Original Article

To Study the Role of Serum Biliurbin and Lipoproteins in Prediction of Ischemic Heart Disease

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Objective: To determine if serum bilirubin, when combined with various risk factors like lipid and lipoprotein predicts ischemic heart disease (IHD).

Material & Methods: Hundred patients with IHD were included in the study from in and out patient departments of Medicine. 25 normal subjects were studied as controls. The traditional risk factors like cholesterol, high-density lipoprotein cholesterol (HDL-C), cholesterol/HDL-C ratios, triglycerides as well as serum bilirubin, albumin and creatinine were determined by standard methods. Besides, age, cigarette smoking, and systolic blood pressure were also recorded.

Results: It was observed that the bilirubin is negatively correlated with hemoglobin, albumin, HDL and LDL-cholesterol. On the other hand a direct correlation with total lipid, cholesterol and ratio of cholesterol/HDL-cholesterol is also observed. High level of serum creatinine level was also found in the patients as compared to normal subjects.

Conclusion: No definite relationship between serum bilirubin and IHD was observed.

Keywords: Bilirubin, Lipoproteins and IHD.

Introduction

Bilirubin and albumin may act as antioxidants. Their circulating levels are lower in patients with ischemic heart disease (IHD) and could be further reduced by more extensive atherosclerosis, i.e. peripheral vascular disease.[1]

Circulating bilirubin is considered to protect human tissues from peroxidation of organic compounds, lipids and thus inhibiting foam cell formation in the arterial wall.[2] Low bilirubin was associated with several cardiovascular risk factors, in particular vascular aging, smoking, low concentrations of high-density lipoprotein cholesterol, low forced expiratory volume and low serum albumin.[3]

Low bilirubin level in blood may prove to be a significant marker for the evaluation of the general anti-oxidant status of the human organism. Mechanisms that give rise to this phenomenon are probably diverse and not well-studied yet. Processes of the formation of free oxygen and peroxide radicals are known to take place in numerous pathological conditions.[4] The effects of serum bilirubin on blood lipids and lipoproteins in a number of patients were investigated by a group of workers.[5] The findings were that total cholesterol (TC) and low-density lipoprotein-cholesterol (LDL-C) were negatively correlated with total bilirubin and direct bilirubin. Their results indicate that bilirubin affects metabolism of lipoproteins and the low level of serum bilirubin is a new risk factor for coronary heart disease. This parameter may, alone or in combination with other factors, make it possible to distinguish individuals with a risk of CAD.[6]

It was found[7] that elevated serum creatinine has been associated with increased mortality in hypertensive persons, the elderly, and patients with myocardial infarction or stroke in whom cardiovascular disease is the major cause of death.

Present study tried to find out the role of serum bilirubin in prediction of ischemic heart disease when combined with risk factors like lipid and lipoprotein.

Material & Methods

Hundred patients with IHD were included in the study. Patients were taken from in and out patient departments of Medicine. 25 normal subjects were studied as controls.

The traditional risk factors like cholesterol, high-density lipoprotein cholesterol (HDL-C), cholesterol/HDL-C ratios, triglycerides as well as serum bilirubin, albumin and creatinine were determined by standard methods. Besides, age, cigarette smoking, and systolic blood pressure were also recorded.

Table-1: Variation in physical parameters.

Parameters	Mean±SD
Mean age	46.7±2.17 yrs
Mean blood pressure	100/65±3.4/1.6 mmHg

Table-2: Variation in bilirubin and other biochemical parameters in serum of patients and their controls (No of cases in parenthesis and values are in mean ± s.e.m).

Parameters	Patients (100)	Control subjects (25)
Bilirubin (mg/dl)	0.94±0.06	0.42±0.04
Creatinine (mg/dl)	1.9±0.81**	0.78±0.03
Albumin (mg/dl)	3.3±0.08**	4.65±0.02
Cholesterol (mg/dl)	254.6±14.8**	185.0±5.9
HDL-Chol (mg/dl)	37.56±0.53**	53.56±0.59
LDL-Chol (mg/dl)	130.56±7.31	141.87±5.52
Ratio of Chol/HDL-Chol	6.77	5.38
Triglyceride (mg/dl)	113.5±4.6	125.25±12.83

***p<0.01=Highly significant difference*

Results

Table 1 shows that the mean age of patients was 46 years. Among these 50% were smokers and their mean blood pressure was 100/65 mmHg.

Assessment of biochemical parameters **i**s tabulated in **Table 2**. Level of bilirubin was increased in patients as compared to normal subjects but this shows no significant difference. In case of creatinine and albumin, level of creatinine was significantly increased in patients ($p<0.01$) whereas the level of albumin was significantly decreased ($p<0.01$) in patients as compared to the normal subjects. Among lipid profile.

It was observed that the levels of serum cholesterol and total lipid were increased in patients. A highly significant difference ($p<0.01$) was observed in case of serum cholesterol. Level of HDL-chol, LDL-chol and triglyceride were decreased in patients as compared to control subjects but significant difference ($p<0.01$) was only observed in case of HDL-cholesterol. On the other hand ratio of cholesterol/HDL-cholesterol was increased in patients as compared to control subjects.

Discussion

Many risk factors for IHD have been identified. Recently an association between low concentration of serum bilirubin and increased risk of IHD has been reported. It was also observed that bilirubin may affect lipoproteins. However, information on this topic remains scarce.

Results of present study indicate that the bilirubin is negatively correlated with hemoglobin, albumin, HDL and LDL-cholesterol. A study observed significantly higher total cholesterol and triglyceride levels and lower high-density lipoprotein cholesterol (HDL-C) levels in the AMI patients. The bilirubin and albumin were lower in AMI patients than controls.[8] Another study provided substantial evidence that serum bilirubin may play a protective role in peripheral arterial disease as well as ischaemic heart disease.[9] It was reported[10] that bilirubin is a potent antioxidant generated intra-cellularly during the degradation of heme by enzyme heme-oxygenase. Increased heme oxygenase activity was associated with enhanced tissue bilirubin content and can increase rate of bilirubin release. Bilirubin may provide cardioprotection against reperfusion injury.

On the other hand a direct correlation with total lipid, cholesterol and ratio of cholesterol/HDL-cholesterol is also observed. It was suggested[11] that serum bilirubin may be combined with LDL-C/HDL-C ratios, cholesterol/HDL-C ratios, cholesterol, or with various apolipoproteins to improve the prediction of CAD. Another group[12] found that bilirubin affects metabolism of lipoproteins and the low level of serum bilirubin is a new risk factor for coronary heart disease.

High level of serum creatinine level was found in patients as compared to normal subject. Same was reported by a group of workers.[7] They suggested a direct relationship of serum creatinine with IHD and it shows a role of renal impairment in the disease. Higher levels of HDL cholesterol were associated with a significant decrease in risk of nonfatal stroke. In contrast, elevated total cholesterol showed a weak positive association with nonfatal strokes. The marked inverse association between HDL cholesterol and stroke seen in hypertensives emphasizes the importance of those modifiable risk factors for stroke known to lower the concentrations of HDL cholesterol.[13]

Conclusion

Present study found no relationship between serum bilirubin and IHD. Hence the relationships between bilirubin require further clarification, although abnormal intermediary metabolism and antioxidant deficiency may be possible linking factors.

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