Original Article

Study of Serum Cholesterol Levels among the Patients of Myocardial Infarction

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Abstract

Myocardial Infarction (MI) is the most common form of heart disease and the single most important cause of premature death in the developed and developing world. Unfortunately the incidence of the condition is increasing rapidly in many developing countries like Bangladesh. Effort should therefore be taken to minimize the risk factors of MI. Large scale randomized clinical trials have shown that lowering high cholesterol concentration mainly by drugs reduces the risk of cardiac events like MI. This study was designed to see the serum cholesterol levels in normal healthy subjects, to compare serum cholesterol levels in patients with MI and those of healthy subjects and to evaluate the association of serum cholesterol level in Bangladesh MI patients.

The present study was carried out in the Department of Biochemistry, BSMMU in collaboration with Department of Cardiology, BSMMU and NICVD, Dhaka during the period of July 2001 to December 2002. A total of 50 subjects were selected, Group A (30 subjects of Control) and Group B (20 subjects of MI). The mean level of serum cholesterol in control subjects were 145.07 $\pm$ 31.39 mg/dl and in test subjects were 226.91 $\pm$ 44.38 mg/dl. This study showed that serum cholesterol level was significantly higher in patients with MI. From the present study, it is difficult to draw any definite conclusion but suggested that high serum cholesterol concentration plays a crucial role in the pathogenesis of MI.

Introduction

MI is the most common form of heart disease.[1] Unfortunately the incidence of the condition is increasing rapidly in many developing countries like Bangladesh. Diseases of the coronary arteries are almost always due to atheroma and its complications, particularly thrombosis. The major risk factors for MI are family history, DM, smoking, hypertension and lipid.[2] Cholesterol is the compound containing a cyclic steroid nucleus namely cyclopentanoperhydrophenanthrene (CPPP). It consists of a phenanthrene nucleus to which a cyclopentane ring is attached. All hyperlipidaemias result from a complex interaction between genetic predisposition and dietary indiscretion. Two conditions in particular-familial hypercholesterolaemia and familial combined hyperlipidaemias-are frequently encountered in clinical practice and are primarily genetic in origin.[3] Patients with familial

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hypercholesterolaemia may develop MI. at an early age. Approximately 50% of the affected individuals will have a MI by the age of 50.[4] High serum cholesterol may increase the risk of MI in the presence of other risk factors, that increase the formation of free radicals, thus accelerating atherogenesis via stimulation of LDL oxidation.[5] So the present work has been designed to see the serum cholesterol levels in normal healthy subjects, to compare serum cholesterol levels in patients with MI and those of healthy subjects and to evaluate the association of serum cholesterol level in MI patients in Bangladesh.

Material and methods

A cross sectional comparative study was done. The test subjects were diagnosed by history, clinical examination and different investigations like ECG, Echo, ETT & CAG. The control subjects had no symptoms and signs of MI and had no predisposing factors related to MI, detected on the basis of history clinical examination and ECG. Age and sex were matched. Data were collected through a preformed data collection sheet (questionnaire). 12 hours fasting blood sample was collected and questionnaire was filled up. Estimation of serum cholesterol was done by enzymatic colorimetric method using reagent kit

Human, Germany. Data were expressed in various forms as presentation and statistical analysis required.

Results

The laboratory investigations of serum cholesterol were done among the 50 subjects. It was expressed as mean $\pm$ SD and the results were expressed in SI units. The mean age of the 50 subjects were 52.25 $\pm$ 9.95 ranging from 43-60 years. The age of control subjects were 52.35 $\pm$ 10.46 ranging from 42-62 years and the age of MI subjects were 55.43 $\pm$ 10.79 ranging from 45-65 years. The distribution of the subjects by sex was studied. Among control subjects 19 were male and 11 were female and in MI patients 13 were male and 7 were female. ANOVA test was done in case of age and sex of the subjects. There is no statistically significant difference was observed among the study subjects P> 0.05 (Table-1). The mean level of serum cholesterol of control subjects were 145.07 $\pm$ 31.39 mg/dl and in test subjects the mean level of serum cholesterol were 226.91 $\pm$ 44.38 mg/dl. A highly significant mean difference (P<0.001) was found in serum cholesterol level between the groups of test and control subjects through the analysis of variance (ANOVA) test of significance of difference (Table-2).

Table 1: Age, sex and economic status of different groups of the study subjects.

Group	Age (in year)	Sex		Income (in Taka)
		Male	Female	
Group A (n=30)	52.35 $\pm$ 10.46	19	11	6000 (2000-25000)
Group B (n=20)	55.43 $\pm$ 10.79	13	7	5000 (2000-21000)
F/p value	1.69/0.194			0.702/0.500

Statistical comparison of mean age, sex & economic status of different groups was done. No statistical mean difference was found among the study groups (P>0.05).

Table 2: Serum cholesterol level of the different group of study subjects.

Group	Serum cholesterol mg/dl
Group A (n=30)	145.07 $\pm$ 31.39
Group B (n=20)	226.91 $\pm$ 44.38
F/p value (ANOVA)	20.69/0.001***

Statistical comparison of mean serum cholesterol level between different groups was done. There was statistically highly significant mean difference between group A vs group B (***p<0.001)

Discussion

The present study was carried out to compare serum cholesterol in patients with MI and those of control subjects. Association of increased serum cholesterol with MI has been observed in series of studies.[6] Many epidemiological studies have demonstrated a positive correlation between mean population plasma cholesterol concentration and morbidity and death from MI. The excess risk is closely related to the plasma concentration of LDL cholesterol and is inversely related with HDL

cholesterol concentration. Most patients who present with hyperlipidaemias suffer from a polygenic predisposition to raised blood lipids, which is aggravated or unmasked by dietary or lifestyle indiscretions. Diets rich in cholesterol or saturated animal fats tend to raise blood cholesterol. Patients with familial hyper-cholesterolaemia suffer from MI due to deficient LDL receptor binding, reduced LDL catabolism and overproduction of B_{100}-containing particles. High cholesterol and low HDL levels are often associated with insulin resistance and hypertension, producing a constellation of conditions of very high risk for macrovascular disease.[7]

So in our study we have measured serum cholesterol concentration of healthy subjects and MI patients. The mean level of serum cholesterol of healthy subjects were 145.07 ± 31.39 mg/dl and in MI subjects were 226.91 ± 44.38 mg/dl. A highly significant mean difference (P<0.001) was found in serum cholesterol level between the groups of MI and healthy subjects. This finding supported the study conducted by Klipstein (1999). In a study among Dutch population conducted by Klipstein (1999) found that mean cholesterol concentration in the healthy subjects were 179.10 ± 45.93 and in MI subjects were 201.87 ± 42.84 (P<0.001).[8] This finding indicates that high serum cholesterol concentration may increase the risk of MI. Basic research has provided strong evidence that LDL oxidation plays an important role in the pathogenesis of atherosclerosis and cardiovascular disease. We observed elevated serum cholesterol concentration to be associated with increased risk of MI. It may be possible that elevated blood cholesterol concentration may accelerate atherogenesis by stimulating the oxidation of LDLs.

Conclusion

The present study showed that serum cholesterol level is significantly higher in patients with MI. From the present work, it is difficult to draw any definite conclusion but suggested that high serum cholesterol level with other major risk factors may be responsible for MI. So, it may be recommended, estimation of serum cholesterol is necessary along with other major risk factors for better management of MI patients. But further study involving a larger sample size, may be carried out to draw a definite conclusion.

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