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Original Article

Lipid Pattern and atherogenic index among medical students

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Abstract:

Background & Objective: In Bangladesh young age group has received little attention in relation to lipid profile & atherogenic index. For this purpose we decided to see lipid pattern & atherogenic index of plasma (AIP) among medical students. Method: In a cross sectional approach, 90 apparently healthy medical students voluntarily recruited from Ist year of Dhaka National Medical college during the period of June,2013 to December,2013. Height, weight, BMI, blood pressure were measured. Total cholesterol (TC), and the various sub fractions; high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and triglycerides (TG) were determined. Atherogenic index of plasma (AIP); log (TG/HDL-C) was calculated, in accordance with the most recent guidelines issued by the American Heart Association (AHA)/American College of Cardiology (ACC) and the National Cholesterol Education Program (NCEP). Results: Among the total students 56.66% had normal BMI, 13.33% were found to be underweight. 23.33% & 6.66% were overweight & obese respectively. Out of 90 students, 22 had low HDL (<40 mg/dl), 11 had increased TG (>150 mg/dl), 5 had increased Cholesterol (>200 mg/dl), 3 had increased LDL (>130mg/dl). Among the students 41 had low cardiovascular risk which represents 45.5%, 45 had increased cardiovascular risk which represents 50%, & 4 had intermediate cardiovascular risk which represents 4.44%. Conclusion: By assessing AIP we found that 41 subjects had low cardiovascular risk which represents 45.5%, 45 had increased cardiovascular risk which represents 50%, & 4 had intermediate cardiovascular risk which represents 4.44%, A high prevalence of cardiovascular risk factors; family history of elevated blood pressure was present.

Keywords: Lipid profile, atherogenic index, atherosclerosis.

Introduction :

Cardiovascular diseases (CVD) are a leading cause of death worldwide[1]. A very high prevalence of CVD is found in countries such as Bangladesh, India, Pakistan, Sri Lanka, and Nepal & these countries comprising 20 per cent of the world's population[2]. The high burden of CVD in these countries is attributable to urbanization and higher risk factor levels (such as obesity, diabetes, dyslipidaemia, hypertension, etc).The relatively early age at which these risk factors manifest, large population size, and the high proportion of young adults in these countries results in increased, morbidity and mortality of CVD[3]. Hyperlipidemias are risk factors for ischemic heart disease (IHD) and peripheral vascular disease. Concentrations of lipids (total cholesterol and triglycerides) and their associated blood transporting lipoproteins (HDL-C, LDL-C, VLDL-C) with the occurrence of atherosclerosis in general and coronary artery disease (CAD) in particular is evident now[4]. The strong association between the risk of coronary artery diseases (CAD), high levels of LDL-C and low levels of HDL-C has been well established[5,6]. However the enormous contributions of triglycerides (TG) to cardiovascular risk have been underestimated especially in our environment[7]. A lot of work has been done on the relationship between TG and HDL-C, and it has been shown that the ratio of TG to HDL-C was a strong predictor of myocardial infarction[8]. Universally, AIP refers to the atherogenic index of plasma calculated as log

(TG/HDL-C) & used as a significant predictor of cardiovascular risk. AIP is based on the ratio of the values of triglycerides to high-density lipoprotein (HDL) levels. Triglycerides and HDL-cholesterol in AIP reflect the balance between the atherogenic and protective lipoproteins. AIP is an easily available cardiovascular risk marker and a useful measure of response to treatment (pharmacological intervention). AIP <0.11indicate low cardiovascular risk, AIP 0.11- 0.21 indicate intermediate cardiovascular risk, AIP > 0.21 indicate increased cardiovascular risk[9,10]. It has been observed that one of the most effective methods of combating the epidemic rise in cardiovascular diseases is to increase awareness about the risk factors and the adoption of healthy lifestyle modifications for disease prevention. Healthcare professionals play a vital role in creating awareness. Medical students of today will be the healthcare providers of tomorrow. Their perceptions regarding prevention of diseases will strongly motivate the future clinical practice[11].

Method & Statistical analysis:

In a cross-sectional approach 90 medical students, age ranging from 18 to 22 years was recruited from I[st] year of Dhaka national medical college as subjects during the period of June 2013 to December 2013. Study includes 90 apparently healthy subjects who are not on any form of medication. Informed consent was obtained from the subjects and ethical clearance was obtained from the relevant authority. Those having any hormonal disorder are excluded from the study. The data was collected through a structured self-administered questionnaire based on a review of similar studies. Fasting blood samples (3.0mls) were collected by venepuncture from the antecubital vein, into sterile plain tubes, under aseptic conditions. The serum was used for the analysis of total cholesterol, triglycerides, and HDL-cholesterol levels. Total cholesterol was measured using established enzymatic methods of Allain et al [17] with the Randox cholesterol kit (Randox England). HDL-C was estimated by HDL-C precipitant method[18]. Triglyceride was assessed enzymatically[19]. LDL-C was calculated using the Friedewald formula[20].This was done using SPSS for windows version 11.

Results:

A total of 90 medical students were included in the study of which 50 (55%) and 40 (44%) were male and female respectively with mean age of 19.61 ± .72 years. About 2.22% of students had elevated blood pressure i.e. > 140/90 mmHg. Out of 90 students, 51 had normal BMI which represents 56.66%, 12 were found to be underweight which resembles13.33%, 21 were overweight representing 23.33% & 6 were obese which represents 6.66%. (Table-1).

Table-1:Frequency & Distribution of BMI of study subjects:

No of students(90)	Percentage
Normal BMI (51)	56.66%
Underweight (12)	13.33%
Overweight (21)	23.33%
Obesity(6)	6.66%

44.4% had family history of DM, 45.5% had family history of Hypertension, and 7.7% had family history of CVD. Most of the students had adequate knowledge about the cardiovascular risk factors. Out of 90 students, 22 had low HDL (<40 mg/dl) representing 24%, 11 had elevated TG (>150 mg/dl) representing 12%, 5 had increased Cholesterol (>200 mg/dl) representing 5.5%, 3 had increased LDL (>130mg/dl) representing 3% (Table-2).

Table-2:Lipid profile in study subjects:

Lipid profile	Frequency of abnormal lipid
HDL	22 (24%)
TG	11(12%)
Cholesterol	5(5.5%)
TG	3(3.3%)

By assessing AIP we found that 41 subjects had low cardiovascular risk (AIP <.11) which represents 45.5%, 45 had increased cardiovascular risk (AIP >.21) which represents 50%, & 4 had intermediate cardiovascular risk (AIP0.11-0.21) which represents 4.44% (Table-3).

Table-3:Atherogenic index in study subjects:

AIP	Number & percentage
Low risk	41(45.5%)
Medium risk	4(4.4%)
High risk	45(50%)

Discussion:

Isolated elevation in triglyceride increases CHD risk more, but its effect can be counteracted by the level of HDL-C[21]. The atherogenic index of plasma which is a mathematical

relationship between TG and HDL-C has been successfully used as an additional index when assessing cardiovascular (CV) risk factors[22,23]. Indeed, it has been suggested that AIP values less than 0.11 are associated with low, 0.11 to 0.21 with medium and above 0.21 with high CV risk[24]. In our study 23.33% students were overweight. Similar studies that calculated BMI of medical students have been conducted in Poland, United Arab Emirates (UAE) and Greece.[25,26,27] Prevalence of overweight in our study was greater than the Polish study but less than the studies conducted in UAE and Greece. One reason that could be responsible for the discrepancy is that BMI reference ranges are different for different ethnicities. We used BMI ranges specific for South Asians. In our study, out of 90 students, 22 had low HDL (<40 mg/dl), 11 had elevated TG (>150 mg/dl), 5 had increased Cholesterol (>200 mg/dl), 3 had increased LDL (>130mg/dl). Among the students 41 had low cardiovascular risk which represents 45.5%, 45 had increased cardiovascular risk which represents 50%, & 4 had intermediate cardiovascular risk which represents 4.44%. Although our study was on a small scale we found that majority of the students were normotensive. Fraction of population having blood pressure in the hypertensive range was low (2, out of 90). Since hypertension is defined as sustained blood pressure of > 140/90 mmHg, so these students could not be diagnosed hypertensive as only one reading of blood pressure was obtained. The range of definitions complicates comparison with other studies on medical students and young adults.

Conclusion:

Majority of medical students had normal BMI, but 50% of our subjects were in increased cardiovascular risk. As they are considered as sedentary workers, so measures should be taken by them to modify their lifestyle. This study highlights a need to improve physical activity, healthy dietary practice in medical students which can promote better lifestyle practices.

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