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Association of Plasma Lipid profile and HbA1c among Saudi Patients with Coronary Heart Diseases, at King Abdulaziz Medical City, Riyadh

TARIG KARAR
Assistant Professor in Clinical Chemistry
Department of Clinical Laboratory Sciences
College of Applied Medical Science
King Saud Bin Abdulaziz University
Kingdom of Saudi Arabia

Abstract:

Coronary heart disease CHD remains a major cause of worldwide morbidity and mortality, so this study aimed to evaluate lipid profile and glycosylated hemoglobin in patient diagnosed with Coronary heart disease, also to study prevalence of diabetes mellitus and hypertension among those patients. Hundred patients diagnosed with CHD of all age groups admitted at King Abdulaziz Medical City, Riyadh (KAMC-R) during the period from March 2014 to June 2014, were enrolled in this study. Relevant biochemical laboratory data for study population was retrieved from biochemistry laboratory database and the obtained data were analyzed using SPSS computer program. The result showed high prevalence of DM and HTN among patients, (72%& 64%) respectively. Results of this study observed high level of HbA1c, fasting glucose, low density lipoprotein LDL, low high density lipoprotein HDL, normal cholesterol and triglycerides(8.6), (13.6), (2.8), (1.0), (4.6), (1.7) when compared with reference values (5.2), (3.9-5.8), (2.6), (1.55),(5.18) (1.7), respectively. This study concluded that increase in HbA1c, LDL and decrease in HDL could be considered as a risk factor for developing CAD.

Key words: Diabetes mellitus, Hypertension, Dyslipidemia, Cholesterol, Triglycerides, LDL, HDL

Introduction:

Coronary heart disease (CHD), also known as coronary artery disease CAD is a narrowing of the blood vessels (coronary arteries) that supply oxygen and blood to the heart. CHD is a major cause of illness and death, generally it caused by atherosclerosis. Atherosclerosis is a pathologic process that causes disease of the coronary, cerebral, and peripheral arteries [1,2]. This process begins when plaque (cholesterol substances) accumulates on the artery walls, causing them to narrow, resulting in less blood flow to the heart. Sometimes a clot may form which can obstruct the flow of blood to heart muscle. Some patients are asymptomatic for life, even though they harbor atherosclerotic plaques in their vasculature. Others have ischemic symptoms, such as myocardial infarction and stroke [3].Risk factor assessment is useful in adults to guide therapy for dyslipidemia, hypertension, and diabetes, and multivariate formulations can be used to help estimate risk for coronary disease events [4-6].

Diabetic patients have a higher prevalence of coronary heart disease with an increased number of fatal coronary events due to a higher incidence of plaque rupture and superimposed thrombosis in diffusely diseased coronary arteries [7].Glycated hemoglobin (HbA1c) is an important indicator of long-term glycemic control with the ability to reflect the cumulative glycemic history of the preceding 2–3 months. Recently, elevated HbA1c has been regarded as an independent risk factor for coronary heart disease (CHD) and stroke in subjects with or without diabetes. The impact of poor glycemic control is so grave that increased maternal HbA1c could impair fetal long axis cardiac function, whereas improving glycemic

control can substantially reduce the risk of cardiovascular events in diabetics [8,9].

A high blood cholesterol level makes the build-up of plaques and consequent atherosclerosis more likely. High cholesterol can be caused by high LDL (low-density lipoprotein) levels or low HDL (high-density lipoprotein) levels. LDL is also known as the bad cholesterol, while HDL is also known as the good cholesterol. Patients with type 2 diabetes often exhibit an atherogenic lipid profile (high TG and low HDL cholesterol) which greatly increases their risk of CVD compared with people without diabetes [10].

Hence in the current study, we aimed to assess microalbuminuria and albumin creatinine as sensitive indicators for the early detection of renal impairment among the diabetic patient.

Materials and Methods

Study design

A quantitative retrospective chart review study.

Study area

This study was conducted at Department of Clinical Chemistry, King Abdulaziz Medical City (KAMC) in Riyadh, Saudi Arabia, during the period from January to March 2014. Clinical data from patients diagnosed with coronary artery disease, of age groups range from 40 to 82 years, admitted at cardiology department of KAMC in 2013 and excluding patients with other cardiovascular diseases.

Sampling Technique:

Patients of both the genders of different age groups who were discharged from KAMC-R with diagnosis of coronary artery

diseases at any point in time during 2013 were enrolled in this study.

Data collection methods

After approval from Institutional Review Board of National Guard, relevant data for study population was obtained from biochemistry laboratory database, computer printout of demographic data, discharge clinical events, and outcomes were collected from medical records department at KAMC. All data were tabulated in the master sheet prior to analysis.

Data management and analysis plan

The statistical analysis was performed using SPSS version 20 (The International Business Machines Corporation, New York). The descriptive results are expressed as mean ± standard deviation and percentage. Variables of the patients group were correlated with each other by Pearson correlation test.

Results:

The study involves 100 patients diagnosed with coronary artery diseases, 72 patients (72%) of them were male and 28 patient (28%) were female as indicated in table (1). 72 patients (72%) had a history of diabetes mellitus type 2, 64 patient (64%) were diagnosed with hypertension, 53 patients (53%) were diabetic hypertensive while only14 patients (14%) non diabetic non hypertensive as indicated in table (2).

Patient's results for glycosylated hemoglobin, fasting glucose, lipid profile andtroponin were expressed as mean ± Standard deviation as indicated in table (3).

Comparison of means of plasma levels Lipid profile, FPG and HbA1c between hypertensive and non-hypertensive among all patients indicated in table (4) Correlation between HDL with triglycerides was indicated in figure (1).

Table (1): Frequency of sex among patients

Variable	Number	Percent
Male	72	72%
Female	28	28%

Table (2): Frequency of DM, HTN among patients

Variable	Number	Percent	Total number
Diabetic	72	72%	100
Hypertensive	64	64%	100
Diabetic hypertensive	53	53%	100
Non diabetic non hypertensive	14	14%	100

Table (3): Base line parameter among patients

Variable	Mean	Reference value
HbA1C	8.6±2.3	4.4-6.4%
Fasting glucose	13.6±3.1	3.9-5.8 (mmol/l)
Total cholesterol	4.6±1.2	<5.18 (mmol/L)
Triglycerides	1.7±0.9	<1.70 (mmol/L)
HDL	1.0±0.3	>1.55 (mmol/L)
LDL	2.8±1.1	<2.60 (mmol/L)
Troponin	9.6	<0.012

The table shows mean ± Std. deviation, reference range and units between brackets

Table (4) Comparison of means of plasma levels Lipid profile, FPG and HbA1c between hypertensive and non-hypertensive among all patients

Variable (Unit)	Hypertensive (64)	Non hypertensive (36)	Reference range	P. Value
HbA1c (%)	8.4	8.5	**(**4.4 – 6.4**)**	0.955
Cholesterol (mmol/L)	4.6	4.7	**(**≤5.18**)**	0.805
Triglycerides (mmol/L)	1.7	1.7	**(**≤1.70**)**	0.950
HDL (mmol/L)	1	0.9	**(**≥1.55**)**	0.058
LDL (mmol/L)	2.8	2.9	**(**≤ 2.60**)**	0.447
FPG (mmol/L)	11.6	9.7	**(**3.9 – 5.8**)**	0.108

The table shows the mean, reference range in brackets and probability (P).
Independent t- test was used for comparison.
P- value ≤ 0.05 is considered significant.

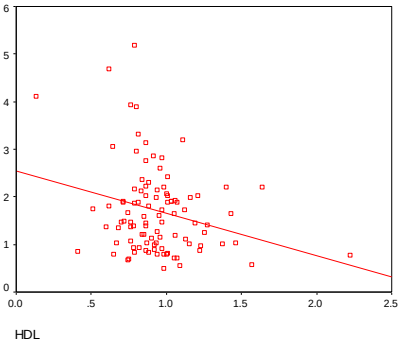

Figure (1) A scatter plot shows the correlation between levels of HDL in mmol/land levels of triglycerides in mmol/l(r=-0.28 P=0.010)

Discussion:

Known that hypertension, diabetes mellitus and dyslipidemia are among the main risk factors contributing to coronary artery stenosis, many previous studies reported that most of patients diagnosed with coronary artery disease suffering and complaining of dyslipidemia, also reported that there is association between elevated plasma lipids and lipoprotein levels and CAD risk [11-13] .Elevated serum triglyceride (TG) and decreased HDL cholesterol levels, the core component of the metabolic syndrome, are also commonly found in many patients with established CAD [14.15]. Furthermore other reports suggest that elevated plasma levels of low density lipoprotein (LDL) cholesterol and lower HDL cholesterol are associated with increased risk of developing coronary artery disease [16,17].Accordingly the results of present study showed increase levels of LDL and triglycerides with decrease levels of HDL when compared with reference range.

Diabetes mellitus (DM) is known to cause microvascular and possibly macrovascular complications. This study was performed to find the association of glycosylated haemoglobin (HbA1c) level among Saudi diagnosed with coronary artery disease. So results of our study reported that 72% of patients

are diabetic and accordingly marked increase in HbA1c among patients was revealed (8.6%). Our results were confirmed by previous study which find that (70.9%) had DM, 73 (93.58%) had HbA1C > 7%. [18]

Previous study indicates that women have much lower rates of coronary heart disease than men [19]. These findings justified our results which revealed that the frequency of male is three times female.

A number of studies have been performed to study the relationship of high triglyceride and/or Low HDL Levels with coronary heart diseases, part of these studies show that many affected members have shown a significant and strong inverse relationship between HDL-C and CHD, furthermore other observational studies using case control methods in patients with CHD have consistently shown a strong association of increased triglyceride with CHD [20]. Therefore the results of present study demonstrated that the concentration of triglycerides was significantly adverse correlate with HDL-C concentration among patient with CHD (r=-0.28 P=0.010). More recently, it has been recognized that triglycerides concentrations correlated negatively with the predominant LDL size (r = −0.650) and HDL-C concentration (r = −0.556)[21].

Conclusion:

This study showed increase level of HbA1c, increase level of LDL and decrease level of HDL therefore diabetes mellitus, hypertension and dyslipidemia could be valuable risk factor for developing CAD, so monitoring of blood pressure, treating of hyperlipidemia and good glycemic control will decrease the incidence of CHD.

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