

Original Article

Triglyceride to High Density Lipoprotein-Cholesterol Ratio as Predictor of Cardiometabolic Risk among Doctors

Miliva Mozaffor¹, Md Matiur Rahman²

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Abstract

Background: Cardiometabolic risk indicates high risk of cardiovascular disease for a person. Obesity, hyperglycemia, hypertension, insulin resistance and dyslipidemia are the contributing factors for cardiometabolic risk. **Objective:** This cross sectional analytical study was conducted to evaluate triglyceride to high density lipoprotein-cholesterol ratio as predictor of cardiometabolic risk among doctors and to compare the risk between male and female doctors. **Results:** One hundred ninety five doctors were enrolled in this study. According to triglyceride to high density lipoprotein-cholesterol ratio 63.5% doctors have cardiometabolic risk in which male and female doctors were 66.3% and 57.5% respectively. The prevalence was apparently higher in male doctors than in female doctors. Receiver operating characteristic curve analysis on the basis of triglyceride to high density lipoprotein-cholesterol ratio at a cutoff value ≥ 3.0 showed area under curve 0.81 (p value=0.000) with sensitivity 72.3% and specificity 75.8%. **Conclusion:** It may be concluded from this study that triglyceride to high density lipoprotein-cholesterol ratio is a good predictor of cardiometabolic risk among doctors.

Key words: Cardiometabolic risk; Triglyceride to high density lipoprotein-cholesterol ratio

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Introduction

Abdominal obesity, insulin resistance, hyperglycemia, dyslipidemia and hypertension are considered as cardiometabolic risks. Smoking and physical inactivity exaggerates this Cardiometabolic risk.¹ Cardiometabolic risk is considered if waist circumference: >90 cm in male and >80 cm in female in case of South Asian population², hyperglycemia is defined when FBG >6.9 mmol/L (or previously diagnosed type II diabetes)³, hypertension when BP $\geq 140/85$ mm Hg⁴, and dyslipidemia when TG ≥ 200 mg/dL and HDL-C value <40 mg/dL⁵. In South Asian individuals the causes of insulin resistance are high TG and low HDL-C concentrations.^{6,7} In India, Bangladesh and Pakistan obesity, hypertension, dyslipidemia and diabetes are increasing.⁸

Triglyceride to high density lipoprotein-cholesterol ratio (TG/HDL-C) is a useful lipid parameter to detect insulin resistance and cardiometabolic risk.⁹ It has been successfully used in predicting the development of diabetes¹⁰, coronary heart disease¹¹, cardiovascular events and all cause of mortality¹². Studies have implied that TG/HDL-C ratio could also serve as an atherogenic index in the plasma and a powerful predictor of CVD incidence.¹³ It has also been suggested that the plasma TG/HDL-C ratio can serve as a simple marker for the diagnosis of metabolic syndrome and insulin resistance.¹⁴

Doctors suffered from lifestyle-associated disorders, but there are no adequate data regarding this. High

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1. Resident, Department of Biochemistry and Molecular Biology, Bangabandhu Sheikh Mujib Medical University, Dhaka
 2. Associate Professor, Department of Biochemistry and Molecular Biology, Bangabandhu Sheikh Mujib Medical University, Dhaka

Correspondence Md Matiur Rahman, Email: dr.matiur57@yahoo.com

serum LDL-C level (54.5%) and low serum HDL-C (66.7%) were the main features of dyslipidemia in male and female physicians studied.¹⁵ Indian doctors have high prevalence of metabolic disorders.¹⁶ In Saudi Arabia, a study among physicians showed higher familial cardiovascular risk with mother and siblings have more dyslipidemia, diabetes or hypertension.¹⁷ This study also showed that prevalence of modifiable CVD risk factors among physicians was not different from general people.

Data regarding cardiometabolic risk among doctors are not sufficient but this risk is preventable by modification of life style. With these in mind this study used TG/HDL-C ratio as predictor of cardiometabolic risk among doctors of our country.

Materials and Methods

This cross-sectional analytical study was conducted on 195 doctors of Bangabandhu Sheikh Mujib Medical University aged 30–60 years from March 2016 to February 2017 through purposive and convenient sampling. Exclusion criteria were pregnancy, endocrine disorders (polycystic ovary), Cushing’s syndrome, thyroid disorders, chronic renal failure and hepatic failure. Patients taking antidepressant, anticonvulsant, and steroids were also excluded. Clearance was taken from Institutional Review Board (IRB) of BSMMU. Purpose and procedure of the study were explained in details and informed written consent was taken from all the study subjects.

After 8–12 hours fasting blood specimens were collected from study subjects to estimate serum glucose and lipid profile. With all aseptic precautions 5 mL of venous blood was drawn. Blood was delivered immediately into a clean dry test tube and was kept in standing position till clot formation. Serum was separated after centrifuging at 3000 rpm for 5 minutes and was collected in microcentrifuge tube, labeled properly and stored in ultra-freezer at –20°C. Fasting serum triglyceride was measured by glycerol phosphate oxidase (GPO-PAP) method.¹⁸ Fasting serum high density lipoprotein-cholesterol was measured by Accelerator Selective Detergent method.¹⁹

All data were entered, checked and edited and then processed by using the software Statistical Package

for Social Sciences (SPSS) version 22.0. Male and female doctor comparison was done by using unpaired t-tests (continuous data) and chi-square test (categorical data). Receiver operating characteristic (ROC) curve was created to evaluate TG/HDL-C ratio index in detection of cardiometabolic risk.

Results

In this study, total subjects were 195. Among them 122 were male and 73 were female. According to triglyceride to high density lipoprotein-cholesterol (TG/HDL-C) ratio 63.6% of study subjects have cardiometabolic risk. Among the male subjects CMR was present in 66.2% male and among female subjects CMR was found in 57.5% (Table I).

Table I: Prevalence of cardiometabolic risk in study subjects based on TG/HDL-C ratio (N = 195)

Cardiometabolic risk		
Sex	Present	Absent
Male	82 (66.2)	40 (33.8)
Female	42 (57.5)	31 (42.5)
Total	124 (63.6)	71 (36.4)

The receiver operating characteristic curve for TG/HDL-C ratio as predictor of CMR in total study subjects showed area under the curve 0.81 (p value=0.000). The sensitivity was 72.3% and specificity was 75.8%. The positive predictive value was 53.9% and negative predictive value was 66.7% (Fig 1).

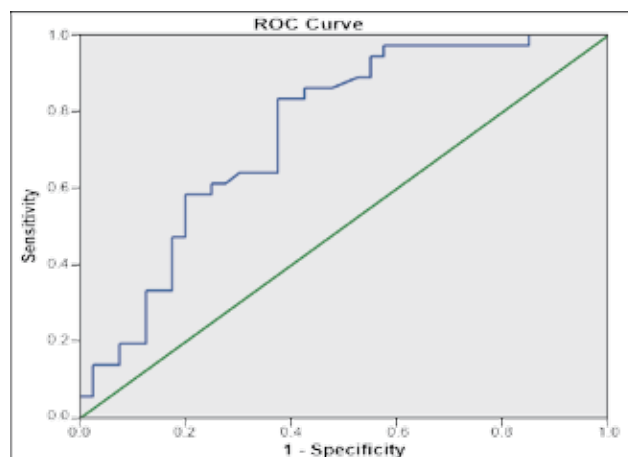


Fig 1. Receiver operating characteristic curve for TG/HDL-C ratio to detect cardiometabolic risk in total study subjects

Discussion

This cross-sectional analytical study measured the prevalence of cardiometabolic risk among Bangladeshi doctors by using TG/HDL-C ratio as predictor. We used cut-off value of TG/HDL-C ratio ≥ 3.5 for male, ≥ 2.5 for female and ≥ 3.0 in both.²⁰

In our study TG/HDL-C ratio was high in male ($p=0.000$). Low HDL-C was found more in male than in female ($p=0.000$). In their study Salazar et al²¹ found statistical significant difference in term TG/HDL-C ratio in male and female.

In our study the prevalence of cardiometabolic risk by TG/HDL-C ratio index was 66.2% in male and 55.5% in female. Ramachandra et al¹⁶ conducted a study among Indian doctors and found the prevalence of metabolic syndrome 29.0%. Their findings support our study. A study at King Abdul-Aziz Medical City in Riyadh showed that prevalence of cardiometabolic risk factors among physicians and non-physicians were almost similar.¹⁷

Our result showed that 66.2% male and 55.5% female doctors had cardiometabolic risk by TG/HDL-C ratio using the sex specific cut-off points of ≥ 3.5 (male) and ≥ 2.5 (female). By this TG/HDL-C ratio, data demonstrated that prevalence of cardiometabolic risk is higher in male than female. Similar type of result was found in a study on South Asian population which showed 33% male and 25% female had elevated TG/HDL-C ratio.²⁰ European Ancestry showed that the prevalence of elevated TG/HDL-C ratio was 25% in male and 24% in female.²¹ A study on physicians of Madurai area identified that 49% of female doctors and 41% of male doctors had metabolic syndrome.²³

In this study, we found that doctors have high prevalence of obesity and dyslipidemia. In Iran, a study on random sample of 272 doctors (aged 26–40 years) showed prevalence of obesity 54.5% among male and 13.3% among female doctors. Male had high serum LDL-C level in 54.5% cases and female had low serum HDL-C level in 66.7% cases.

Receiver operating characteristic curve of TG/HDL-C ratio was produced. AUC of TG/HDL-C ratio were 0.81 (both sex), 0.88 (male) and 0.75 (female). TG/HDL-C showed sensitivity 86.2% and specificity 59.3% for male, sensitivity 75.0% and specificity

65.0% for female, sensitivity 72.3% and specificity 75.8% for total study subjects.

We made a correlation of cardiometabolic risk factors with TG/HDL-C ratio index. In case of male we found significant positive correlation of TG/HDL-C ratio for SBP, DBP, TG and a significant negative correlation for HDL-C. In female we found significant positive correlation of TG/HDL-C ratio for FSG, TG, WC and a significant negative correlation for HDL-C. In their study Silvana et al²⁴ observed that TG/HDL-C ratio showed significant positive correlation for TC, TG, LDL-C and significant negative correlation for HDL-C. In our study TG/HDL-C ratio index was found good (AUC=0.81) for its predictive value of cardiometabolic risk.

From this study, it may be concluded that the prevalence of cardiometabolic risk is high among doctors. The prevalence was higher in male doctors than in female doctors. TG/HDL-C ratio index was found good for prediction of cardiometabolic risk.

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