



EVALUATION OF TG/HDL CHOLESTEROL RATIO AND NON HDL/HDL RATIO AS A MARKER OF CARDIOVASCULAR RISK IN DIABETICS MELLITUS

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ABSTRACT

Aim: The aim of our study was to determine lipid profile levels in diabetics and nondiabetics and to evaluate cardiovascular risk using TG/HDLc ratio and Non HDLc/HDLc ratios.

Study Design: A hospital based cross sectional study was conducted on patients attending the Out Patient Department of Medicine of Doon Medical College, Dehradun (Uttarakhand) during a period of 06 months from January 2018 to June 2018. 200 patients (100 Diabetics + 100 Non-diabetics) in the age group 30-80 years were selected randomly for the study. Of the 100 Diabetics (52 Male + 48 Female) and of the 100 Non diabetics 56 were males and 44 were females. All the participants underwent biochemical analysis-FBS, PPBS, HbA1C and lipid profile (TC, TG, HDL), LDL, VLDL and Non-HDL were calculated by computational methods. TG/HDLc ratio and Non HDLc/HDLc ratios were also calculated to assess cardiovascular risk.

Methodology: Biochemical & statistical analysis was done on all the selected 200 subjects. TG/HDL ratio and Non-HDLc/HDLc ratios were calculated.

Results: Total Cholesterol, TG, LDL & TG/HDLc ratio & Non-HDL/HDL ratio were found to be significantly increased in diabetics when compared with non diabetics. HDL levels were found to be & slightly less in diabetics as compared to Non diabetics.

Conclusion: We concluded that Non HDLc/HDLc ratio & TG/HDLc ratio can be used as early markers of cardiovascular risk.

KEYWORDS : Diabetes Mellitus, Non HDLc, TG/HDLc ratio, Non-HDLc /HDLc ratio.

INTRODUCTION:

Type 2 Diabetes Mellitus is a part of the metabolic syndrome with a cluster of several abnormalities, including insulin resistance, dyslipidaemia and cardiovascular disease^(1,2), which in part might be due to abnormalities in lipid & lipoprotein metabolism^(3,4).

Type 2 diabetes and its complications lead to an elevated cardiovascular risk globally. Adults with diabetes have 2 to 4 times higher risk of experiencing cardiovascular events than adults with no diabetes^(5,6).

It has also been suggested that non-HDLc may be a strong predictor of coronary heart disease mortality and non-fatal coronary events than LDL-c in people with diabetes⁽⁴⁾. Elevated non HDLc signifies increase in cardiovascular risk even if LDLc levels are at or below the NCEP goal or appear to be normal⁽⁷⁾.

The aim of the present study was to compile further evidence for clinical utility of TG/HDLc ratio & Non HDLc/HDLc ratio as a simple & effective tool for early identification of cardiovascular disease.

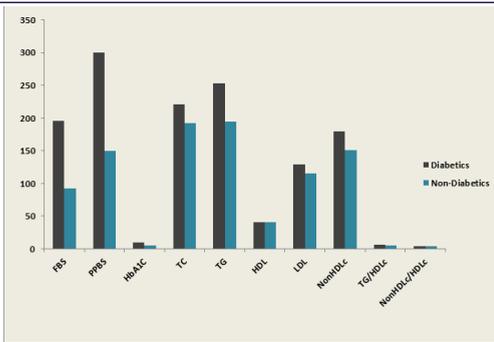
METHODOLOGY: A hospital based cross sectional study was conducted on patients attending the Out Patient Department of Medicine of Doon Medical College, Dehradun (Uttarakhand) during a period of 06 months from January 2018 to June 2018. 200 patients (100

Diabetics + 100 Non-diabetics) in the age group 30-80 years were selected randomly for the study. Of the 100 Diabetics (52 Male + 48 Female) and of the 100 Non diabetics 56 were males and 44 were females. All the participants underwent biochemical analysis-FBS, PPBS, HbA1C and lipid profile (TC, TG, HDL), LDL, VLDL and Non-HDL were calculated by computational methods. TG/HDLc ratio and Non HDLc/HDLc ratios were also calculated to assess cardiovascular risk.

Fasting blood sugar was estimated using glucose oxidase method⁽⁸⁾. Total cholesterol & HDLc were determined by enzymatic methods^(9,10). TG was estimated by an analytical method based on the sequence of reactions described by Fossatic et al⁽¹¹⁾. LDLc was calculated according to the computational procedures of Freidwald et al⁽¹²⁾. Statistical analysis was done using SPSS software and values were expressed as mean±SD±SE.

RESULTS: Total Cholesterol, TG, LDL & TG/HDLc ratio & Non-HDLc/HDLc ratio were found to be significantly increased in diabetics when compared with nondiabetics. HDLc levels were found to be & slightly less in diabetics as compared to Nondiabetics. Non-HDLc/HDLc ratio and TG/ HDLc ratio were significantly raised as compared to nondiabetics. The observations are tabulated in Table 1 and depicted graphically in Figure 1.

Parameters	Diabetic (52 male + 48 female) mean±SD±SE	Non-diabetic (52 male + 48 female) mean±SD±SE	t- value	p- value	Significant
FBS mg/dl	196±74.79±10.32	92.8±14.85±2.05	9.57	<0.0001	HS
PPBS mg/dl	300±80.99±11.77	150.72±34.19±4.72	12.005	<0.0001	HS
HBA1C	9.81±2.58±0.36	5.53±1.20±0.17	10.62	<0.0001	HS
TC mg/dl	221.08±55.51±7.66	192.54±49.68±6.85	2.7	0.008	HS
TG mg/dl	253.44±142.58±19.67	194.76±118.21±16.30	2.24	0.02	S
HDLc	40.84±8.17±1.13	41.18±3.96±0.55	-0.2	0.76	NS
LDLc	129.53±46.93±6.47	115.28±37.60±1.19	1.68	0.09	NS
Non HDLc	180.24±55.8±7.7	151.36±49.71±6.86	2.73	0.007	HS
TG/HDLc	6.54±4.38±0.60	4.89±3.34±0.46	2.11	0.03	S
NonHDLc/HDLc	4.58±1.76±0.24	3.72±1.32±0.46	2.76	0.006	HS



DISCUSSION:

Cardiovascular disease is the primary cause of morbidity and mortality in patients with diabetes and accounts for approx 65% of overall death with diabetic complications. Adults with diabetes have approx two to four times higher CVD rate than adults without diabetes⁽¹³⁾. Type 2 Diabetes is also frequently associated with vascular complications & dyslipidemia. The major features initially recognized were hypertriglyceridemia, decreased levels of HDLc and a normal or elevated levels of LDLc with an altered composition.

The present study showed 54% of the diabetics to be hypercholesterolaemic (TC \geq 200mg/dl), which is in consistent with the study by Sert et al⁽¹⁵⁾. Our study showed 64% of diabetics had hypertriglyceridemia (TG \geq 150mg/dl) and it is also support by studies by Sert et al⁽¹⁵⁾ & Regmi et al⁽¹⁶⁾. Our study also reveals 64% of diabetic patients had serum LDLc \geq 100mg/dl, a similar study by Turkey reported that 69.1% of diabetics had serum LDLc \geq 100mg/dl⁽¹⁵⁾. Our study depicted 60% of diabetics with HDLc less than 40mg/dl which is in accordance with the study by A. Pandeya⁽¹⁷⁾.

Non-HDLc is a single index of all the atherogenic apolipoprotein B containing lipoproteins LDL, VLDL, IDL. Hence in patients with diabetes, non-HDLc may be a stronger predictor of cardiovascular disease than either LDLc or TG. NCEP guidelines state that the LDLc is not a valid basis for therapeutic decision when TG level is above 200mg/dl, instead Non-HDLc is the therapeutic target⁽¹⁸⁾. So Non-HDLc, the elevated level of which signifies increased CVD risk, can be used as part of lipid profile.

Our study suggests that TG/HDLc ratio & Non-HDLc/HDLc ratio can be used as markers for insulin resistance and CVD risk in Type 2 diabetes patients⁽¹⁹⁾.

CONCLUSION: We conclude that Diabetes mellitus and dyslipidaemia go hand in hand. Dyslipidemia is an independent risk factor for cardiovascular diseases. Non-HDLc/HDLc ratio and TG/HDLc ratio can be used as simple, cumulative & early markers of cardiovascular diseases. They are cost effective, available and affordable markers of cardiovascular risks.

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