Full Length Research Paper

Lipid Profile Abnormalities as Predictive Factor for Electrocardiogram Changes and Coronary Artery Disease among Sudanese People in Shendi Locality

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Abstract

Coronary artery diseases (CAD) remain the leading cause of death. Dyslipidemia is an important risk factor for the initiation and progression of atherosclerosis and is strongly associated with Coronary artery diseases. This study was a prospective, observational survey study conducted at Shendi locality to estimate the Lipid profile Abnormalities and Electrocardiogram (ECG) Changes in the period between (2010) and (2012). The study included (100) volunteers selected randomly, aged between (25-60 years). The study showed (44) subjects (group 1) with normal lipid profile and (56) subjects (group 2) with abnormal lipid profile. In this study, we found a highly significant statistical difference (P < 0.05) between lipid profile in group I and group II. In (group 2) 6 subjects (10.3%) were with ECG changes. When comparing the anthropometric characteristics of the two groups there was no statistical difference with respect to weight, height and body mass index. The same was for Systolic pressure and diastolic pressure (‘p’=0.558, ‘p’=0.430, ‘p’=0.345, ‘p’=0.729 and ‘p’=0.420 respectively). Abnormal lipid profile can be considered as predictive for Electrocardiogram Changes and Coronary Artery Disease.

Key word: Lipid Profile, Coronary Artery Diseases, Electrocardiogram, Sudanese.

INTRODUCTION

Heart disease or cardiovascular disease is defined as the class of disease that involved the cardiac or blood vessels including arteries and veins. Although the term technically refers to any disease that affects the cardiovascular system, it is usually to refer to those related to atherosclerosis and arterial disease since they shared similar conditions of causes, mechanisms and treatments (Maton, 1993). The primary underlying disease processing that leads to atherosclerosis is the deposition of lipid on the arterial surface progress to form plaques that reduced blood flow and induced blood clots that blocked flow entirely (McGill et al., 2000). Dyslipidemia, including high serum total cholesterol, LDL cholesterol and triglyceride levels and low HDL cholesterol levels, is an established risk factor of coronary heart disease (Garvey et al., 2003; Genest et al., 1992). Most cases of Dyslipidemia have genetic bases, in some cases, in addition to genetic disorder(s), environmental factors such as diet, exercise and smoking habits also play important role in manifestation and progression of the disease. LDL cholesterol is atherogenic and it is associated with increased risk of atherosclerosis and its complications (Assmann et al.,
1996; Sarwar et al., 2007) such as coronary heart disease and stroke. Small and dense LDL cholesterol particles are more atherogenic (Nordestgaard et al., 2007; Elnasri and Ahmed, 2008) and have greater predictive value for cardiovascular disease risk as compared to its simple quantitative measurement (Elnasri and Ahmed, 2008). LDL cholesterol level is elevated by a diet rich in saturated fats, smoking, sedentary life style, and increased visceral fat (Farmer, 2008) the risk of coronary heart disease is decreased by lowering its level. The incidence of coronary heart disease (CHD) rises steadily and exponentially with increasing serum cholesterol levels (Idogun et al., 2007).

Cholesterol concentration also exhibits a positive relationship with the coronary heart disease mortality (Mathura et al., 2005). HDL cholesterol is antiatherogenic, and it protects against the coronary heart disease (Ahmed et al., 2005; Haq et al., 2006). Low HDL cholesterol increases the risk of cardiovascular disease (Firdous and Khan, 2007). HDL cholesterol levels are increased in individuals who exercise, whereas low HDL cholesterol, high triglycerides are found in obese subjects increasing cardiovascular disease risk (Khalil et al., 2005). Although correlation between serum cholesterol levels and atherosclerosis diminishes with advancing age, the predictive value of cholesterol is restored when fractioned into its atherogenic LDL and protective HDL components (Elnasri and Ahmed, 2008). High serum triglyceride levels are also associated with increased risk of coronary heart disease (Ahmed et al., 2005; Haq et al., 2006). Hence, this study was carried out to assess the Lipid profile as a risk factor for cardiovascular risk in Shendi, Sudan.

**MATERIALS AND METHODS**

This study was conducted at Shendi locality- Sudan to estimate lipid profile among Sudanese people in the period between (2010) and (2012). The study included (100) volunteers. Their ages range from (25-60) years. Blood samples were obtained after an overnight fast. (5) ml of venous blood was taken from antecubital vein by plastic disposable syringes. The blood was then transferred into plain glass tubes. After one hour at room temperature (after clot retraction) centrifugation of the blood was done at a relative centrifugal force of (1000) g for (5) minutes. Afterward sera were transferred to glass containers and stored at (-20°C) to be analyzed in patches. Serum total cholesterol (TC), high density lipoprotein-cholesterol (HDL-C), low density lipoprotein-cholesterol (LDL-C), triglyceride (TG) and plasma fasting glucose were measured. Height, weight, blood pressure and electrocardiogram (ECG) were done for all participants in this study. Clinical data were collected through a questionnaire, and (SPSS) version (11.5) program was used for data analysis. All the data were presented as the mean ±SD.

**Inclusion criteria**

Individuals in the age range of (25-60).

**Exclusion Criteria**

Individuals with pre-existing cardiac disease, smokers, diabetics and hypertensives.

**RESULTS**

The study included (100) volunteers and showed (44) subjects (group 1) with normal lipid profile and (56) subjects (group 2) with abnormal lipid profile. The subjects with increased total cholesterol, total triglycerides and low density lipoprotein, decrease HDL belong to this group. This group was compared to the group I. In the comparison of the anthropometric characteristics of the two groups there was no statistical difference between both the groups with respect to height, weight and body mass index, and also for systolic pressure and diastolic pressure ('p'=0.558, 'p'=0.430, 'p'=0.345, 'p'=0.729 and 'p'=0.420, respectively).

Table 1 summarizes anthropometric characteristics of the two study groups.

The results also revealed a highly significant statistical difference (P<0.05) between lipid profile in group I and group II. Table 2 shows the Correlation of normal lipid profile (Group I) compared with (Group II) abnormal lipid profile.

In subjects with abnormal lipid profile it was found that (10.3%) with ECG changes. Table 3.

**DISCUSSION**

In the present study the total cholesterol, total triglycerides and low density lipoprotein were increased, and HDL was decreased in subjects with abnormal lipid profile (Group II) was statistically significant by (P<0.005), when compared with (Group I) subjects of normal lipid profile. Dyslipidemia is a disorder of lipoprotein metabolism, including lipoprotein overproduction or deficiency. Dyslipidemias may be manifested by elevation of the total cholesterol, the “bad” Low-Density Lipoprotein Cholesterol (LDL-C) and the triglyceride concentrations, and a decrease in the "good" High-Density Lipoprotein Cholesterol (HDL-C)
Table 1. Anthropometric data of subjects with normal lipid profile (Group I) and abnormal lipid profile (Group II)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group I (N=44)</th>
<th>Group II (N=56)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>41.57±10.8</td>
<td>49.2±12.4</td>
<td>.002*</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.36±12.2</td>
<td>66.9±13.1</td>
<td>.558</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.67±0.08</td>
<td>1.6±0.1</td>
<td>.430</td>
</tr>
<tr>
<td>BMI</td>
<td>23.37±4.2</td>
<td>24.1±4.2</td>
<td>.420</td>
</tr>
<tr>
<td>Systolic pressure</td>
<td>123.18±12.3</td>
<td>125.9±15.4</td>
<td>.345</td>
</tr>
<tr>
<td>Diastolic pressure</td>
<td>80.68±8.4</td>
<td>80.1±8.4</td>
<td>.729</td>
</tr>
</tbody>
</table>

*t- test P<0.05 is significant, Mean ± SD; BMI: body mass index

Table 2. Correlation of normal lipid profile (Group I) compared with abnormal lipid profile (Group II)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group I (N=44)</th>
<th>Group II (N=56)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol</td>
<td>4.186±0.6</td>
<td>5.16±1.0</td>
<td>.000</td>
</tr>
<tr>
<td>HDL</td>
<td>1.5±0.5</td>
<td>1.05±1.1</td>
<td>.010</td>
</tr>
<tr>
<td>LDL</td>
<td>2.3±0.7</td>
<td>3.8±1.0</td>
<td>.000</td>
</tr>
<tr>
<td>TG</td>
<td>1.25±0.3</td>
<td>1.7±0.7</td>
<td>.000</td>
</tr>
</tbody>
</table>

*t- test P<0.05 is significant, Mean ± SD.

Table 3. Distribution of study population according to (ECG)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group II (N=56) (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (ECG)</td>
<td>50 (89.3%)</td>
</tr>
<tr>
<td>Abnormal (ECG)</td>
<td>6 (10.7%)</td>
</tr>
</tbody>
</table>

Concentration in the blood (Maton, 1993). Hyperlipidaemia, hyperlipoproteinaemia, is the condition of abnormally elevated levels of any or all lipids and/or lipoproteins in the blood. It is the most common form of dyslipidemia (which also includes any decreased lipid levels). Lipids (fat-soluble molecules) are transported in a protein capsule, and the size of that capsule, or lipoprotein, determines its density. Elevated cholesterol in the blood involves abnormalities in the protein particles which transport all fat molecules, including cholesterol, within the water of the bloodstream. This may be related to diet, increased body fat, genetic factors (such as low density lipoprotein receptor mutations in familial hypercholesterolemia) and the presence of other diseases such as diabetes and an underactive thyroid. The type of hypercholesterolemia depends on which type of particle (such as low density lipoprotein) is present in excess (AshaBisht et al., 2012). In the study, 10.7 % of the abnormal lipid profile subjects showed abnormal ECG, epidemiologic data also suggest that hypercholesterolemia and perhaps coronary atherosclerosis itself are risk factors for ischaemic stroke. Increasing evidence also points to insulin resistance which results in increased levels of plasma triglycerides and low-density lipoprotein cholesterol (LDL-C) and a decreased concentration of high-density lipoprotein cholesterol (HDL-C) as an important risk factor for peripheral vascular disease, stroke, and (CAD) (Paul S. Jellinger et al., 2012).

An assessment of the Framingham and Multiple Risk Factor Intervention Trial (MRFIT) data showed that approximately (85)% of excess risk for premature (CAD) is due to one or more of the following major risk factors: advancing age, high serum total cholesterol level, high (LDL-C) concentration, type 2 Diabetes mellitus, hypertension, cigarette smoking, and a family history of premature (CAD) (Paul et al., 2012). The findings of the large case-control study of acute Myocardial Infarction (MI) in (52) countries (INTERHEART study) reported that worldwide, the two most important risk factors for heart attacks are smoking and abnormal lipids, which together account for about (7%) of the Population Attributable Risk (PAR) of an acute (MI) (Conroy et al., 2003).

CONCLUSION

Increase the lipid profile Abnormalities and electrocardiogram (ECG) Changes is a risk factor for (CAD).
REFERENCES


