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Association of Dyslipidemia with Angiographically Proven Severity of Coronary Artery Disease

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Abstract: ***Background: Dyslipidemia is a primary, widely established as an independent major risk factor for coronary artery disease (CAD) and may even be a prerequisite for CAD, occurring before other major risk factors come into play. Hence, the study is done to record the association of dyslipidemia with the severity of angiographically proven coronary artery disease patients. Objectives: To know the association of dyslipidemia with angiographically proven severity of coronary artery disease (Single vessel disease, Double Vessel disease, Triple Vessel disease and non-significant disease). Methods: 112 angiographically proven coronary artery disease patients (mean age±SD: 56.93±10.61 years) were enrolled for the study. All patients were evaluated for dyslipidemia and blood samples were collected or biochemical markers. Results: There was a significant association between dyslipidemia and incidence of CAD (p-value=0.007). But no significant association was seen with the severity of CAD (p-value=0.056). Conclusion: The present study demonstrates that dyslipidemia is associated with risk of coronary artery disease but not associated with the severity of coronary artery disease.***

1. Introduction

Coronary artery disease (CAD) or cardiovascular diseases (CVDs) are leading cause of morbidity and mortality and imposes tremendously heavy socio-economic burden worldwide. With the turn of the century, CVD have become the leading cause of mortality in India. [(1)]According to the Global Burden of Disease study,in 2016, there was a nine times difference between states in the disability adjusted life year (DALY) rate for ischaemic heart disease. 23·8 million (95% UI22·6–25·0) prevalent cases of ischaemic heart disease were estimated in India in 2016,a 2·3 times increase in ischaemic heart disease casesfrom 1990.[(2)] This increase is due to industrialization, urbanization and related lifestyle changes which are called epidemiologic transition. CADs are the most predictable cause of sudden death.

Multiple risk factors are associated with CAD. Dyslipidemia is a primary, widely established as an independent major risk factor for CAD and may even be a prerequisite for CAD, occurring before other major risk factors come into play. [(3)]

Among the risk factors that contributed to DALYs dueto cardiovascular diseases in India in 2016, the leadingones were dietary risks (56·4%, 95% UI 48·5–63·9), highsystolic blood pressure (54·6%, 49·0–59·8), air pollution(31·1%, 29·0–33·4), high total cholesterol (29·4%,24·3–34·8), tobacco use (18·9, 16·6–21·3), high fastingplasma glucose (16·7%, 11·4–23·5), and high BMI(14·7%, 8·3–22·0), for both sexes combined.[(2)]

CAD requires an integrated approach to the reduction of its risk factors. Identification and management of risk factors are essential for preventing CAD in asymptomatic individuals mainly over 40 years of age as primary prevention, and for preventing recurrent events in patients with established disease as secondary prevention. Risk factors management should be conceived as prevention or treatment of the atherosclerotic disease process itself. CAD risk factors are modifiable and unmodifiable; the presence of unmodifiable risk factors may necessitate more intense management of modifiable risk factors like Abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, consumption of fruits, vegetables, and alcohol, and regular physical activity account for most of the risk of myocardial infarction worldwide in both sexes and at all ages in all regions. Treating all the modifiable risk factors will reduce the premature cases of myocardial infarction. [(4)]

In the last twenty years, considerable advances have been achieved in the determination and improvement of CAD risk factors including diabetes and hypertension. Lipids and lipoproteins have become increasingly important in clinical practice, primarily because of their association with CAD, and became the major risk factor for the development of this disease, according to epidemiological studies, especially in affluent countries where fat consumption is high. [(5)] Hence, this study was done to record the association of dyslipidemia with the severity of CAD.

2. Methods

Permission was obtained from the institutional ethics committee.

Written informed consent of the patients were obtained after explaining the details of the study.

One hundred and twelve (112) angiographically proven CAD patients were taken up from MGM Medical College & Hospital, Aurangabad.

All of them were in chronic stable condition. A history was taken, and physical examination & laboratory tests were performed in all subjects.

Detailed drug history was taken and patients on beta-blockers, combined OC pills, progesterone, diuretics, danazol, enzyme-inducing anticonvulsants were excluded from this study because these conditions may have a serious influence on lipid profile.

Fasting blood samples were collected after 14 h fasting and Lipids were measured. Dyslipidemia, defined as elevated total or LDL cholesterol levels, or low levels of HDL cholesterol. [6] The desirable levels of lipids in serum are LDL <130mg/dl, HDL in males >40 mg/dl, Triglycerides <150 mg/dl, Total cholesterol <200 mg/dl. [19]

Interpretation of Angiography Finding: Coronary angiography was performed in the standard manner in all patients through either radial or femoral artery access. Angiographic CAD is defined as >50% of diameter stenosis in any of the major epicardial coronary arteries, while diffuse CAD is defined as involvement of >20 mm segment in a particular epicardial vessel characterized as the single vessel, double vessels and triple vessel involvement.

Data Analysis

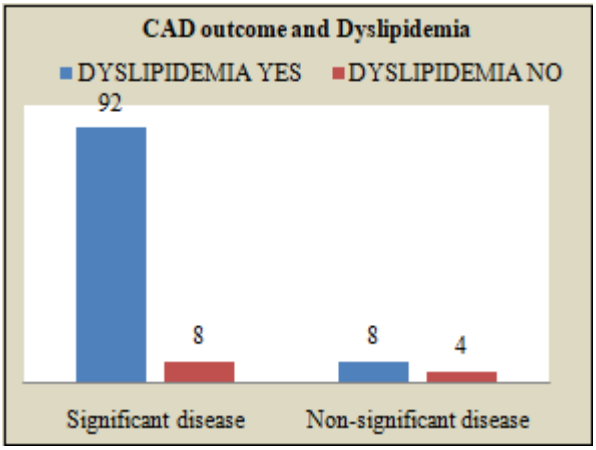
The collected data was entered in MS EXCEL sheet. All the analysis was done by using the windows based SPPS statistical package (version 24.0, spssinc: Chicago, il USA) and p values <0.05 was considered statistically significant. The chi-square test was used to find an association between two attributes.

3. Results

The study included 112 participants ranging from age 30 to 80 years (Mean±SD of age56.93±10.61).

Table 1: Association between Dyslipidemia and incidence of CAD

CAD outcome	Dyslipidemia		Total	Chi-square value	P-value
	YES	NO			
Significant disease	92	08	100	7.19	P=0.007 (Significant)
Non-significant disease	08	04	12		
Total	100	12	112		



Out of 112 CAD patients, 100 were having dyslipidemia and out of that 100 patients, only 8 patients (66.66%) were having non-significant CAD i.e. coronary artery blockage <50% whereas rest 92 patients (92%) had significant CAD (>50% coronary blockage).

Association between Dyslipidemia and incidence of Coronary Artery Disease was statistically significant (p-value=0.007).

Table 2: Association between Dyslipidemia and severity of CAD

CAD outcome	Dyslipidemia		Total	Chi-square value	P-value
	YES	NO			
Single vessel disease	41	03	44	7.56	P=0.056 (Non Significant)
Double Vessel disease	27	02	29		
Triple Vessel disease	24	03	27		
Non-significant disease	09	04	12		
Total	100	13	112		

Coronary angiographic findings in our study revealed nonsignificant CAD patients (12 subjects) 10.71%, while single, double, triple – vessel CAD were present in (44 subjects) 39.28%, (29 subjects) 25.89%, (27 subjects) 24.10% respectively. Dyslipidemia was found in 41 SVD patients (93.18%), 27 DVD patients (93.10%), 24 TVD patients (88.88), 9 Nonsignificant CAD (75%). And the association between dyslipidemia and severity of Coronary Artery Disease was not statistically significant (p-value=0.056).

4. Discussion

Many populations based prospective studies have been conducted to evaluate the impact of dyslipidemia on CVD. [7,8,9,10] The Framingham study demonstrated the association of elevated cholesterol with coronary artery disease and Determining the levels of lipoproteins such as low-density lipoprotein (LDL) cholesterol and high-density lipoprotein (HDL) cholesterol improves the prediction of risk. [11]

Although randomized controlled trials are limited, their results are largely congruent with epidemiologic evidence. Epidemiology shows that high levels of serum cholesterol impart increased risk for CAD, whereas low levels coincide with low rates of CAD.[12-15] In accordance, RCT demonstrates that reducing serum cholesterol by lowering LDL-C levels can diminish the incidence of CAD morbidity and mortality in men at high risk for CAD because of raised LDL-C levels. This clinical trial provides strong evidence for a causal role for these lipids in the pathogenesis of CAD. [16]

A study done by Jacques E. Rossouw et al. (1990)[17] showed that the causal role of cholesterol in reinfarction has been demonstrated by the higher relative risk in men with coronary disease who have elevated serum cholesterol levels. The need for preventive action in patients who have had a myocardial infarction is predicated on their high absolute risk of reinfarction; this already high risk is aggravated by an elevated serum cholesterol level. The secondary prevention trials have demonstrated that a 10 per-cent reduction in cholesterol can be expected to reduce the rate of nonfatal reinfarction by 19 per-cent and of fatal infarction by 12 per-cent. With vigorous dietary treatment

and the use as indicated of effective drugs, singly or in combination, substantial lowering of lipid levels is feasible [(18)] and should result in a larger reduction in reinfarction rates.

There are very few studies on the correlation of dyslipidemia and extent of coronary artery disease, and out of the one study showed that Combined hyperlipidemia, simple hypercholesterolemia, Metabolic Syndrome, and low HDL-c were associated with multivessel coronary artery disease independent of CVD risk factors and coronary artery calcium (CAC) score.[(20)] Our study has shown that there is a significant association between dyslipidemia and incidence of CAD but not with the severity of CAD. This discrepancy in our study may be due to small sample size and the grouping like Combined hyperlipidemia, simple hypercholesterolemia, Metabolic Syndrome, and low HDL-c were not done in our study. Previous study used the above grouping and accordingly results were made. These findings may lay the groundwork for further analysis of the underlying mechanisms in the observed relationship, as well as for the development of clinical strategies for primary prevention.

5. Conclusion

The present study demonstrates that dyslipidemia is associated with risk of coronary artery disease but not associated with the severity of coronary artery disease.

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