$), TG ($P=0.008$), TC/HDL ($P<0.001$) and TG/HDL ($P=0.040$). However, there was an insignificant correlation between gender and TC, LDL-c, VLDL, HDL, Triglycerides, TC/HDL, and TG/HDL ($P>0.05$). Regarding

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complications, The STEMI group has a higher but non-statistically significant complications rate (26.6%) than the NSTEMI group (13.7%) and the UA group (21.4%) in the form of heart failure, pulmonary edema, and cerebrovascular stroke (Table 4). When studying the relation between different age groups and gender differences with lipid parameters we found that there was a statistically significant relation between age groups and TC (P<0.001), LDL-c (P=0.009), VLDL (P=0.016), HDL (P=0.001), Triglycerides(P=0.008), TC/HDL (P<0.001) and TG/HDL (P=0.040) (Table 5). However, the relation between gender and TC, LDL-c, VLDL, HDL, Triglycerides, and TC/HDLandTG/HDL (P>0.05) was non-significant (Table 6).

Table 1: Socio-demographic characters of the studied groups

Variables		STEMI group (N=64)		NSTEMI group (N=22)		UA group (N=14)		Test value	P-value
		No.	%	No.	%	No.	%		
Age (years)	Mean± SD	58.13±10.55		52.91±11.0		55.14±14.14		T= 0.625	0.436
	Median	59.0		63.0		52.5			
	Range	29.0- 82.0		42.0- 85.0		38.0- 90.0			
Age groups	25-39 years	2	3.1%	0	0.0%	1	7.1%	X^2= 5.16	0.524
	40- 49 years	12	18.8%	3	13.6%	4	28.6%		
	50- 59 years	19	29.7%	5	22.7%	5	35.7%		
	≥ 60 years	31	48.4%	14	63.6%	4	28.6%		
Gender	Male	48	75.0%	18	81.8%	7	50.0%	X^2= 4.76	0.093
	Female	16	25.0%	4	18.2%	7	50.0%		

P value< 0.05 is significant, SD: Standard deviation, T= Student T test, X2= Chi-Square test

Table 2: Comparison of risk factors in the studied groups

Variables		STEMI group(N=64)		NSTEMI group (N=22)		UA group(N=14)		Testvalue	P-value
		No.	%	No.	%	No.	%	No.	%
BMI (Kg/m²)	Normal	36	56.3%	5	22.7%	5	35.7%	X^2= 16.37	**0.003**
	Overweight	20	31.3%	17	77.3%	6	42.9%		
	Obese	8	12.5%	0	0.0%	3	21.4%		
Dietary habits	Healthy meals	27	42.2%	10	45.5%	9	64.3%	X^2= 2.26	0.323
	unhealthy meals	37	57.8%	12	54.5%	5	35.7%		
Smoking	Non-smoker	25	39.1%	6	27.3%	8	57.1%	X^2= 8.61	0.072
	Smoker	31	48.4%	8	36.4%	4	28.6%		
	Ex-smoker	8	12.5%	8	36.4%	2	14.3%		
Hypertension (HTN)	Not HTN	27	42.2%	11	50.0%	8	57.1%	X^2= 5.40	0.248
	Controlled	8	12.5%	5	22.7%	0	0.0%		
	Uncontrolled	29	45.3%	6	27.3%	6	42.9%		
Diabetes mellitus (DM)	Not diabetic	25	39.1%	10	45.5%	7	50.0%	X^2= 1.78	0.776
	Controlled	9	14.1%	3	13.6%	3	21.4%		
	Uncontrolled	30	46.9%	9	40.9%	4	28.6%		

Bold = significant, P value< 0.05 is significant, SD: Standard deviation, X2= Chi- Square test

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Table 3: Comparison of lipid profiles in the studied groups

Variables	STEMI group(N=64)			NSTEMI group(N=22)			UA group(N=14)			Testvalue	P-value
	Mean	± SD	Median	Mean	± SD	Median	Mean	± SD	Median		
Total cholesterol (mg/dl)	215.80	69.42	210.00	261.09	42.50	250.50	182.64	48.38	164.50	F= 8.81	**<0.001**
LDL-C (mg/dl)	140.77	44.47	139.50	121.95	39.84	109.50	104.50	39.49	101.00	KW =8.96	**0.011**
VLDL-C (mg/dl)	40.32	15.67	38.00	33.09	15.79	32.00	35.71	18.86	30.00	KW =4.704	0.095
HDL-C (mg/dl)	31.72	9.75	32.00	38.77	7.39	39.50	35.29	8.63	36.00	KW =10.08	**0.006**
Triglycerides (mg/dl)	214.38	77.31	197.50	165.45	78.97	160.00	178.57	94.31	150.00	KW =7.66	**0.022**
TC/HDL	8.02	5.25	6.62	5.25	1.86	5.09	5.51	1.90	6.11	KW =7.25	**0.027**
TG/HDL	7.89	5.18	6.01	4.49	2.50	3.84	5.55	3.71	4.70	KW =15.09	**0.001**

Bold = significant, P value< 0.05 is significant, SD: Standard deviation,KW= Kruskal–Wallistest

Table 4: Comparison of clinical history in the studied groups

Complications	STEMI group (N=64)		NSTEMI group(N=22)		UA group(N=14)		Testvalue	P-value
	No.	%	No.	%	No.	%		
No complications	47	73.4%	19	86.4%	11	78.6%	X^2=3.87	0.694
Heart failure	10	15.6%	2	9.1%	3	21.4%		
Pulmonary edema	4	6.3%	1	4.5%	0	0.0%		
Cerebrovascularstroke	3	4.7%	0	0.0%	0	0.0%		

P value< 0.05 is significant, SD: Standard deviation, X2= Chi-Square test

Table 5: Associations between age groups and lipid profile

Variables	Age groups								Test value	P-value
	25-39 years		40- 49 years		50- 59 years		≥ 60 years			
	Mean	± SD	Mean	± SD	Mean	± SD	Mean	± SD		
Total cholesterol (mg/dl)	120.00	7.00	171.84	39.57	255.31	42.17	199.71	64.88	T= 2.02	**<0.001**
LDL-C (mg/dl)	75.00	25.71	119.68	22.11	148.21	43.01	131.76	44.50	^{Z}MWU =2.84	**0.009**
VLDL-C (mg/dl)	54.67	11.93	47.78	18.40	40.38	19.01	36.31	15.28	^{Z}MWU =2.14	**0.016**
HDL-C (mg/dl)	45.33	7.23	34.84	6.34	28.10	6.73	35.14	10.34	^{Z}MWU =2.95	**0.001**
Triglycerides (mg/dl)	180.00	25.00	275.79	103.87	186.97	65.97	209.39	75.70	^{Z}MWU =2.96	**0.008**
TC/HDL	2.71	.63	5.14	1.65	9.58	2.77	6.72	4.69	^{Z}MW=2.64	**<0.001**
TG/HDL	4.10	1.27	8.23	4.26	7.04	3.10	6.90	4.43	^{Z}MWU =3.78	**0.040**

P value< 0.05 is significant, SD: Standard deviation, ^{Z}MWU = Z value of Mann Whitney U test,T=Student t-test

Table 6: Association between lipid profile with gender

Variables	Gender				Test value	P-value
	Male(N=73)		Female (N=27)			
	Mean	± SD	Mean	± SD		
Total cholesterol (mg/dl)	209.36	68.07	198.11	48.76	T= 0.786	0.434
LDL-C (mg/dl)	131.30	46.81	132.22	38.29	^{Z}MWU = 0.365	0.715
VLDL-C (mg/dl)	38.10	14.98	37.96	19.87	^{Z}MWU = 0.569	0.569
HDL-C (mg/dl)	33.81	9.70	33.67	9.15	^{Z}MWU = 0.086	0.932
Triglycerides (mg/dl)	192.88	67.32	202.96	113.63	^{Z}MWU = 0.303	0.762
TC/HDL	7.14	4.48	6.84	4.70	^{Z}MWU = 0.144	0.886
TG/HDL	6.66	4.10	7.24	6.19	^{Z}MWU = 0.404	0.686

P value< 0.05 is significant, SD: Standard deviation, ^{Z}MWU = Z value of Mann-Whitney U test, T=Student t-test

DISCUSSION

In current society, dyslipidemia is a risk factor that can be controlled. It goes unnoticed until the initial presentation with ACS when it is discovered. Lipid profile and clinical and pathological patterns in individuals with (ACS) were the primary goals of this work [5]. On comparison of risk factors for CAD between the three groups, there was a significant increase in BMI comparison (p=0.003) while there were insignificant differences as regards dietary habits, smoking, hypertension, and DM. In agreement, our results revealed that the STEMI, NSTEMI,and UA groups didn't differ significantlyregarding hypertension, DM, and smokingrates (P>0.05). STEMI patients hadsignificantly greater smoking rates than the controls. while in contrast to our results, they found that there was no significant difference among groups regarding BMI. In contrast to our results, they found that patients with UA had a greater rate of hypertension and dyslipidemia than those with NSTEMI/STEMI [6]. Regarding lipid profile, The STEMI group has significantly higher TC, LDL-C, TG, TC/HDL, and TG/HDL levels ($p < 0.001$, 0.022, 0.027, and 0.001 respectively) and significantly lower HDL-C (p=0.006) than other groups. TC, LDL, and TG serum levels were statistically higher in ACS patients than in controls, although HDL values were considerably lower in ACS patients than in controls. Patients with ACS had TC/HDL>5 and TG/HDL>4 levels that were significantly greater than those in the control [7]. The TC/HDL and TG/HDL ratios were shown to be independent risk factors for ACS using stepwise regression of lipid profile. The lowest HDL values were observed in the NSTEMI group, and there was a significant difference from the controls. Triglyceride levels were similaramong ACS subgroups and the controls [8, 9]. Also, the study by HDL had the highest correlations with Gensini score (to estimate the severity of STEMI, NSTEMI, &unstable angina) in all groups (R=-0.38, P<.001). while non-significantly correlated with TC, LDL, and TG. The current study also revealed that there was a significant relation between age groups and TC (P<0.001), LDL-c(P=0.009), VLDL(P=0.016), HDL(P=0.001), Triglycerides(P=0.008), TC/HDL(P<0.001) and TG/HDL (P=0.040). However, the relation between gender and TC, LDL-c, VLDL, HDL, Triglycerides, TC/HDL, and TG/HDL (P>0.05) was non-significant [10]. Finally, The STEMI group has a higher nonsignificant complications rate (26.6%) in the form of heart failure, pulmonary edema, and cerebrovascular stroke. To our knowledge, none of the related studies compared the rate of complications among STEMI, NSTEMI, and UA groups [11]. Our study has some limitations. First, there are just a few patients in this hospital-based study. Additionally, the lipid profile was taken during the first 24 hours following the incident, thus baseline levels were unavailable for comparison. The apolipoprotein (Apo B and Apo AI) measurements, which are significantly linked to an increased risk of MI, were also not included in this study [12, 13].

CONCLUSION

Patients with ACS have a significant prevalence of dyslipidemia as a risk factor. These individuals are more likely to have low HDL than high LDL values; nevertheless, they are more likely to have high TG values than low HDL values. We also found that dyslipidemia was significantly correlated with age and non-significant with sex.

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