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NON-HIGH DENSITY LIPOPROTEIN CHOLESTEROL (NON-HDL-C)–A CORONARY RISK FACTOR

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Background: Ischaemic heart disease (IHD) is influenced by elevated cholesterol, low density lipoproteins-C (LDL-C), triglycerides and low blood levels of high density lipoproteins (HDL-C). Recently, non-HDL-C has also been suggested as one of the factors involved in IHD. Non-HDL-C is the difference between total cholesterol and HDL-C. Assuming that non-HDL-C levels are raised in IHD, a cross sectional study was designed to evaluate the levels of non-HDL-C in patients of IHD. **Methods**: Thirty adult non-smoking male (age 50±0.51 years) patients of IHD were compared with 30 adult non-smoking males (47.27±1.15 years) controls without IHD. A 12 hours fasting blood sample was analysed to determine serum cholesterol and HDL on autoanalyzer. **Results**: Non-HDL-C was significantly raised (p<0.001) in patients of IHD when compared to controls. Values of non-HDL-C were 158.00±4.79 and 127.63±2.82 (Mean±SEM) in patients and controls respectively. **Conclusion**: Non-HDL-C contains all known potentially atherogenic lipid particles including LDL-C, intermediate density lipoproteins and very low density lipoproteins cholesterol remnants. Results of this study suggest it's possible involvement in IHD. Non-HDL-C is an emerging a coronary risk factor. It is a cost effective screening test that may be included in coronary risk profile.

INTRODUCTION

Coronary heart disease risk is influenced by elevated cholesterol, low density lipoprotein-c (LDL-C), triglycerides, hypertension cigarette smoking, Low HDL-C levels, family history, life habits, increased Lipoprotein (a), homo-cysteine[1], c-reactive protein, fibringen[1,2] and haematacrit[3]. A recent study[4] has shown that risk of death due to cardiovascular disease increases with raised levels of non-HDL-C. Non-HDL –C may also be a better parameter for cardiovascular risk assessment and as target for therapy[5].

Non-HDL-C is defined as the difference between total cholesterol (TC) and HDL-C and contains all known and potentially atherogenic lipid particles[5], including LDL-C, Lipoprotein (a), intermediate–density lipoprotein cholesterol and very low density lipoprotein cholesterol remnants, therefore a good and potential predictor of risk for cardiovascular diseases. Considering the importance of non-HDL-C, we carried out this cross-sectional study to evaluate the levels of non-HDL-C, a newly recognized risk factor, in patients of IHD.

MATERIALS AND METHODS

A total of 60 subjects were included in this study. Thirty adult non-smoking male patients of IHD diagnosed on history and typical ECG findings at rest as described[6] and as applied

elsewhere[3] were compared with 30 non-smoking, sex-matched controls without history of IHD and with normal resting ECG. Exercise tolerance test and anatomical diagnosis with angiography were not considered as diagnostic criteria. Routine life habits other then smoking were not recorded. Subjects were advised to attend Aga Khan laboratory in the morning with 12-hours fasting where blood samples was collected for analysis of serum cholesterol and HDL on automated analyzer, Selectra-2™. Serum cholesterol was measured by CHOD-PAP (Cholesterol oxidase phenolanpyrone), enzyme method by using Merck kit. HDL-C was determined by HDL-C (immuno FS link method of Diagnostic System International, DIA Sys Gm bH Germany) Non HDL-C was calculated by subtracting individual values of serum cholesterol with HDL-C values.

Statistical analysis was done on SPSS version 10. Results are expressed as Mean±SEM. Student t-test was applied to see the level of significance. Value of $p \leq 0.05$ was considered statistically significant.

RESULTS

Our results in table-1 show that serum total cholesterol, HDL-C and Non-HDL-C (difference between TC and HDL-C) in patients (age 50.07±0.51 years, mean±SEM) were found significantly different from control (age 47.27±1.15 years). TC and Non HDL-C were raised whereas HDL-C was decreased significantly in patients when compared with controls. Age of controls was less than age of cases with $p<0.04$. All values are expressed as Mean±SEM. Ninety-Five percent confidence intervals of the difference of mean of cholesterol, HDL-C and Non-HDL-C were 27.5 to 31.6, – 8.5 to –7.7 and 28.4 to 32.4 respectively when cases were compared to controls.

Table-1: Comparison of serum Cholesterol, HDL-C and Non-HDL-C between patients with IHD and control (Mean±SEM)

Parameters	Patients with IHD (n=30)	Controls (n=30)	*p*
Cholesterol (mg%)	207.60±5.07	178.03±2.72	< 0.001
HDL-C (mg%)	44.23±0.89	52.33±0.82	< 0.001
Non- HDL-C (mg%)	158.00±4.79	127.63±2.82	< 0.001

DISCUSSION

Our results reveal that non-HDL-C was significantly raised in patients of IHD when compared to clinically healthy controls.

The lipid research clinic programme follow up study compared usefulness of non-HDL-C with LDL-C in predicting CVD mortality[5]. The LDL-C was found less predictive of CVD death compared to Non-HDL-C. Non-HDL-C is also said to particularly useful in certain patients sub-groups, such as those with type 2 diabetes and hypertriglyceridaemia[5]. The reason may be that Non-HDL-C includes all of the potential atherogenic lipid fractions.

Due to its composition/contents non-HDL-C is an emergency coronary risk factor therefore efforts should be made to reduce its level by advising increase in physical activity. In the newest guidelines of the national cholesterol education programme adult treatment panel III, attention was given to other lipid and lipoprotein parameters. Possibility of incorporating non-HDL-C in the treatment of lipids was discussed[7] so that drugs could be approved to increase HDL-C in patients with isolated low HDL-C and hence in controlling non-HDL-C. Depending upon the severity of risk involved the levels of non-HDL-C should be <130 mg/dl to <190 mg/dl[8]. The sum of LDL-C and VLDL-C or, alternatively, TC minus HDL-C termed non-HDL-C is a cost effective screening test to assess lipid derangement as well as response of lipid lowering agent. It is also suggested that previous epidemiological studies including Framingham should retrospectively evaluate the significance of Non-HDL-C for better explanation of this newly emerging coronary risk factor. Since it is a preliminary report at national level and it's findings are consistent with other studies[4,8] therefore large scale studies are desired to see the importance of non- HDL-C in both sexes, diabetes mellitus, hypertension, IHD and follow- up interventional studies. Reference values also need to be set in the light of our findings.

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