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Comparison between HDL-C/TC and TG/HDL-C Ratios for the Prediction of Dyslipidaemia in Troponin I Positive Patients

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1. INTRODUCTION

Cardiac troponin I and cardiac troponin T have become the preferred markers for detecting Myocardial Infarction, as they are more sensitive and tissue-specific than their main competitor, the MB fraction of creatine kinase (CK-MB)[1]. It has been shown that even very small elevations in troponins are associated with an increased risk of an adverse outcome in patients with acute coronary syndromes[2].

Lipid abnormalities have long been suspected to contribute to atherosclerosis; several epidemiological and cohort studies have established a strong association between total cholesterol, LDL-cholesterol (LDL-c), or low HDL-cholesterol (HDL-c) and the incidence of atherosclerosis related diseases, such as ischemic heart disease, stroke, and peripheral vascular disease. Plasma total cholesterol (TC) and low density lipoprotein cholesterol (LDL-C) levels are positively correlated with CHD, whereas high density lipoprotein cholesterol (HDL-C) levels are inversely related. However, TC or LDL-C and HDL-C are poorlycorrelated with each other so that knowledge of both may be important to predict CHD risk than does either of them alone[3].

Some of the authors also found that TG/ HDL-c ratio >4 is the most powerful independent predictor of CHD development. It has also been suggested that HDL/TC value is most important for predicting CHD[5].

In our study we have aimed to evaluate the correlation between the TG/HDL-c and HDL/TC ratio in patients with dyslipidemia and troponin I positive.

2. MATERIALS AND METHODS

The subjects selected for the study were the patients who were suspected for coronary disease with troponin I positive and presented to College of Medical Science, Bharatpur, Nepal. The subjects included 90 patients, 56(62.2%) men and 34(37.8%) women, with a mean age of 55 ± 15 years. Among them 70 patients were selected who had dyslipidemia The troponon I was detected qualitatively using “tropnin-kit” method. The blood glucose, total cholesterol (TC), high density lipoproteins cholesterol (HDL) and Triacylglycerol (TG) values were analysed using Hitachi Roche 902 autoanalyser using standard methods.

The presence of risk factors were defined as follows: hypercholesterolemia (total cholesterol ≥200 mg/dL), hypertriglyceridemia (≥150 mg/dL), low HDL-cholesterolemia (HDL-c) <40 mg/dl, elevated TG/HDL-c ratio (>3.75) and low HDL-c/TC ratio (≤0.24)

The study was made double blind type as the selection of the reports was done without prior information of both the subjects and the concerned medical personnel of casualty and ICU. The ethical clearance was granted by the ethical committee of College of Medical Sciences and Teaching Hospital, Bharatpur, Nepal.

Statistical analysis:

Clinical and laboratory data were expressed as mean ±SD. Statistical analysis were done using SPSS 17.0 statistical software (SPSSINC., Chicago, IL, USA) and Microsoft office access data base.

3. RESULTS

The subjects included 90 patients, 56(62.2%) men and 34(37.8%) women, with a mean age of 55 ± 15 years. Among them 70 patients were selected who had dyslipidemia. Total cholesterol was 142.7± 52.2mg/dL; triacylglycerol, 136.2±91.5 mg/dL; HDL-c, 32.0 ± 8.5 mg/dL; TG/HDL-c, 4.2 ± 2.7; and HDL-c/TC, 0.24 ± 0.007. TABLE 1 shows mean value of lipid profiles of the patients.

We applied the one sample t- test for each of the test and found out that there was no any significance increase in the lipid profiles except HDL-c. HDL-c was low than the normal range almost in most of the samples. Similarly, HDL-c/TC and TG/HDL-c were little higher than the test value.

We divided the patients into two groups according to the standard cut off values as shown in TABLE 2. Prevalence of dyslipidemia was studied by taking the reference of each individual test. We observed that lower HDL -c is the main factor for dyslipidemia associated with coronary diseases. When we compared the HDL-c/TC and TG/HDL-c, found out that HDL-c/TC is better option for predicting the risk factor for coronary disease and dyslipidemia.

4. DISCUSSION

Several studies have attempted to determine the risk levels for CAD using lipid indexes or formulas[6]. More recently, in the INTERHEART case-control study, the apoB/apoA1 ratio was shown to be the strongest risk factor associated with myocardial infarction[7]. This ratio had already been proposed as an accurate predictor of risk for major coronary events in the AFCAPS/TexCAPS15 and AMORIS[8] studies. The Copenhagen Male Study showed triglycerides as another strong risk factor, but it found that stratifying triglyceride levels by HDL-c levels led to more accurate detection of increased risk of coronary disease[9].

The ultimate goal is to protect the patients from cardiac events as soon as possible. In our study we observed that actual cholesterol level alone is not the important factor for determining the cardiovascular diseases. Alone triglycerides also did not show very significant role in predicting the risk of coronary disease. HDL-c seemed to be the better option for this if measured alone. HDL-c being an important factor it can be used for determining the HDL-c/TC and TG/HDL -c. The atherogenic link between high triglycerides and HDL -c is due to the higher plasma concentration of triglyceride-rich, very low-density lipoprotein that generates small, dense LDL during lipid exchange and lipolysis. These LDL particles accumulate in the circulation and form small, dense HDL particles, which undergo accelerated catabolism, thus closing the atherogenic circle[10,11].

Some of the authors also found that TG/ HDL-c ratio >4 is the most powerful independent predictor of CAD development [10]. It has also been suggested that HDL-c/TC value is also important for predicting CVD [5].

In our study, we found out that HDL-c/TG ratio is better option than TG/HDL to predict dyslipidemia (TABLE 2). It was observed that the prevalence of dyslipidemia is higher if HDL-c/TG ratio is calculated than TG/HDL-c ration. But these ratios alone cannot predict the risk if other lipid profiles are omitted.

5. CONCLUSION

Although all the tests included in the routine lipid profiles are important for identification and study of cardiovascular diseases, HDL-c proved to be the best one. Furthermore, where there is choice of measuring either of the two ratios: HDL-c/TC or TG/HDL-c then HDL-c/TC is better option.

Abbreviations:

HDL-c : High Density Lipoprotein Cholesterol, TC : Total Cholesterol, TG : Triglycerides, CHD : Cardiovascular Heart Disease, CVD : Cardiovascular Disease

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APPENDIX - A

TABLE 1: Mean value of lipid profiles of the patients.

Variables	Mean ± SD		Test (One sample t-test)	
			Test Value	Significance
Total cholesterol	142.7	± 52.2mg/dL	200 mg/dL	$p = 0.000$
Triacylglycerol	136.2	± 91.5mg/dL	150 mg/dL	$p = 0.379$
HDL-Cholesterol	32.0	± 8.5mg/dL	40 mg/dL	$p = 0.000$
HDL-Cholesterol: Total Cholesterol	0.24	± 0.07	0.24	$p = 0.982$
Triacylglycerol: HDL-Cholesterol	4.2	± 2.7	3.75	$p = 0.323$

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TABLE 2 : Prevalence of dyslipidemia in the patients according to lipid profiles.

Variables		Number of Participants (%)	Prevalence of Dyslipidemia
1. Total Cholesterol	Group 1 (<200mg/dL)	62 (88.6%)	11.4%
	Group 2 (≥200mg/dL)	8 (11.4%)	
2. Triacylglycerol (TAG)	Group 1 (<150mg/dL)	48 (68.6%)	31.4%
	Group 2(≥150mg/dL)	22 (31.4%)	
3. HDL-Cholesterol	Group 1 (<40mg/dL)	60 (85.7%)	85.7%
	Group 2 (≥40mg/dL)	10 (14.3%)	
4. HDL-Cholesterol : Total Cholesterol	Group 1 (<0.24)	38 (54.3%)	54.3%
	Group 2 (≥0.24)	32 (45.7%)	
5. Triacylglycerol : HDL-Cholesterol	Group 1 (≤3.75)	36 (51.4%)	48.6%
	Group 2 (>3.75)	34 (48.6%)	