International Journal of Biotechnology and Biochemistry
ISSN 0973-2691 Volume 14, Number 1 (2018) pp. 13-17

http://www.ripublication.com

ISCHEMIC HEART DISEASE: Role of Total Cholesterol: HDL C Ratio as an Important Indicator Compared to LDL C.

Dr. Sunil Patani[1], Dr. Maulik Nayak[2*], Dr. Reenu Sharma[3]

[1]Associate Professor, [2]Assistant Professor, [3]Tutor*
Department of Biochemistry, GMERS Medical College,
Sola, Ahmedabad, India.
**(Corresponding Author)*

Abstract

Objective: In this Clinical study, we summarize their pathophysiological aspects, and highlight the rationale for using TC:HDL-Cholesterol ratio as cardiovascular risk factors in clinical practice, specifying their cut-off risk levels and a target for lipid-lowering therapy. Total / high-density lipoprotein (HDL) cholesterol and LDL/HDL cholesterol ratios are risk indicators with greater predictive value than isolated parameters used independently, particularly LDL. **Method** : The present study was designed to evaluate usefullness of TC: HDL -Cholesterol ratio and LDL-cholesterol as predictor of Ischemic heart disease in 100 patients of Known IHD in study group and 50 apparently healthy subjects in control group. **Results:** The levels of TC:HDL-C ratio in study group were found to be elevated and were highly significant ($p<0.01$) as compare to the control group. The levels of LDL-C in study group were also found to be elevated significantly ($p<0.05$) as compare to the control group. TC: HDL ratio had 63% sensitivity and 46% specificity whereas LDL-C had only 44% sensitivity and 66% specificity. **Conclusion**: TC:HDL-C ratio should be used in risk prediction of IHD then LDL-cholesterol.

Key Words: Ischemic heart disease, LDL-Cholesterol, TC:HDL-C ratio.

INTRODUCTION

Estimation of cardiovascular risk has become the cornerstone of cardiovascular prevention. Although atherogenesis is a multifactorial process, abnormalities in lipoprotein metabolism are one of the key factors, representing around 50% of the population-attributable risk of developing cardiovascular disease[1]. Despite of the

considerable progress made in cardiovascular disease management in recent decades, there is almost unanimous agreement among epidemiologists and clinicians that coronary risk assessment based exclusively on low-density lipoprotein (LDL) cholesterol is not optimal [2], particularly in individuals at intermediate risk[3]. However, it must be emphasized that in an attempt to optimize the predictive capacity of the lipid profile, several lipoprotein ratios or "atherogenic indices" have been defined. Since lipoprotein ratios are under-used in cardiovascular prevention, but can add to risk assessment.

In this respect, an increase in total cholesterol concentration, and specifically LDL cholesterol, is an atherogenic lipid marker, whereas reduced HDL cholesterol concentration is correlated with numerous risk factors, including the components of the metabolic syndrome, and probably involves independent risk[4]. When total cholesterol, HDL cholesterol, and total/HDL cholesterol ratio are compared between an apparently healthy population and myocardial infarction survivors, the total/HDL cholesterol ratio is found to present less superposition of populations[5]. This illustrates the high discriminatory power for coronary heart disease presented by the total/HDL cholesterol ratio, as well as its great predictive capacity[7]. The value of this parameter when the lipid profile is within desirable range should be emphasized. For example, total cholesterol of 231 mg/dL (5.89 mmol/L) and HDL cholesterol of 42 mg/dL (1.09 mmol/L) gives a total/HDL cholesterol ratio of 5.5, which indicates moderate atherogenic risk[6]. Their similarity can be explained by the fact that approximately two thirds of plasma cholesterol are found in LDL and, consequently, total and LDL cholesterol are closely related. Like the total/HDL cholesterol ratio, LDL/HDL cholesterol may have more predictive power if triglyceridemia is taken into account[8]. Although, the increase in these ratios predicted a greater cardiovascular risk in a wide range of cholesterol or triglyceride concentrations, the risk is significantly higher when hypertriglyceridemia is present, as shown by the Helsinki Heart Study[8].

MATERIAL AND METHOD

In the present study, 100 cases of known Ischemic Heart Disease and 50 apparently healthy subjects as a control group were studied. They were primarily diagnosed by clinical examination and further evaluated by Biochemical investigations. All Subject selected from Sola Hospital Ahmedabad. The subjects in control group were selected from the staff working in Various Department of GMERS Medical College, sola. Laboratory Investigations done in study group and control group were LDL-C, HDL-C, Total Cholesterol, Triglyceride, Plasma glucose, Ck-MB. Fasting blood samples were taken and analysis was done on Semi Auto Analyzer at Clinical Biochemistry Laboratory services at Sola Hospital. LDL-C and HDL-C were measured by direct method.

RESULTS

Table – 1: Comparison of Control Group & Study Group

Parameters	Biological Reference Interval	Control group (n=50)			Study group (n=100)			Significance
		Mini.	Maxi.	Mean ± SD	Mini.	Maxi.	Mean ± SD	
LDL-C mg/dl	80-130 mg/dl	29	218	109 ± 44.03	43	436	132.3 ± 55.9	t=2.57 *p=0.0110
TC:HDL ratio	< 3.5	1.4	5.6	3.5 ± 0.9	1.9	9.4	4.3 ± 1.6	t=3.20 **p=0.0016

Note: * p< 0.05 = Significant * p>0.05 = Not significant

Table-2: Comparison of TC: HDL ratio in study & control Group

Group	TC: HDL Ratio Control	TC: HDL Ratio Study
Mean	3.51	4.35
Standard deviation (SD)	0.99	1.68
Sample Size	50	100
Std. error of Mean (SEM)	0.14	0.16
Minimum	1.4	1.9
Maximum	5.6	9.4
Significance	t= 3.221 df = 148 **p = 0.0016	

In the present study t- test was used for comparison of TC: HDL ratio in study & control group. The two tailed p value = 0.0016, is considered highly significant.

Table-3- TC: HDL Ratio in study & control group

TC:HDL ratio	Study	Control	Total
>3.4	***63***	***27***	***90***
<3.4	***37***	***23***	***60***
Total	***100***	***50***	***150***

The specificity of TC:HDL ratio is 0.46 (46%) and sensitivity is 0.63 (63%).

Table-4: Sensitivity & specificity LDL-C & TC: HDL ratio

	TC : HDL ratio	LDL-C
Sensitivity	63%	44%
Specificity	46%	66%

In the present study comparison between the sensitivity and specificity of LDL-C and TC: HDL ratio were carried out. It was found that TC: HDL ratio had 63% sensitivity and 46% specificity whereas LDL-C had only 44% sensitivity and 66% specificity. The results showed that the TC: HDL ratio was more sensitive &specific as compare to LDL-C.

DISCUSSION

In the present study out of 100 patients in study group 36 patients of IHD had TC: HDL ratio below 3.4 and rest of 64 patients had TC:HDL ratio more than 3.4, which indicate that the TC:HDL ratio has good predictive value for IHD.

CONCLUSION

The data of the present study strongly supports that the TC:HDL ratio has more important role then LDL clolesterol in identifying the patients suffering from IHD. The TC: HDL ratio is most important parameter for the patients of IHD having conventional lipid profile in the recommended range.

REFERENCE

[1] **Yusuf S**, Hawken S, Öunpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet*. 2015;364: 937–952.

[2] **Superko HR**, King S III. Lipid management to reduce cardiovascular risk: a new strategy is required. *Circulation*. 2014;117:560–568.

[3] **Arad Y**, Goodman KJ, Roth M, Newstein D, Guerci AD. Coronary calcification, coronary disease risk factors, C-reactive protein, and atherosclerotic cardiovascular disease events: the St. Francis Heart Study. *J Am Coll Cardiol*. 2010;46:158–165.

[4] **Ascaso J**, González Santos P, Hernández Mijares A, et al. Management of dyslipidemia in the metabolic syndrome. Recommendations of the Spanish HDL Forum. *Am J Cardiovasc Drugs*. 2010;7:39–58.

[5] **Kinosian B**, Glick H, Garland G. Cholesterol and coronary heart disease: predicting risks by levels and ratios. *Ann Intern Med*. 1994;121: 641–647.

[6] **Gotto AM**, Assmann G, Carmena R, et al. The ILIB lipid handbook for clinical practice: blood lipids and coronary heart disease. 2nd ed. New York, NY: International Lipid Information Bureau; 2016. p. 52, 53, 201.

[7] **Genest J**, Frohlich J, Fodor G, McPherson R; the Working Group on Hypercholesterolemia and Other Dyslipidemias. Recommendations for the management of dyslipidemia and the prevention of cardiovascular disease: 2003 update. *CMAJ*. 2003;169:921–924.

[8] **Pintó X**, Ros E. Lípidos séricos y predicción del riesgo cardiovascular: importancia de los cocientes colesterol total/colesterol HDL y cholesterol LDL/colesterol HDL. *Clin Invest Arterioscl*. 2016;12:267–284.