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Study of High Density Lipoprotein Cholesterol among Patients with Acute Coronary Syndrome in Sohag University Hospital

Abstract

Objective: To estimate the prevalence, and impact of high-density lipoprotein cholesterol (HDL-C) on in-hospital outcomes among acute coronary syndrome (ACS) patients in Sohag University Hospital.

Methods: Data were collected prospectively from 273 consecutive patients admitted with a diagnosis of ACS. A low HDL-C was defined as a level <40 mg/dL (1.0 mmol/L) for males and <50 mg/dL (1.3 mmol/L) for females and satisfactory HDL-C is defined as a level ≥40mg/dl for males and ≥50mg/dl for females.

Results: The overall mean age of the study patients was 58.9_+11.3 years and majority was males (51.4%). The overall prevalence of low HDL-C was 73.3% and satisfactory HDL-C was 26.7%. During in-hospital stay and at discharge, the majority were on statin therapy (83.2%) while 7.7% were on fibrates. Low HDL-C patients were associated with higher in-hospital mortality than satisfactory HDL-C patients (12% vs. 11%; p=0.012) and higher CHF (18% vs.5.5%; p=0.01).

Conclusion: ACS patients in Sohag governorate in upper Egypt have a high prevalence of low HDL-C. Insignificantly higher in-hospital mortality and CHF were associated with low HDL-C in women but not in men.

Keywords: Lipoportein cholesterol; Coronary syndrome

Research Article

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Abbreviations: ACS: Acute Coronary Syndrome; HDL: High-Density Lipoprotein; STEMI: ST Segment Elevation Myocardial Infarction; NSTE-ACS: Non ST Segment Elevation Acute Coronary Syndrome; CHF: Congestive Heart Failure; PCI: Percutaneous Coronary Intervention; Gulf RACE: Gulf Registry of Acute Coronary Events; ACC: American Cardiac College; MI: Myocardial Infarction; CABG: Coronary Artery Bypass Graft; BMI: Body Mass Index

Introduction

Acute coronary syndrome (ACS) is a high-risk manifestation of coronary artery disease and represents a substantial proportion of all acute hospitalizations. Although mortality because of ACS has declined in recent years Fox KA et al. [1], largely attributable to optimization of timely reperfusion and innovations in pharmacological therapy, ischemic heart disease remains a leading cause of death and accounted for 7.25 million deaths worldwide in 2008 World Health Organization [2].

High-density lipoprotein (HDL) is one of the major carriers of cholesterol in the blood. It attracts particular attention because, in contrast with other lipoproteins, as many physiological functions of HDL influence the cardiovascular system in favorable ways unless HDL is modified pathologically. The functions of HDL that have recently attracted attention include anti-inflammatory and anti-oxidant activities. High anti-oxidant and anti-inflammatory activities of HDL are associated with protection from cardiovascular disease Kontush A et al. [3]. High-density lipoprotein (HDL) is positively associated with decreased risk of coronary heart disease (CHD) As defined by the US National Cholesterol Education Program Adult Treatment Panel III guidelines, an HDL cholesterol level (HDL-C) of 60 mg/dL or greater is a negative (protective) risk factor Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) [4]. On the other hand, a high-risk HDL cholesterol level is described as one that is below 40 mg/dL. Randomized, controlled clinical trials have demonstrated that interventions to raise HDL cholesterol levels are associated with reduced CHD events. A prospective analysis by Mora et al. [5] investigated the link between cholesterol and cardiovascular events in women and found baseline HDL-C level was consistently and inversely associated with incident coronary and coronary vascular disease events across a range of low-density lipoprotein-cholesterol (LDL-C) values [5]. While higher HDL levels are correlated with cardiovascular health, no incremental increase in HDL has been proven to improve health. In other words, while high HDL levels might correlate with better cardiovascular health, specifically increasing one's HDL might not increase cardiovascular health Soudijn W [6].

Data from the landmark Framingham Heart Study showed that, for a given level of LDL, the risk of heart disease increases 10-fold as the HDL varies from high to low. On the converse, however, for a fixed level of HDL, the risk increases 3-fold as LDL varies from low to high Meyers et al. [7]. Even people with very low LDL levels are exposed to increased risk if their HDL levels are not high enough. When is treatment indicated for high cholesterol level? [8,9]. HDL levels below 40 mg/dL result in an increased risk of coronary artery disease, even in people whose total cholesterol and LDL cholesterol levels are normal. HDL levels between 40 and 60 mg/dL are considered "normal" Richard NF et al. [10]. However, HDL

levels greater than 60 mg/dL may actually protect people from heart disease. Indeed, for several years, doctors have known that when it comes to HDL levels, the higher the better. Low HDL–C Grundy SM et al. [11] and Alberti KG et al. [12] was defined as levels of <40 mg/dl (1.0 mmol/L) for men and <50mg/dl (1.3mmol/L) for women. By analogy with the risk associated with low levels of HDL in patients with chronic CVD, low concentrations of HDL-C are an indicator of poor prognosis in patients with ACS. The most conspicuous (but not the only) example is the MIRACL clinical trial (Myocardial Ischemia Reduction with Aggressive Cholesterol Lowering), which randomized 3086 patients with ACS to 16 weeks of treatment with atorvastatin or placebo. In a treatment-adjusted analysis, the levels of HDL-C at the time of diagnosis of ACS predicted the risk of death, repeat infarction, or recurrent angina at 16 weeks Olsson AG et al. [13]. In fact, while low-density lipoprotein cholesterol (LDL-C) levels did not predict CVR, the risk in patients in the upper quartile of HDL-C (>53 mg/dL) was 62% lower than in patients in the lower quartile (>_38 mg/dL). In a single-center observational study of 1032 patients with ACS who underwent percutaneous coronary intervention (PCI) and were treated with statins, multivariate analysis showed that the risk of death or a Cardio-vascular event was greater in patients with low HDL-C, both at 1 month and at 1 year of follow-up Wolfram RM et al. [14].

Another study with 320 patients recruited at the point of ACS diagnosis showed that high levels of HDL-C were associated with a lower cardiovascular risk Tziakas DN et al. [15]. The study by Cordero et al. [16] reinforces the evidence for the protective role of HDL-C in patients with chest pain in general. Our registry provided a unique opportunity to study the prevalence, and impact of HDL-C level on in-hospital outcomes among ACS patients in Sohag governorate in Upper Egypt. To our knowledge, there is scant literature on the subject worldwide apart from a similar registry, The Gulf Registry of Acute Coronary Events (Gulf RACE) Zubaid M et al. [17].

Patients and Methods

The presented study was performed on 273 patients of both sexes .It is a prospective, registry of consecutive patients hospitalized with the final diagnosis of ACS in Sohag University Hospital, within 6 months from July to December 2012. The diagnosis of the different types of ACS and definitions of data variables were based on the American Cardiac College (ACC) clinical data standards. No control (cohort) was included. A confirmed written Consent was taken from all the Patients. The patients were selected for this study according to the following inclusion and exclusion criteria.

Inclusion criteria

a. Patients with final diagnosis of acute coronary syndrome.

b. Patients above 18 years.

Exclusion criteria

a) Patients admitted in the coronary care _unite (CCU) with final diagnosis other than ACS.

b) Patients under 18 years.

c) Patients on statin and other anti-dyslipidemic medications.

For all the patients the following was done

Thorough history taking with special emphasis on

i. History of ischemic heart disease, past history of myocardial infarction (MI), percutaneous coronary angiography(PCI)or coronary artery bypass graft (CABG).

ii. Age.

iii. Gender.

iv. Diabetes.

v. Hypertension.

vi. Smoking, current smoking was defined as smoking

vii. Cigarettes or water-pipe (sheesha) within 1 month of index admission.

viii. Family history of similar condition, a positive of CHD was defined as evidence of this history Family disease in a children, parent, sibling, before 55 years of age.

Thorough clinical examination

A. General examination:

a. Pulse.

b. Blood Pressure.

c. Body mass index (BMI).

d. Waist circumference.

B. Local cardiac and chest examination.

With special emphasis on signs of heart failure

Investigations

i. ECG.

ii. Total CK.

iii. CK_MB and Troponin.

iv. Lipid Profile especially:

a) Total Cholesterol.

b) HDL_C.

c) LDL_C.

d) Triglycerides.

e) VLDL_C.

v. Random blood glucose.

vi. Serum creatinin.

Results

Demographic characteristics of the studied population

The study include 273 patients admitted in Sohag University Hospital coronary care unit by final diagnosis ACS during 6 consecutive months from the period 1st July to 31th December 2012. As shown in Table 1 there were 160(58.6%) males and 113(41.4%) females. The mean age is 58.9_+11.3 (27_87)Ys. The

total population was divided into 3 age groups as shown in Table 2 and Figure 1.

Table 1: Characteristics of the 273 Patients with Acute Coronary Syndrome in Sohag University Hospital.

Total N(273)	
113 (41.4%)	Female.N(%)
58.9±11.3	Age Yrs
25.24±5.1	BMI cm/m^2
94±11.7	Waist circumference Cm
138(50.5%)	Previous IHD.N(%)
78 (28.6%)	Past history of MI.N(%)
10(3.7%)	Past history of CABG.N(%)
28(10.3%)	Past history of PCI.N(%)
59 (21.6%)	Family history of IHD.N(%)
86 (31.5%)	Smoker.N(%)
108(39.6 %)	Hypertension .N(%)
89 (32.6%)	DM .N(%)
124 (45.4%)	STEMI .N(%)
149(54.6%)	NSTE_ACS.N(%)
64(23.4%)	Renal impairement *.N%
185.36±54.5	Total Cholesterol ,mean mg/dl
115.4±47 mg/dl .N(%) 39 (14.3%) <7	LDL_C mean mg/dl
82(30%)	70_100 mg/dl .N(%)
152 (55.7%)	>100 mg/dl.N(%)
152.4 ±121.6	Triglyceride mean mg\dl
177(64.8%)	<150mg/dl .N(%)
96(35.2%)	≥150 mg/dl .N(%)
Anti-dyslipidaemic initiatin at hospital	
227(83.2%)	Statin .N(%)
21(7.7%)	Fiberates .N(%)
25(9.2%)	Non .N(%)

Table 2: Classification of the study population by age and gender differentiation.

Age Group		Male N	Female N	Total	Percentage
A	18-40Yrs	13	6	19	7 %
B	>40-65Yrs	110	73	183	67%
C	>65 Yrs	37	35	34	26%
Total		160	113	273	100%

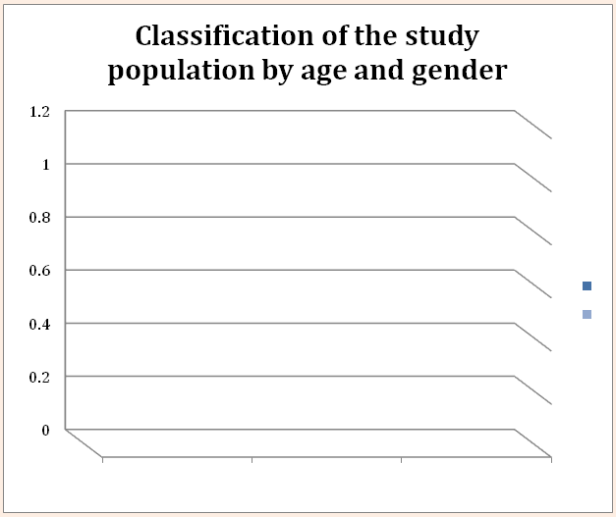

Figure 1: Classification of the study population by age and gender differentiation.

The prevalence of HDL_C level among the patients was low HDL_C level 200(73.3%) (<40mg/dl for men and <50mg/dl for women) and satisfactory HDL_C level 73(26.7%) (the level ≥ 40 for men and ≥50 for women), with mean BMI 25.2±5 (15_41) kg/m^2 and with mean Waist Circumference 94±11.7(60_126)Cm. The study patients was associated with 108 (39.6%) hypertension, D.M 89 (32.6%), stroke 86 (31.5%). Most of the patients had NSTE_ACS 149 (54.6%) associated with higher median total cholesterol (185.4±54.4) mg/dl, high mean Triglycerides (152.4±121.6 mg/dl) and mean LDL-C (115.5±47mg/dl). Furthermore, majority of the patients initiated statin therapy at the hospital 227(83.2%) but only 27(7.7%) fenofibrate as shown in Table 1.

Frequency of in hospital course and outcome in ACS patients in Sohag University Hospital

As regard the hospital course and outcome, 177(64.8%) improved, 40(14.7%) suffered CHF, 15(5.5%) suffered recurrent ischemic attacks, 4(1.5%) suffered re-infarction 6(2.2%) suffered Cardiogenic shock and 24(11.7%) died as shown in Table 3 and Figure 2.

Table 3: Frequency of in hospital course and outcome in ACS patients in Sohag University Hospital.

In-Hospital Course	Frequency (N)	Percent (%)
Improved	177	64.8
CHF	40	14.7
Reishaemia	15	5.5
Reinfarction	4	1.5
Cardiogenic Shock	6	2.2
Death	24	11.7

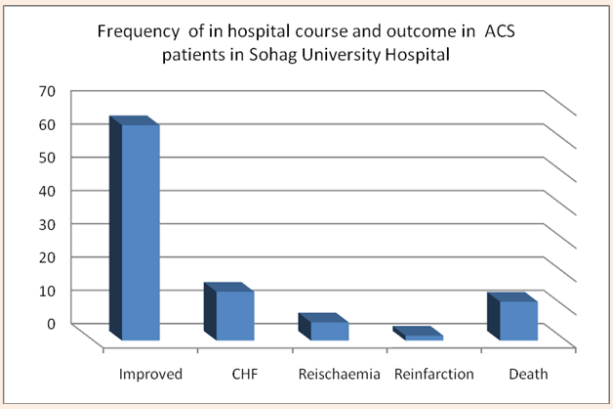

Figure 2: Frequency of in hospital course and outcome in ACS patients in Sohag University Hospital.
P value=0.002

Demographic and clinical characteristics of study population stratified by level of high density lipoprotein cholesterol

The patients were divided into two groups, as shown in Table 4, the low HDL-C group [group I], compared with the satisfactory HDL-C group [group II]. The low HDL-C group was associated with higher female gender (49.5%vs.19.2% p>0.001) see Figure 3, and associated with higher median BMI (25.5 vs. 24.4 kg/m^2; p=.025), greater waist circumference (94vs.91 cm p=0.026), higher rate in diabetics (37.5 vs. 19.2%; p=0.004) see Figure 4, and higher prevalence of low HDL-C in hypertensives (45 vs. 24.7%; p=0.002) see Figure 5, Low HDL-C group was also higher in ex-smokers (62.5% vs. 37% p<0.001) lower current smoking (28.1% vs. 41.1% p<0.001) see Figure 6, high in renal impairment (serum creatinin >2 mg/dl) (26.5% vs. 15.1%; p=0.048) and higher in NSTE_ACS (57% vs. 48% p=0.184).

Table 4: Demographic and Clinical Characteristics of Study Population Stratified by Level of High Density Lipoprotein Cholesterol.

Variable	Group I	Group II	P Value	Significance
Age Yrs	58.9_+14.4	59.53_+9.8	0.001>	S
Male. N%	59(36.9%)	101(63.1%)	0.001>	S
Family h/o of CAD. N%	31(42.4%)	107(53.5%)	0.107	N.S
BMI kg/m2	24.4_+5.1	25.5_+5.5	0.025	S
Waist Circumference Median Cm	91. _+9.6	95_+12.3	0.026	S
Hypertension N %	18(24.7%)	90(45%)	0.002	S
Diabetes Mellitus N%	14(19.2%)	75(37.5%)	0.004	S
Smoker N%	30(41.1%)	56(28%)	0.001>	S
Ex Smoker N%	27(37%)	125(62.5%)	<0.001	S
Past MI N%	21.9%) 16	62(31%)	0.142	N.S
Past PCI N%	7(9.5%)	21(10.5%)	0.82	N.S
Past CABG N%	2(2.7%)	8(4%)	0.62	N.S
Renal Impairement N%	11(15%)	53(26.5%)	0.025	S
Blood Glucose mg/dl	154_+82	183_+95	0.03	S
NSTE_ACS N%	38(52%)	86(43%)	0.184	N.S
STEMI_ACS N%	35(48%)	114(57%)	0.184	N.S
Statins N%	59(81%)	168(84%)	0.79	N.S
Other Antidyslipidaemic	6(8.2%)	15(7.5%)	0.79	N.S

Group 1 (satisfactory HDL_C)
Group II (low HDL_C)
P value is significant if <0.05
P value is highly significant if <0.001

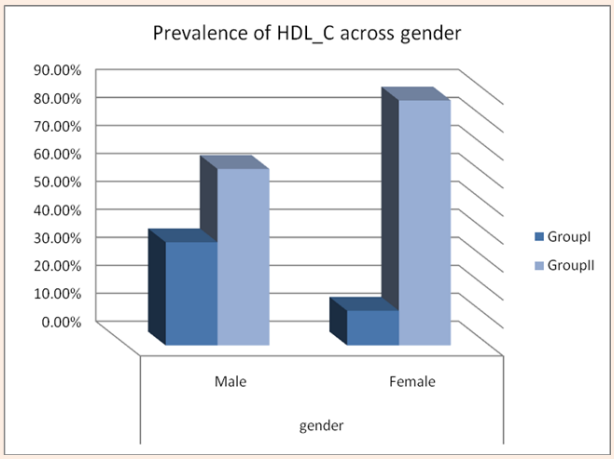

Figure 3: Prevalence of HDL-C across gender.
P value <0.001, Group I (satisfactory HDL_C), Group II (low HDL_C)

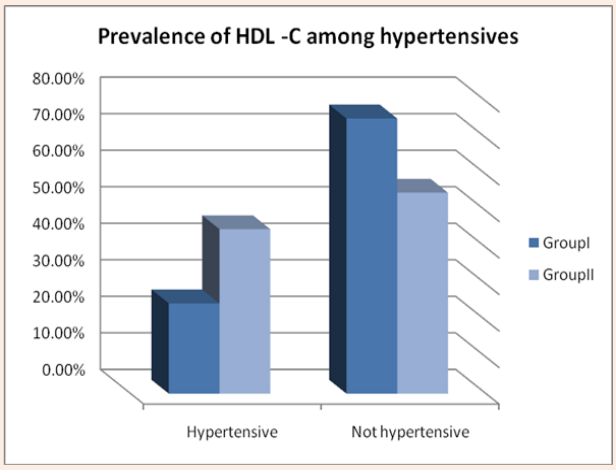

Figure 5: Prevalence of HDL-C among hypertensives.
P value = 0.002, group 1(satisfactory HDL_C) Group II (low HDL_C)

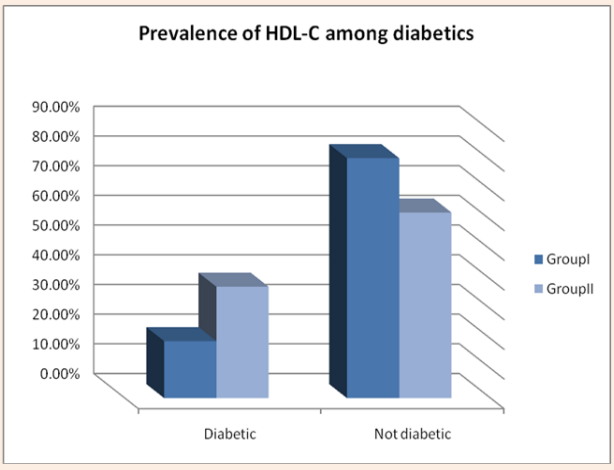

Figure 4: Prevalence of HDL-C among diabetics.
P value = 0.004, group 1(satisfactory HDL_C) Group II (low HDL_C)

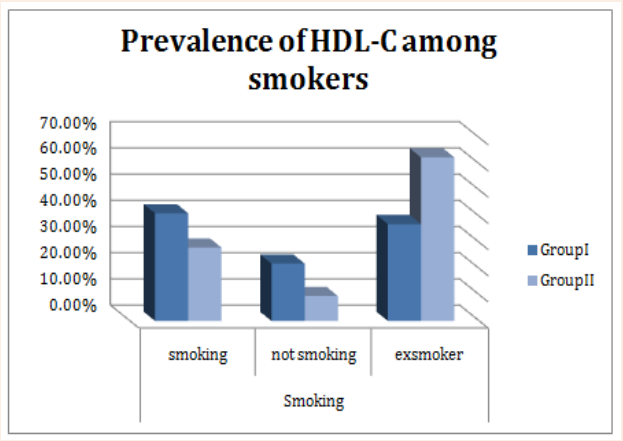

Figure 6: Prevalence of HDL_C among smokers.
P value<0.001, Group I (satisfactory HDL_C), Group II (low HDL_C)

Lipid characteristics of study population stratified by level of high density lipoprotein cholesterol

The low HDL-C group was associated with lower median LDL_C (113 vs. 120mg/dl, p=0.34) and higher mean Triglycerides (161 vs.128 mg/dl p =0.47) and higher mean VLDL_C (31 vs. 27mg/dl p=0.054) as shown in Table 5, Figures 7 & 8.

Table 5: Lipid Characteristics of Study Population Stratified by Level of High Density Lipoprotein Cholesterol (HDL_C)(n=273).

Lipid Profile	Group I 73 (26.7%)	GroupII 200(73.3%)	P Value	Significance
Total Cholesterlol mg/dl. Mean	200±47	200±56	0.025	S
LDL_C Mean mg/dl	120±45	113±48	0.34	N.S
< 70 mg/dl	6(8.2%)	33(16.5%)	0.02	S
70-100mg/dl	22(30.2%)	60(30%)	0.02	S
>100 mg/dl	45(61.6)	107(53.5%)	0.02	S
Triglyceides Mean mg/dl	128.3_+52	161.3_+13	0.47	N.S
<150 mg/dl	54(74%)	123(61.5%)	0.05	S
≥150 mg/dl	19(26%)	77(38.5%)	0.05	S
VLDL_C	26.2_+13	30.8_+2	0.05	S

Group II (low HDL_C), P value is significant if <0.05, P value is highly significant if <0.001

Citation: Thabet NI, Hassanin HA, Kamal YM (2015) Study of High Density Lipoprotein Cholesterol among Patients with Acute Coronary Syndrome in Sohag University Hospital. J Cardiol Curr Res 2(5): 00073. DOI: 10.15406/jccr.2015.02.00073

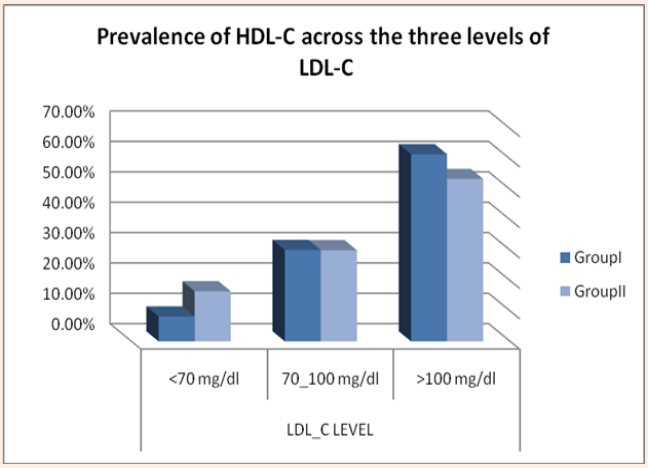

Figure 7: Prevalence of HDL-C across the three levels of LDL_C. P value=0.2, Group I (satisfactory HDL_C), Group II (low HDL_C)

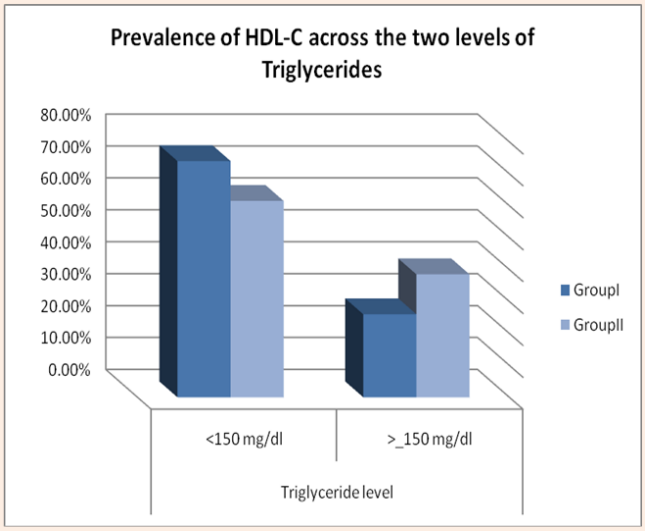

Figure 8: The prevalence of HDL-C across the two levels of Triglycerides. P value=0.056, Group I (satisfactory HDL_C), Group II (low HDL_C),

Patients with higher BMI, prior MI, diabetes mellitus, hypertension, renal impairment, ex-smokers, and were female more likely to have low HDL-C. However, those that were young, males, had higher LDL-C and lower triglycerides levels were more likely to be associated with satisfactory HDL-C.

The impact of HDL-C on in-hospital course and outcomes

The impact of HDL-C on in-hospital outcomes revealed that low HDL-C was associated with higher all in hospital morbidity and mortality, CHF(36 (14.7%) vs. 4(5.5%) p=0.01), recurrent ischemic attacks (14(7%) vs. 1(1.4%) p=0.01), reinfarction (2(2.7%) vs. 2(1%) p =0.29), cardiogenic shock (6(3%) vs. (0%) p=0.013) and Death (16(14.2%) vs. 16(10%) P = 0.012) compared with the satisfactory HDL-C group as shown in Table 6.

Cardiovascular risk factors across gender

Women had higher rates of other cardiovascular risk factors than males, as shown in Table 7 and Figure 9 e.g.: DM (46.9% vs. 22.5% P<0.001), Hypertension (48.7% vs. 33% p=0.01) higher BMI (25.9_+6 cm vs. 24.8_+4.3 p=0.001) higher Waist Circumference (94.4cm vs. 93.6 cm p=.02), higher family history of IHD (24.8% vs. 19.4% p =0.3) and higher mean total LDL_C (154.5±147 vs. 151±99.8 mg/dl p = 0.8).

Table 6: In_hospital course and outcome of patients with ACS stratified by HDL_C level .

In_Hospital Course and Outcome	Group I N(%)	Group II N(%)	P Value	Significance
Improved	57(78.1%)	120(60%)	0.02	Significant
CHF	4(5.5%)	36(18%)	0.01	Significant
Reischaemia	1(1.4%)	14(7%)	0.07	Insignificant
Reinfarction	2(2.7%)	2(1%)	0.29	Insignificant
Cardiogenic Shock	0(0.0%)	6(3%)	0.13	Insignificant
Death	8(11%)	24(12%)	0.012	Significant
Total	73 (100%)	200(100%)		

Group I (satisfactory HDL_C),

Group II (low HDL_C),

P value is significant if <0.05,

P value is highly significant if <0.001

Table 7: Prevalence of cardiovascular risk factors across gender.

	Male (160)	Female(113)	P Value	Significance
Diabetes N%	36 (22.5%)	53 (46.9%)	<0.001	S
Hypertension N%	53 (33%)	55 (48.7%)	0.01	S
BMI Mean.cm/m2	24.8± 4.3	25.9 ±6	0.001	S
WC cm	93.6±10.5	94.4±13.3	0.02	S
Past History of IHD N%	74(64.3%)	64(56.6%)	0.09	N.S
Past History of MI N%	48(30%)	30(26.5%)	0.5	N.S
LDL_C Mean mg/dl	151±99.8	154.5±147	0.8	N.S
<70 mg/dl N%	20(12.5%)	19(16.8)	0.049	S
70-100 mg/dl N%	41(25.6%)	41(36.8%)	0.049	S
>100 mg/dl N%	99(61.9%)	53(47%)	0.049	S
Triglycerides Mean g/dl	121±50	108±41	0.02	S
<150 mg/dl N%	107(67%)	70(62%)	0.4	N.S
≥150mg/dl N%	53(33%)	43(38%)	0.4	N.S
Family History of IHD N%	31(19.4%)	28(24.8%)	0.3	N.S

P value is significant, P value is highly significant if <0.001

BMI: Body Mass Index; WC: Waist Circumference; IHD: Ischaemic Heart Disease; MI: Myocardial Infarction; LDL: Low Density Lipoproteins.

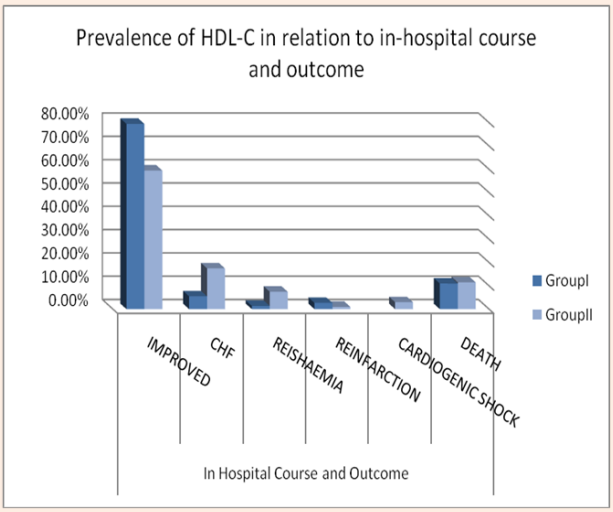

Figure 9: The prevalence of HDL_C among patients according to in hospital course and outcome.
P value=0.009, Group I (satisfactory HDL_C), Group II (low HDL_C)

Table 8: Frequency of in hospital course and outcome across gender.

In Hospital Course and Outcome	Male N(%)	Female N(%)	P Value	Significance
Impoved	113(70.6)	64(56.6%)	0.03	S
CHF	21(13.1%)	19(16.8)	0.4	N.S
Reischaemia	8(5%)	7(6.2)	0.7	N.S
Reinfarction	1(.6%)	3(2.7%0	0.16	N.S
Cardiogenic Shock	2(1.3%)	4(3.5%)	0.2	N.S
Death	16(10%)	16(14.2)	0.3	N.S
Total	160	113		

P value is significant if <0.05, P value is highly significant if <0.001, CHF: Congestive Heart Failure.

Citation: Thabet NI, Hassanin HA, Kamal YM (2015) Study of High Density Lipoprotein Cholesterol among Patients with Acute Coronary Syndrome in Sohag University Hospital. J Cardiol Curr Res 2(5): 00073. DOI: 10.15406/jccr.2015.02.00073

Table 9: The frequency of the in hospital course and Outcome in relation the diagnosis.

Variable	STEMI_ACS 124(45.4%)	NSTE_ACS 149(54.6%)	P value	Significance
Improved	92(74.2%)	85(57%)	0.003	Significant
CHF	9(7.3%)	31(20.8%)	0.002	Significant
Reischaemia	6(4.8%)	9(6%)	0.7	Insignificant
Rinfarction	2(1.6%)	2(1.3%)	0.8	Insignificant
Cardiogenic shock	3(2.4%)	3(2%)	0.8	Insignificant
Death	11(8.9%)	21(14%)	0.18	Insignificant

P value is significant if <0.05, P value is highly significant if <0.001

STEMI: ST Segment Elevation Myocardial Infarction; NSTE-ACS: Non ST Segment Elevation Acute Coronary Syndrome; CHF: Congestive Heart Failure.

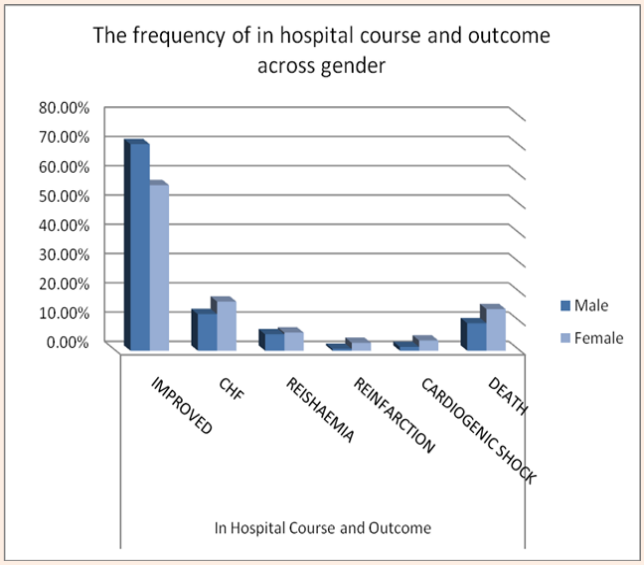

Figure 10: The frequency of in hospital course and outcome across Gender.

P value=0.17

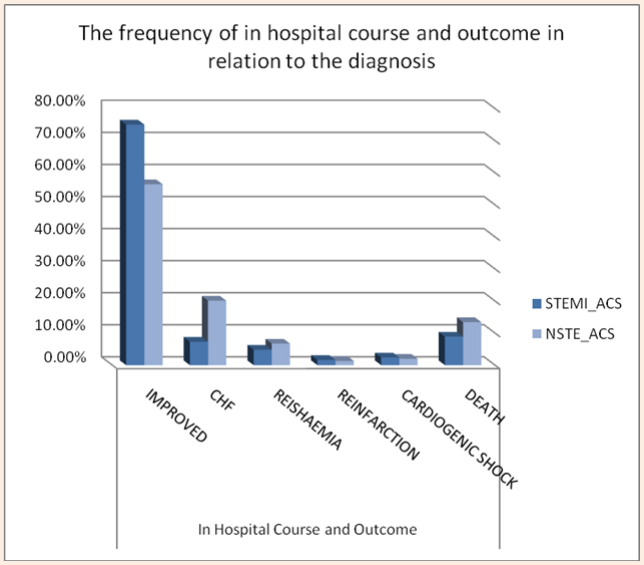

Figure 11: The frequency of the in hospital course and outcome in relation the diagnosis.

P value=0.02

STEMI: ST Segment Elevation Myocardial Infarction; NSTE-ACS: Non ST Segment Elevation Acute Coronary Syndrome; CHF: Congestive Heart Failure.

Women had higher in hospital mortality and morbidity than males as shown in Table 8 and Figure 10. Higher CHF (19(16.8%)vs.21(13%) p=0.4), Recurrent ischaemic attacks (7 (6.2%)vs.8(5%) p=0.7) Reinfarction (3(2.7%)vs.1(.6%) p=0.2), Cardiogenic Shock (4(3.5%) vs. 2(1.3%) p=0.2) and Death (16(14.2%) vs. 16(10%) p=0.3). Patients with diagnosis of NSTE_ ACS had higher rate of recurrent ischemia (9(6%) vs. 6(4.8%) p=0.8) and CHF (31(21%) vs. 9(7.3%) p=0.002) and higher rate of death (21(14%) vs. 11(9%) p=0.18) as shown in Table 9 and Figure 11.

Discussion

Ischemic heart disease is the main cause of disability and death in the most countries of the world. Despite the major improvements in diagnosis and treatment, one third of patients with ACS die. Half of these patients, within the first hour and before reaching to the hospital die. And two-thirds of those who survive do not ever fully recover and do not return to normal life Mirkhani H et al. [18].

The most common clinical manifestations of ACS are unstable angina (UA), non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI). UA and NSTEMI are closely related conditions and called NSTE_ACS, both characterized by clinical symptoms suggestive of acute ischaemia (e.g. chest pain or discomfort), occurring de novo or rapidly increasing in frequency, duration and or intensity, with or without ST-segment depression or T-wave inversion on the Electrocardiogram (ECG). However, distinction between UA and NSTEMI is made by the absence or presence of circulating biomarkers for myocardial necrosis, respectively life Anderson JL et al. [19].

With few exceptions, low HDL is an independent risk factor for CAD in case-control and prospective observational studies. In contrast, high HDL levels are associated with longevity and are protective against the development of atherosclerotic disease. In the Framingham Study, risk for CAD increases sharply as HDL levels fall progressively below 40 mg/dL Castelli WP et al. [20]. Several mechanisms by which HDL protects against the development of

CVD have now been identified. As outlined above, RCT is a well-established antiatherogenic function of HDL. A second important mechanism is the reduction of inflammation through the selective decrease of endothelial cell adhesion molecules that facilitate the binding of mononuclear cells to the vessel wall and promote lesion development Barter PJ et al. [21]. In this study two hundreds and seventy three patients was hospitalized with diagnostic criteria of ACS were studied to find out the prevalence of different levels of HDL_C in the studied patients and the impact of HDL_C on in-hospital outcome during hospital admission period in CCU ranging from 3 to 7 days.

We have demonstrated that about 200(73.3%) of studied patients had low HDL levels (<40mg/dl for men and <50mg/dl for women) and 73 (26.7%) had satisfactory HDL level (≥40 mg/dl for men and ≥50 mg/dl for women)these result coincide with study on 6,266 patients, from middle east on 6 countries of the Gulf area Khalid AR et al. [22] showed the prevalence of low HDL(62%) and satisfactory HDL (38%). And coincide with a study from united states Rubins et al. [23] showed that in a population of 8,500 men at Veterans Affairs Medical Centers throughout the United States, 63% had low HDL-C. Contrary to the above reports which shows the very high prevalence of low HDL_C, There are other studies from other provinces of middle east reported high prevalence but to a lower extend study from Oman Ibrahim AZ et al. [24] on 1,458 patients showed the prevalence of low HDL_C (53%). Also a study from Spain Xavier P et al. [25] on 367 patients also reported high prevalence of low HDL_C (57%) but to a lower extend. And Sachdeva A et al. [26] study on 136,905 patient in USA, showed (55%) of patients hospitalized with CAD had admission low HDL-C. And other similar study in USA by Wolfram M et al. [27] on 1,032 patients, showed a prevalence of low HDL_C (53.3%).

In contrast, some studies showed low prevalence of low HDL. Arai et al. [28], in Japan on 249 patients reported low HDL (34%) and high prevalence of satisfactory HDL(66%). And Correia et al. [29] in Brazil on 97 patients reported low HDL(28%) and high prevalence of satisfactory HDL (72%). The higher percentage of low HDL_C and low percentage of satisfactory HDL_C in this study from all the studies abroad is due to the the small number of patients, bad eating habits, prevalence of obesity, poor sport culture, high prevalence of smoking either direct or passive and poor health culture. The low HDL-C group, compared with the satisfactory HDL-C, was associated with higher female gender (49.5%vs 19.2%; p <0.001), higher median BMI (25.5 vs. 24.4 kg/m^2; p=.025), greater waist circumference (94 vs. 91 cm; p=0.026), diabetes (37.5 vs. 19.2%; p=0.004), hypertension (45 vs. 24.7%; p=0.002) higher renal impairment (serum creatinin>2 mg/dL) (26.5% vs. 15.1% p = 0.048) and higher NSTE_ACS (57% vs. 48% p=.18). Higher recurrent cardiovascular diseases, past history of IHD (53.5% vs. 42.5% p value=0.1), past history of MI (31% vs. 22% p value=0.14), past history of PCI (10.5% vs. 9.6% p value=0.8) and past history of CABG (4% vs. 2.7% p value=0.6) all of this coincides with the study from middle east on 6 countries of the Gulf area Khalid AR et al. [22]. And in contrary to Xavier P et al. [25] which low HDL_C was more prevalent in males than females. The impact of HDL-C on in-hospital outcomes revealed that low HDL-C was associated with higher all in hospital morbidity and mortality e.g CHF, recurrent ischemic attacks, reinfarction, cardiogenic shock and death compared with the satisfactory HDL-C group. But the low HDL_C impact on in hospital outcome was significant for CHF and Death and this coincides with Khalid AR et al. [22]. Low HDL-C is a component of metabolic syndrome and seen more commonly with obesity and diabetes [29,30]. In our analysis, patients with higher BMI, and diabetes mellitus, were more likely to have low HDL-C even after adjusting for other factors and this coincides with Khalid Al-Rasadi et al. [22]

Diabetic patients who have low HDL-C levels have cardiovascular event rates greater than those of diabetic patients with normal HDL-C levels levels Davidson MH et al. [30,31]. Kato et al. [32] showed that among the components of metabolic syndrome, abdominal obesity and low HDL-C levels were more frequently observed in patients with multiple, complex coronary lesions and this coincides with our study. Therefore, abdominal obesity and low HDL-C are likely to be key factors for coronary plaque vulnerability and may be associated with the poor clinical outcomes of ACS patients. Low HDL-C appears to be potentially a modifiable risk factor for patients with ACS. Optimization of lifestyle modifications by moderate weight loss (by 5-10%) combined with exercise significantly decrease triglycerides and increase HDL-C levels, consequently improving cardiovascular risk. Van Gaal LF et al. [33] Low HDL-C has been shown to be associated with a higher risk of cardiovascular events and a greater burden of atherosclerosis, even among patients with controlled LDL-C, including those who are treated with a high dose statins Barter P et al. [34] and deGoma EM et al. [35].

In this context, showed that low levels of HDL-C remain significantly associated with increased cardiovascular risk despite statin treatment as a meta-analysis by Jafri et al. [36]. Moreover, a study by Correia et al. [29] demonstrated that low levels of HDL-C at admission in individuals with NSTE_ACS predicted recurrent in-hospital events during hospitalization and LDL_C and triglycerides were not associated with cardiovascular events and this on the contrary to our study which show that low HDL_C in patients with NSTE_ACS is insignificantly associated with recurrent cardiovascular events except it is significantly associated with higher CHF. The high prevalence of low HDL in women, is likely related to the high prevalence of obesity and metabolic syndrome among women in Egypt Similarly a published Gulf RACE study on gender differences of cardiovascular risk factors, El-Menyar A et al. [37] showed that women had higher rates of other cardiovascular risk factors such as diabetes and hypertension and this coincides with our study and coincides with other study of GULF area by Khalid AR et al. [22]. Moreover in their study, women had higher adjusted in-hospital mortality compared with men. However, in our study, low HDL-C did not correlate with either mortality or cardiogenic shock in relation to gender, low HDL-C was in women insignificantly related to both mortality(14.2% vs. 10% p =0.3) and cardiogenic shock in females (3.5 vs. 1.3% p =0.2) and this coincides with Xavier P et al. [25]. But in contrast to Ibrahim AZ et al. [24] which Show significant relation between low HDL-C and all causes of in hospital morbidity and mortality in females.

Study Limitations

The limitations of a registry-type study apply, such as unidentified confounders which could influence the results. Furthermore, lipid levels may be partially affected during the acute phase of ACS and this could have influenced the estimation of low HDL-C levels Cannon CP et al. [38]. However, a recent study found little change in lipid levels measured serially in the first days of hospitalization for ACS de Lemos JA et al. [39]. The study

was on a small governorate and in one hospital and consequently the number of patients is small in comparison to other studies.

Conclusion

This study demonstrated a high prevalence of low HDL_C levels in ACS patients in Sohag governorate in Upper Egypt and that this abnormality was more common in females than in males. Low HDL-C was common in diabetics, hypertensives, patients with renal impairment and in over weight and obese patients. Low HDL-C was significantly associated with higher all in-hospital mortality and CHF, but insignificantly associated with in-hospital mortality and cardiogenic shock in women. Although guidelines for LDL-C management in ACS are well established, treatment recommendations concerning HDL-C levels are not as rigorous or aggressive. Failure to recognize the prognostic value of low HDL-C in ACS may predispose these patients to higher risk of recurrent events and worse outcomes. Studies evaluating the clinical benefit of increasing HDL-C levels in patients with ACS are needed. It may be that small changes in HDL-C or those induced by currently available lipid lowering drugs are not effective.

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