

## Frequency of significant three vessel coronary artery disease and left main stem disease in acute coronary syndrome patients having high LDL cholesterol level

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**Objective:** To calculate the frequency of significant three-vessel coronary artery and left main stem disease in patients presenting with acute coronary syndrome having high LDL cholesterol level.

**Methodology:** This observational study was performed in Lady Reading Hospital, Peshawar, Pakistan from June 1, 2013 to December 31, 2013. All consecutive patients undergoing coronary angiography admitted with acute coronary syndrome within past 30 days and having LDL cholesterol more than 130mg/dl were included in the study. Demographic data was noted. The data was analyzed by using software SPSS version 16.

**Results:** A total number of 206 patients were included in the study. Mean age was 51.25±8.4 years. Of them, 139(67.5%) were male and 67(32.5%) female. Hypertension was found in

87(42.2%) patients, diabetes was found in 71(34.5%) patients, 56(27.2%) were smokers, family history of CAD was present in 39(18.9%) patients. The incidence of significant three vessel coronary artery disease was 52(25.2%) and left main stem disease were present in 15(7.2%). Out of 67(32.4%) with severe triple vessel and Left main stem disease, males were 51(76.1%) and females were 16(23.9%). Patients with significant three vessel and left main stem disease were more frequently males and younger.

**Conclusion:** Patients having acute coronary syndrome with High LDL levels are more frequently have significant three vessel and Left main stem disease. (Rawal Med J 201;42:459-462)

**Key words:** Low density lipoproteins, acute coronary syndrome, significant three vessel disease.

### INTRODUCTION

Major types of lipids (cholesterol, cholesteryl esters, phospholipids and triglycerides) circulate in plasma by lipoprotein transport system.<sup>1</sup> Lipoproteins are complex macromolecular structures, composed of a core of cholesteryl esters and triglyceride surrounded by phospholipids and special proteins, apolipoproteins. Five major families of lipoproteins are chylomicrons, very low density lipoprotein (VLDL), intermediate density lipoprotein (IDL), low density lipoprotein (LDL) and high density lipoprotein (HDL). High LDL is a modifiable risk factor which promotes cholesterol transport and acts as shuttle among tissue cholesterol, triglyceride-rich lipoprotein and liver.<sup>2</sup> Macrovascular complications are the leading causes of morbidity and mortality in diabetic patients; >60% of diabetic patients die of cardiovascular

diseases.<sup>2</sup> In all populations studied, individuals with diabetes have a greatly increased risk of coronary heart disease (CHD) compared with nondiabetic individuals,<sup>3</sup> and risk of cardiovascular disease (CVD) death in diabetic individuals may be as high as that in nondiabetic individuals with previous myocardial infarction.<sup>4</sup> In diabetic patients dyslipidemia is the main cause which causes increase cardiovascular mortality and morbidity.<sup>2,4</sup>

Despite this, there is insufficient information on the relative importance of CVD risk factors in persons with diabetes and strategies for risk factor reduction.

A study from Pakistan revealed that low HDL and high LDL were strong and independent risk factors for the development of atherosclerosis.<sup>5</sup> In patients with IHD, cholesterol levels greater than 160 mg/dl and LDL cholesterol levels greater than 130 mg/dl should be treated with drug therapy along with

dietary measures.<sup>6-8</sup> In this study, we calculated the frequency of significant three-vessel coronary artery disease and left main stem disease in patients presenting with acute coronary syndrome (ACS) having high LDL cholesterol. In a large cohort of patients hospitalized with CAD, almost half have admission LDL levels <100 mg/dL. More than half the patients have admission HDL levels <40 mg/dL, whereas <10% have HDL  $\geq$ 60 mg/dl. These findings may provide further support for recent guideline revisions with even lower LDL goals and for developing effective treatments to raise HDL.<sup>9</sup>

## METHODOLOGY

This observational study was performed in Lady Reading Hospital, Peshawar, Pakistan from June 1, 2013 to December 31, 2013. All consecutive patients of both gender age more than 18 years undergoing coronary angiography admitted with ACS within past 30 days and with LDL cholesterol more than 130mg/dl were included in the study. Patients with first episode of ST elevation myocardial infarction, left bundle branch block, Non ST-segment elevation myocardial infarction, unstable angina, stable angina with high LDL were included in the study. The sampling technique used was non probability purposive sampling. Patients with acute pulmonary embolism diagnosed on ECG or CT scan, history of previous coronary artery bypass grafting, PCI, co-morbidities like renal failure, hepatic failure, sepsis, use of drugs like statins, niacin and fibrates and obesity were excluded. Informed consent was taken from each patient.

Coronary angiography was reported by a cardiac physician having at least three years experience in cardiac catheterization. Cardio Chek PA Cholesterol Testing Analyzer was used for measuring LDL levels. Demographic data was entered via a specially designed proforma for this study purpose. Significant three vessel disease was defined as when all the three coronary vessels i.e. left anterior descending (LAD), circumflex and right coronary artery (RCA) had more than 50% disease. Left main coronary artery disease was defined as when the left main coronary artery had 50% or more disease. Data were analyzed by using SPSS Version 16.0.

## RESULTS

A total number of 206 patients were included in the study. Their mean age was 51.25 $\pm$ 8.4 years. 139(67.5%) were male and 67(32.5%) female. Hypertension was found in 87(42.2%) patients and diabetes was found in 71(34.5%) patients (Table 1).

**Table 1. Baseline characteristics of study population.**

Variables	Numbers	Percentages
Age	51.25 $\pm$ 8.4 years.	
Males	139	67.5%
Females	67	32.5%
Hypertension	87	42.2%
Diabetes	71	34.5%
Smoking	56	27.2%
Family History of CAD	39	18.9%

**Table 2. Frequency of significant three vessel disease in patients with Acute coronary syndrome and High LDL levels.**

Variables	Number (206)	Percentage
Significant three vessel disease	52	25.2%
Significant Left main stem disease	15	7.2%

Significant three vessel coronary artery disease was seen in 52(25.2%) and left main stem disease were present in 15(7.2%) patients (Table 2). Out of 67(32.4%) with severe triple vessel and left main stem disease, males were 51(76.1%) and females were 16(23.9%). Patients with significant three vessel and left main stem disease were more frequently males and younger.

## DISCUSSION

We found that male patients had more frequent significant triple vessel and left main stem disease as compare to females. High LDL cholesterol levels appear to be an adverse prognostic indicator for patients with NSTEMI and may represent a unique target for new therapeutic interventions. Our study findings are similar to Roe et al which showed incidence of 30% of severe triple vessel disease among patients with hypercholesterolemia.<sup>10</sup> In our study, the findings are about the same that about 32% of these patients had significant three vessel and left main stem disease.

In a study by Wang et al<sup>11</sup> who related severity to quantitative and categorical atherogenic variables and assessed severity of angina (no angina, stable angina, or unstable angina) at the time of study in the same way. There were eight variables independently predictive of severity: in descending order of relative importance, male gender, diabetes, smoking dose, ratio of total cholesterol to high-density lipoprotein cholesterol (TC/HDL-C), lipoprotein(a) [Lp(a)], age, positive family history, and hypertension.<sup>11</sup> Our findings are similar to this study as frequency of diabetes, male gender and smokers were very high in our study.

This demonstrated that high LDL level is strong risk factor for CAD associated with significant three vessel disease as shown by by salahuddin et al.<sup>5</sup> This study also demonstrated that low HDL level and high LDL and lipoprotein "a" is a significant predictor of severity of coronary artery, left main stem and multi-vessel involvement.<sup>5</sup>

Higher LDL levels appear to be a unique, common, and potentially modifiable risk factor for patients with ACS. As a result, alternative athero-protective treatment strategies designed to modulate LDL levels and/or LDL function will require further study (especially in the primary prevention population) to reduce the risk of future CAD, as well as in the ACS population to reduce the risk of subsequent adverse outcomes. In the meantime, identification of patients with ACS who have High LDL levels should prompt the initiation of intensive dietary and lifestyle modification interventions that may mitigate some of the risks associated with this adverse prognostic indicator. Recently published ATP4 guidelines show that there are four high risk groups for atherosclerotic cardiovascular disease which needs high intensity treatment for decreasing mortality and morbidity. High intensity treatment includes either rosuvastatin 20-40mg or atorvastatin 40-80 mg.<sup>12</sup>

There were few limitations to this analysis. Firstly, high LDL values were not further sub classified and their effect on CAD was not demonstrated separately, as done by Reo et al.<sup>10</sup> Secondly, recorded LDL levels during the hospitalization may differ from chronic LDL levels before presentation, so the impact of high LDL levels on the progression of

CAD may not be accurately represented by in-hospital LDL levels.

## CONCLUSION

Patients having acute coronary syndrome with high LDL levels more frequently have significant three vessel and left main stem disease.

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**Conflict of Interest:** None declared  
Rec. Date: Jan 8, 2017 Revision Rec. Date: May 23, 2017 Accept Date: Jul 6, 2017

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