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Study of Lipid Profile in Patients of Coronary Artery Disease among Rural Population

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Abstract: *India and other developing countries in South Asia are progressively facing alarming proportions of morbidity and mortality caused by coronary artery disease. There are a number of studies on dyslipidemia in coronary artery disease patients in Indian subcontinent, mostly in urban population in different geographical territories of the country. There was no such community-based study in rural population of Bihar. Hence this case control study was undertaken to study dyslipidemia among the rural patients admitted to hospital with coronary artery disease. 100 consecutive cases diagnosed as coronary artery disease aged 30 to 90 years were compared to 50 ages and sex matched healthy controls. Age, gender, blood pressure, history of smoking and diabetes mellitus, waist-hip ratio and Body Mass Index were recorded in each subject. Blood samples for investigations of lipid profile i.e. serum cholesterol (CHO), triglyceride (TG), high density lipoprotein–cholesterol (HDL-C) and low density lipoprotein-cholesterol (LDL-C) were collected from cases. It was found that high prevalence of dyslipidemia i.e. elevated serum cholesterol and TG and low HDL cholesterol were significant in all the age groups above 40 years. Interestingly our study in rural population is not associated with increased risk of coronary artery disease with LDL levels. In order to implement preventive approach to CAD, our findings suggest that early detection of abnormal lipid profile and modification of lifestyles are important.*

Keywords: *Coronary artery disease, CAD, dyslipidemia, rural population.*

I. Introduction

Coronary artery disease (CAD) is a condition that develops due to the accumulation of atherosclerotic plaque in the pericardial coronary arteries leading to myocardial ischemia. It is a common multifarious public health crisis today and a leading cause of morbidity and mortality in both developing and developed countries. [1] By 2020, the disease is forecasted to be the major cause of morbidity and mortality in most developing nations. [2],[3] In a study conducted between 1998 and 2002 in a North Indian population, Mohan et al. showed that CAD occurred at much lower levels of total cholesterol and LDL-C than other populations, and high triglyceride and low HDL levels were of a universal phenomenon in this population. The importance of dyslipidemia in the pathogenesis of CAD is well-known. [4] Our study revealed a high prevalence of dyslipidemia -elevated levels of total cholesterol, high triglycerides with concurrent low HDL-C values. CAD is the most common cause of mortality in India, [5] homing an approximately one-sixth of the world population. Hence, understanding the predominant risk factors like dyslipidemia among the Indian population is important. [6][7] Furthermore, the South Asian population, especially that of the Indian subcontinent, is believed to have a higher risk and prevalence of CAD as compared with European and African population. [8][9]

Keeping these facts in mind the present study was undertaken in the departments of Biochemistry, Pathology and Medicine to study the role of lipid profile in coronary artery disease patients.

II. Materials And Methods

The present study was a prospective hospital based case control study. 100 consecutive cases of coronary artery disease aged 30 to 90 years were compared to 50 ages and sex matched healthy controls.
Required permission for the research methodology was obtained from the ethical committee of the institute where study was conducted.

Selection of cases and controls

A) Cases

Patients with coronary artery disease admitted to clinical care unit were recruited. Patients with previous history of coronary artery disease were also included.

B) **Controls**

Age and sex matched controls were recruited either from volunteers or patients admitted. None of them had any evidence of coronary artery disease (angina, chest pain, dyspnoea, fatigue etc) .

C) Exclusion criteria applied

Any person having evidence of diseases which may adversely affect the outcome was not included in case or control group. They were

- Patients with liver disease
- Patients with renal disease
- Patients with joint pain
- Patients with hypothyroid/hyperthyroid disease
- Patients with cerebrovascular disease
- Patients with anaemia
- chronic obstructive lung disease

Data was recorded using standard forms on sex, age, gender, blood pressure, previous history of attacks of myocardial infarction. Blood samples were collected from all the subjects after taking proper consent. Lipid profile investigations that included serum cholesterol, triglyceride, HDL –cholesterol and LDL-cholesterol were all carried out on a semi automated analyzer using standard kits. The SPSS statistical package was used for analysis. P value < 0.05 was considered as significant.

Table 1: Cut off levels for different biochemical parameters used in study

Biochemical Parameters	Cut off level
Cholesterol	>200mg/dl
Triglyceride	>150mg/dl
HDL cholesterol	<40mg/dl
LDL cholesterol	>130mg/dl

III. Observation

The total cholesterol levels (mean±SD values) ranged between 221.94±32.03 to 195.20±37.28 in different age groups of cases and these values were significantly high compared to the CHO levels in corresponding age groups of controls (p=0.006) except in the age groups of < 40 years.

Except in the age groups of < 40 years the triglyceride levels were significantly high in all the other age groups of cases compared to control groups(p=0.008)

The HDL cholesterol levels were significantly low in all age groups of cases except in <40 years age group compared to the levels in control groups (p=0.0114).

The mean LDL cholesterol levels were not significantly different in any of the age groups compared to the levels in control groups (p=0.219). Accordingly the numbers of cases with raised LDL cholesterol levels in all the age groups were also not significantly high compared to the control groups.

Mean and SD levels of four biochemical parameters except LDL were statistically significant between cases and controls (p <0.05).

Table 2: Comparative analysis of different biochemical parameters in cases and control groups.

Biochemical parameters	Mean±SD values in		P value
	Cases(n=100)	Controls (n=50)	
Cholesterol(mg/dl)	221.94±32.03	195.20±37.28*	0.006
Triglyceride(mg/dl)	190.66±77.84	154.70±76.57*	0.008
HDL cholesterol(mg/dl)	42.97±10.62	47.64±10.31**	0.0114
LDL cholesterol(mg/dl)	111.34±38.36	103.14±38.37	0.219

*Mean levels were significantly high in cases compared to the levels in control group.

**Mean HDL cholesterol levels in cases were significantly low compared to the levels in controls

IV. Discussion

Epidemiological studies have identified a number of important risk factors for CAD. Previous case control studies from India have reported importance of smoking, hypertension, diabetes mellitus and abnormal lipids in pathogenesis of CAD [10]

This study was designed in a tertiary care hospital in rural region of Bihar. Cases and controls represent a homogenous population. To reduce the effect of confounding we chose age and sex matched controls.

Almost all studies on risk factors for ischaemic heart disease in Indians or abroad except one [11] have been cross sectional surveys. Epidemiologically the strongest way to demonstrate a cause and effect relationship between a risk factor and disease would be a cohort study but is expensive in terms of money and time. So we believe that case–control design provides a reasonable alternative between a cross sectional and cohort study. Enas et al. have shown that Indian emigrants to western states have a high prevalence of dyslipidemia and insulin resistance, thereby increasing the risk for CAD. [12][13] Hyperlipidemia is recognized as a potent modifiable risk factor for CAD. Populations that consume low fat and high carbohydrate diets have low HDL cholesterol and high triglyceride levels [14–16]Rural populations who consume low fat and high carbohydrate diets have low HDL cholesterol and high triglyceride levels [17,18,]. Gupta et al 2002 has shown that total cholesterol and triglycerides were higher while HDL levels were lower in individuals with IHD than in those without IHD. [19] A higher prevalence of low HDL cholesterol and an elevated triglyceride level was found in the rural than in the urban population by Chadha et al (1997). Our findings agree with those of Gupta et al and Panwar et al who reported high cholesterol and triglycerides, with low HDL [19, 20,]

It is important to consider the role of air pollution in the pathogenesis of coronary heart disease in the urban population. The toxic compounds involved in air pollution e.g. oxides of nitrogen, sulfur dioxide and suspended particles, are powerful pro-oxidants that enhance the oxidation of lipoproteins and oxidized lipoproteins, particularly LDL cholesterol, are powerful inducers of atherosclerosis.[21]Our study is not associated with increased risk of coronary artery disease with LDL levels. This observation may be due to relatively low air pollution and low concentration of pro-oxidants in rural areas.

V. Conclusion

This community based case-control study in rural population shows that high serum cholesterol and triglyceride and low HDL cholesterol are clinically significant in all the age groups above 40 years. But interestingly our study is not associated with increased risk of coronary artery disease with LDL levels. The importance of this study lies in the fact that it reveals a distinct association of dyslipidemia with CAD and highlights patients with dyslipidemia as potential targets for early intervention. Therefore, early detection of abnormal lipid profile and its proper management by life-style modification [22] and by drugs, if needed may play a key role in preventing the progress of the atherosclerotic process in coronary artery disease.

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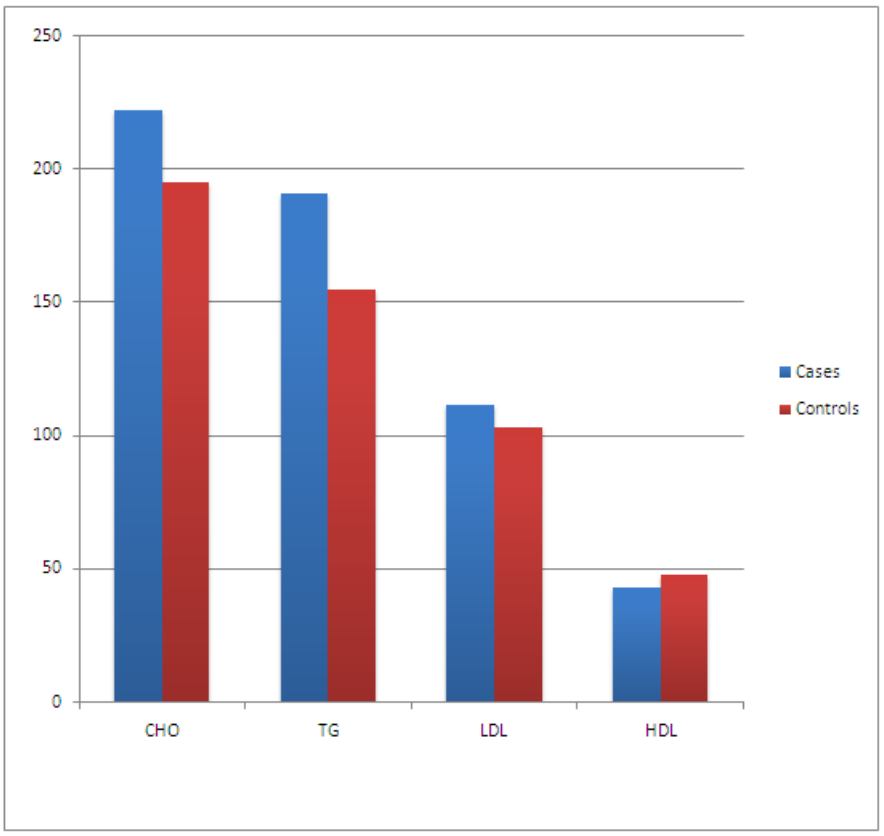

Figure 1

Legend To Figure:

Comparative analysis of different biochemical parameters in case and control groups. Bars represent mean±SD levels in each group.