

## LOW HDL LEVELS AS A MAJOR RISK FACTOR IN PATIENTS OF ACUTE MYOCARDIAL INFARCTION

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### Contribution

SNA conceived the idea and designed study. MARS and KAH did data collection and manuscript writing. MAK did review. All authors contributed equally to the submitted manuscript.

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### ABSTRACT

**Objective:** To determine the frequency of low HDL levels in patients presenting with acute myocardial infarction.

**Methodology:** It was a descriptive cross-sectional study. Conducted from 1st January to 31st July 2016. Patients with acute myocardial infarction admitted at Emergency Department of Chaudary Pervaiz Elahi Institute of cardiology were included in the study via non-probability purposive sampling. All patients of either gender between 20 to 60 years of age were included. Permission was taken from the ethical committee of the hospital. Informed consent was taken from all the patients included in the study. Twelve hours fasting lipid profile of the patients were taken and HDL levels were noted. Statistical analysis was performed by entering all the data in SPSS version 16.0.

**Results:** There were 382 patients in total. Mean age of the patients was  $54.05 \pm 7.39$  years. There were 218 (57.1%) males. Mean level of HDL cholesterol was found to be  $41.03 \pm 8.96$  mg/dl ranging from a minimum of 24mg/dl to 63mg/dl. Isolated low level of HDL cholesterol was found to be present in 84 (22%) while it was not present in 298 (78%) of the patients. There was no significant effect of age, gender and smoking noted on the frequency of isolated low HDL.

**Conclusion:** Low HDL level is noted to be present in a high percentage of acute MI patients and can be a major risk contributor.

**Key Words:** Dyslipidemia, Isolated low HDL .

## INTRODUCTION

Cardiac diseases (CVD) are showing increasing trend all over the world especially obstructive diseases of coronaries. The term "Dyslipidemia" refers to abnormalities of different known parameters of blood lipids. It includes elevation of plasma total cholesterol and triglycerides (TGs), and/or a low high-density lipoprotein (HDL) level that leads to the development of atherosclerosis in coronary arteries and arteries elsewhere in human body. Many researches in recent passed has shown that high HDL in blood is related to low cardiovascular disease risk and has a protective effect.<sup>1</sup>

Abnormalities in lipids have many reasons which may be genetic or acquired (secondary). Lipid measurements are continuous traits so abnormal levels are defined by 99 percentile.<sup>3</sup> Because of a linear relation between lipid levels and heart disease risk, it is concluded that lower is the levels, lower will be the risk of CAD risk. So like any other continuous variable, normal level is considered to that at which benefit are more. As discussed many studies and papers have been published showing recently showing inverse relation between HDL levels and CAD but evidence is not as strong as the relation between LDL and CAD.<sup>2,3</sup>

It has also been noted that low HDL is not only a risk marker but in many researches it has been shown to be operating independently regardless of LDL levels.<sup>4</sup> In different studies, in patients of acute coronary syndrome low-HDL-cholesterol was found to be 34.1%<sup>6</sup> in one research while in another research results were 22.4% in Asians while 14.5%<sup>5</sup> in non Asians

## METHODOLOGY

It is a descriptive cross-sectional study. Patients with acute myocardial infarction admitted at Emergency Department of Chaudary Pervaiz Elahi Institute of cardiology from 1st January to 31st July 2016, were included in the study via non-probability purposive sampling. Patients with 4% margin of error, 96% confidence level taking expected percentage of low HDL levels as in other trials, in patients undergoing trans-radial catheterization,

calculated by formula.  $n = z^2 p(1-p)$  with acute myocardial infarction were included in the study.<sup>10</sup> All patients of either gender between 20 to 60 years of age presenting with acute ST segment elevation myocardial infarction were included in the study with the objective to determine the frequency of isolated low levels of HDL in lipid profile. Patients with the following characteristics were excluded from the study; patients of myocardial infarction more than 48 hours after MI, any known congenital dyslipidemia and patients already taking statins or other antidyplipidemics. Permission was taken from the ethical committee of the hospital. Informed consent was taken from all the patients included in the study. The demographic information like name, age, gender, number of smoking pack years was noted. 12 hours fasting lipid profile was taken from all patients. All information was noted on specially designed Performa attached along with. The collected information was entered and analyzed through SPSS (Version 10). Mean and standard deviation were calculated for quantitative variables like age, number of smoking pack years and level of HDL. Frequencies and percentages were calculated for gender and isolated low levels of HDL. Stratification was used to control the effect modifiers like age, gender, number of smoking pack years. Chi-square test was applied to see the effect of these on frequency of isolated low HDL-C.  $P < 0.05$  was considered significant.

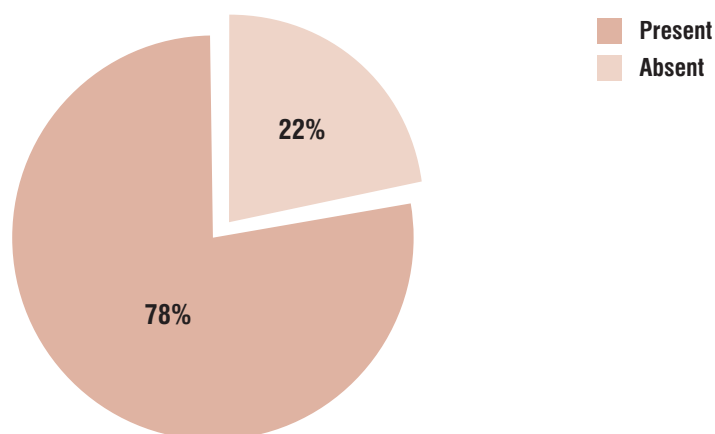
## RESULTS

There were 382 patients in total. Mean age of the patients was  $54.05 \pm 7.39$  years ranging from a minimum of 35 to a maximum of 67 years. There were 218 (57.1%) males while 164 (42.9%) were females. Mean number of smoking pack years was  $8.10 \pm 02.08$  ranging from a minimum of 0 to a maximum of 40 pack years. Mean level of HDL cholesterol was found to be  $41.03 \pm 8.96$  ranging from a minimum of 24 to a maximum of 63. Isolated low level of HDL cholesterol was found to be present in 82 (22%) while it was not present in 298 (78%) of the patients (Table 1, Figure 1).

**Table 1: Characteristics of the Study Population (n = 382)**

Variables	Frequency n (%)
Mean Age	$54.05 \pm 7.39$ years
Males	218 (57.1%)
Females	162 (42.9%)
Mean smoking pack years	$8.10 \pm 2.08$
Mean HDL	$41.03 \pm 8.96$
Isolated low levels of HDL	42/191 (22%)

**Figure 1: Frequency of isolated low levels of HDL n = 382**



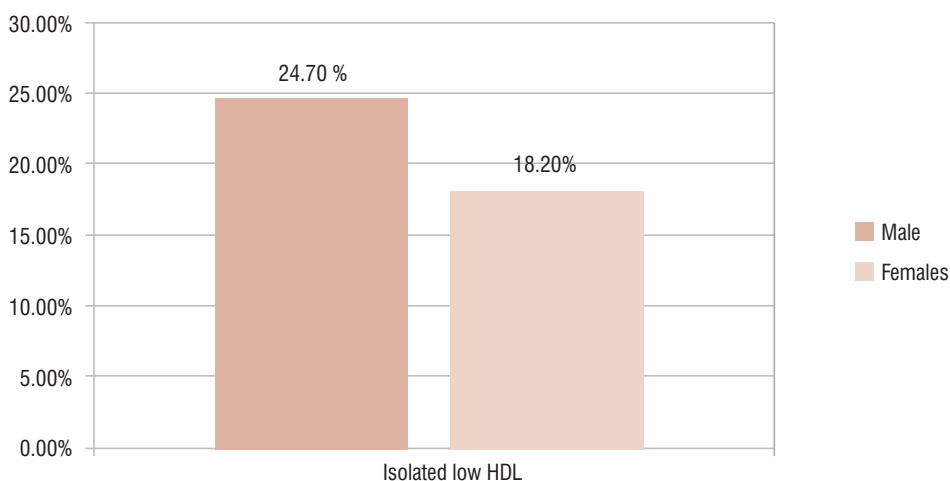
When the effect of age was noted on the frequency of isolated low levels of HDL, it was found that in age group < 45 years, there were 60 patients in total. Males were 38/60 (63.3%) while females were 22 (36.7%). Mean HDL level among these patients was 41.50 + 7.21 and isolated low HDL was found in 16/60 (26.7%) while it was not found in 44/60 (73.3%). In age group 46-55 years, there were 128 patients in total. Mean HDL level was found to be 39.42 + 8.87. Males were 82/128 (64.1%) whereas females were 46 (35.9%). Isolated low levels of HDL was found to be present in 32/128 (25%) whereas it was not present in 96/128

(75%). In age group > 55 years there were 196 patients in total. Mean level of HDL was 41.95 + 9.42. There were 98/196 (50.5%) males while females were 96/196 (49.5%). Isolated low levels of HDL was present in 36/196 (18.6%) while it was not present in 158/196 (81.4%). P- value was found to 0.50. When the effect of gender was noted it was found that there were 109/191 (57.1%) males while there were 82/191 (42.9%) females (Table 2, Figure 2). When the effect of smoking was noted that there were 186 patients who had never smoked. (Table 3).

**Table 2: Effect of Age on the Frequency of Isolated Low HDL (n = 382)**

Variables	Males (n= 218)	Females (n=162)	P-value
Mean age	53.36 ± 7.26	54.98 +7.51	0.297
Mean HDL	35.61 ± 6.17	48.24 +6.72	
Isolated low HDL	27 (24.7%)	15 (18.2%)	

**Figure 2: Effect of Gender on the Frequency of Isolated Low HDL (n = 382)**



**Table 2: Effect of Smoking on the Frequency of Isolated Low HDL (n = 382)**

Variables	Frequency n (%)	Frequency n (%)	Frequency n (%)	P-value
Males	52/186 (28%)	80/110 (72.7%)	43 (100%)	0.35
Females	134/186 (72%)	30/110 (27.3%)	-	
Mean HDL	44.85 ± 8.73	39.71 ± 8.62	34.91 ± 5.55	
Isolated low HDL	40/186 (21.5%)	24/110 (21.8%)	20/86 (23.3%)	

## DISCUSSION

In many researches it has been found that there is inverse relation between two lipid parameters that is between LDL and HDL.<sup>6,7</sup> It has also been noted that low HDL related risk is independent of LDL levels.<sup>8</sup> In some other researches low HDL risk is found to be equivalent to high LDL levels.<sup>9,10</sup> It has also been shown that low HDL prevalence is variable in different communities and ranges between 6% to 34%.<sup>8,11</sup> Whether to treat this group with drugs to decrease CAD risk is not very clear in previous studies.

The Tromso Heart Study showed that low HDL is a common finding and three times more likely increases the risk of developing CAD when compared to LDL levels in same group of patients.<sup>12</sup> Wilson in Framingham heart study also showed low HDL as a clear risk factor for CAD.<sup>13</sup> Castelli WP et al. showed statistically strong association between low HDL and CAD risk with as strong as associated with high LDL and CAD risk.<sup>14</sup> Michael Miller has stated: "Low HDL-C is the most common lipoprotein abnormality in patients with CHD and is predictive of CHD events, even when total cholesterol levels are normal".<sup>15</sup> Low HDL is also established as a risk factor for stroke and statins have decreased adverse outcomes in these patients<sup>16</sup>. One Korean study has shown low HDL among main risk factors of CAD<sup>17</sup>.

Two large studies have clearly shown the same consistent results as in other studies that low HDL is present in almost one third of population and clearly and independent risk factor in patients with ischemic heart disease. Among these patients low HDL as an only lipid abnormality is very common and present in almost 66% of patients. In people other than Asia, low HDL-C is found to be seen in almost 25% of patients which in turn leads to 25% increase in CAD risk. Among Asian people low HDL is as important as high LDL for CAD disease. Data from Taiwan showed that approximately one 25% of the people had low HDL-C defined.<sup>18</sup> In contrast, data from Singapore have indicated that up to one half of the adult population have suboptimal HDL-C levels.<sup>19</sup> The high prevalence of low HDL-C present in these populations may partly explain why migrant studies have shown that South Asians have between 50% and 200% higher CHD rates compared with European populations even after adjustment for conventional risk factors such as smoking, BP, and total cholesterol.

So it can be concluded that if we raise HDL by drugs or by means of life style changes like daily aerobic exercise, consumption of fruits and vegetables and smoking cessation, there is a strong evidence based chance that we can substantially reduce CAD burden especially needed in Asian population as all studies have shown low HDL is more common in Asians and CAD prevalence is also in Asians as compared to western population.

## CONCLUSION

Low HDL level is noted to be present in a high percentage of acute myocardial infarction patients and can be a major risk contributor.

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