*ejpmr, 2019,6(4), 345-349*

**SJIF Impact Factor 4.897**

**EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH**

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

# SERUM HIGH DENSITY LIPOPROTEIN –AN INDEPENDENT RISK FACTOR AMONG YOUNG PATIENTS WITH ST ELEVATION MYOCARDIAL INFARCTION IN TAMIL ETHINICS

**[1]K. Chandra Kala and [2]*P. Meena Kumari**

[1]Assistant Professor, Department of Biochemistry, Tirunelveli Government Medical College, Tirunelveli, Tamil Nadu, India.

[2]Assistant Professor, Department of Medicine, Tirunelveli Government Medical College, Tirunelveli, Tamil Nadu, India.

***Corresponding Author: Dr. P. Meena Kumari**

Assistant Professor, Department of Medicine, Tirunelveli Government Medical College, Tirunelveli, Tamil Nadu, India.

**Article Received on 24/01/2019** **Article Revised on 14/02/2019** **Article Accepted on 06/03/2019**

## ABSTRACT

**Background:** Occurrence of Acute Myocardial Infarction (AMI) in younger age is ever-increasing in worldwide and it has been reported that 60% of AMI in young age is due to genetic causes. The aim of this study is to ascertain Serum HDL as an independent biochemical marker for the South Indian young AMI patient's less than 40 years and to find its relationship with other risk factors of AMI. **Methodology:** This cross sectional study was done in 40 Patients aged less than 40 years with AMI with typical chest pain, ST Elevation in ECG and a rise in serum CK-MB, without any other known risk factors and age and sex matched 40 control. Serum was used to analyze Glucose, Urea, Creatinine, HDL, TGL, Total Cholesterol, LDL, VLDL, CK-MB and other factors. Finally statistical analysis was done using SPSS-19.0. **Result:** Statistical analysis showed significant variation of serum HDL between patients and controls $P \leq 0.001$. Further, positive significant changes were observed between patients and controls in Serum Glucose: $P \leq 0.04$, Serum AST: $P \leq 0.05$, Serum CK-MB: $P \leq 0.001$. **Conclusion:** This study confirms the independent association between STEMI and Serum HDL among South Indian euthenics.

**KEYWORDS:** Serum HDL, Lipid profile in young AMI, Biomarkers in AMI. Acute Myocardial Infarction.

## INTRODUCTION

Prevalence of acute myocardial infarction (AMI) in patients with less than 40 years of age is increasing in trends (4-8%) in world. A recent Bethesda Conference projected a classification system according to the strength of the support that risk factor intervention favorably affected the outcome of AMI.[1]

Incidence was reasonably ever-increasing due to the increased frequency of the risk factors for atherosclerosis in the younger age group; principally, the increased incidence of impaired fasting glucose, low high-density lipoprotein, high levels of triglycerides levels and an increased BMI. However, non-atherosclerotic coronary artery disease like hypercoagulability should also be investigated or at least assumed to be the cause for AMI in the younger patients.[2]

AMI in young adults, present with typical chest pain, and ischemic changes in ECG, the clinical, and the prognostic characteristics. Therefore, it is potential to put forward the presence of genetic conditions at the origin AMI.[3] The etiology for acute myocardial infarction (AMI) is multifactorial; though, several studies have implicated altered lipid metabolism as one of the vital factors in the development of AMI. Kumar et al observed significantly elevated total cholesterol (TC), increased triglyceride (TG) levels and lower high-density lipoprotein cholesterol (HDL) levels in AMI patients.[4]

As per Kulsoom B et al serum low-density lipoprotein cholesterol (LDL) levels and the ratio of LDL to HDL were not significantly different among the two groups; however, serum HDL levels were significantly decreased in AMI group.[5] Hence the risk of AMI was associated with an increase in LDL and a decrease in HDL, in both Asians and non-Asians.[6]

Reduced concentrations of serum HDL and increased serum TGL were found to be independent risk factors, while serum LDL was not associated with AMI.[7] But, Lehto et al did not find any difference in mean serum Total Cholesterol levels between the AMI patients and controls, while mean HDL was considerably lower in the AMI group. The cardiac marker has been positively correlated with TC, LDL, and TG and negatively correlated with HDL.[8] Using the bivariate and multivariate Cox proportional hazards analysis to

identify independent predictors of major adverse coronary events it was found that HDL predicted major role, which in turn provided support for interventions targeting HDL level for cardiovascular risk reduction.[9] Li et al have revealed that the cases with reduced HDL level had high incidence of AMI and CHD mortality compared with other hyperlipidemia. However, AMI attacks and deaths decreased significantly at the normal and high HDL levels, signifying that protective effect of HDL against ACS is more prominent in people with low lipid level.[10]

This was partly due to the increased prevalence of the risk factors for atherosclerosis in the younger age group; especially, the increased incidence of impaired fasting glucose, high levels of triglycerides, low high-density lipoprotein levels and an increased waist to hip ratio. However, non-atherosclerotic coronary artery disease or hypercoagulability should also be investigated or at least suspected in the younger patients. So, a study was conducted to learn the profile of young patients (15-40 years) with acute myocardial infarction with an emphasis on Assessment of the risk factors and Mode of presentation.

The literatures undoubtedly indicate lipids metabolism plays an important role of in occurrence of AMI. However, the biomarker value of various components of lipids profile is not clear due to conflicting findings in various studies. We therefore compared the lipid profiles of AMI and chest pain patients with respect to normal subjects. In addition, we also studied the role of other risk factors in AMI and evaluated its correlation with lipid profiles.

## METHOD

The approval of the ethics committee of K.A.P.V. GOVERNMENT Medical College, Trichy was obtained. This study was conducted at Government Mahatma Gandhi memorial Hospital which was attached to K.A.P.V. GOVERNMENT Medical College Trichy, Tamil Nadu, and India for one year in order to obtain 40 patients. The patients were below 40 years of age. This was a cross-sectional study which includes the patients with history of typical ischemic type of chest discomfort, Evolutionary changes on the serially obtained ECG (ST segment elevation) and Rise of the serum cardiac marker (CK-MB) Exclusion criteria includes: patients with any or combination of Renal Disease, Life Expectancy less than one year, Severe Neuro Psychiatric Problems, Known Diabetic Patients, Known History of Thromboembolic Disorders, Known Hypertensive Patients, Smokers, History of Previous Coronary Artery Disease, Alcoholic, and Obese Individuals. Control subjects were 40 healthy individual men and women who came with some patients and healthy volunteers of age less than 40 years, during May 2016 to March 2017. The data were prospectively recorded as per the protocol. In all the participants, details of the age, sex and occupation were recorded with the details of smoking, alcohol use, a known history of hypertension and diabetes mellitus and a significant family history of ischemic heart disease. Weight, Height and BMI was recorded for each person. Fasting lipid profile, Fasting blood glucose, serial ECGs and the cardiac enzymes (CPK- MB) were evaluated Echocardiography was done in all the patients. The risk factors which were studied were hypertension, diabetes mellitus, overweight (BMI of > 25 kg/m2), the waist to hip ratio, (a WHR of >0.91cms was considered as a risk factor), hyperlipidaemia (serum cholesterol of 200 mg%), a past history of IHD (ischemic heart disease), and a family history of ischemic heart disease. Finally statistical analysis done using SPSS 19.0.

## RESULT

The mean age of the patients with myocardial infarction was 17 years, Mean and SD of age in patients and controls was 33.48 ± 5.26 and 32.33 ± 6.09, Minimum and Maximum age for patients: 17 and 40 years, with a maximum number of patients (87.5%) being within the age of 30-40 years and 10% of the patients being in the age group of 20-30 years. The youngest patient was age 17 years old and the oldest was 40 years old. 80% of the patients were males.

Anterior wall MI was found in 45% of the patients and 32.5% of them had inferior wall MI. 22.5% of the patients had lateral wall MI in the electrocardiogram findings. The study revealed that there is a significant association between lipid profile which increase the risk of AMI. A positive significant change was observed between patients and controls in Serum HDL: $P \leq 0.008$, Serum Glucose: $P \leq 0.05$, Serum AST: $P \leq 0.06$ Serum CK-MB: $P \leq 0.001$ from Table II. The significance of Serum TGL was $P \leq 0.532$, serum LDL $P \leq 0.320$. ($P \leq 0.05$ is significant).

**Table 1: Minimum Age, Minimum Age and Mean and SD of patients and control groups.**

| S.NO | GROUP | No of cases | Minimum Age | Maximum Age | Mean Age ± Std. Deviation | P value |
|---|---|---|---|---|---|---|
| 1 | Patients | 40 | 17 | 40 | 33.48± 5.26 | ≤ 0.061 |
| 2 | Control | 40 | 19 | 40 | 32.33 ± 6.09 | |

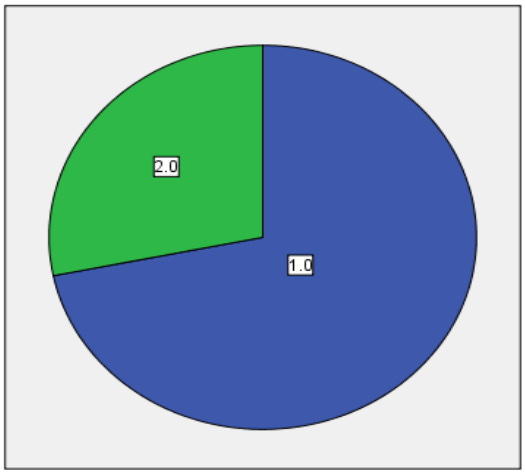


**Figure 1: Distribution of sex among young Acute Myocardial Infarction Patients 1.0 males 2.0 females.**

**Table II: Mean ± SD and its significance of various risk factors of AMI among South Indian Patients.**

| S.No | Variable | Group | Mean ± SD | | P value | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| 1 | SBP | Patients | 106.97 | 9.18 | 0.906 | 4.778 | 5.38 |
| | | Control | 106.67 | 11.36 | | 4.7 | 5.38 |
| 2 | DBP | Patients | 74.24 | 8.3 | 0.871 | 4.0 | 3.39 |
| | | Control | 74.55 | 6.6 | | 4.0 | 3.40 |
| 3 | BMI | Patients | 23.38 | 1.98 | 0.205 | 0.32 | 1.48 |
| | | Control | 22.80 | 1.67 | | 0.3 | 1.48 |
| 4 | Urea | Patients | 36.91 | 6.19 | 0.056 | 2.7 | 8.662 |
| | | Control | 31.18 | 5.73 | | 2.79 | 8.663 |
| 5 | Sugar | Patients | 126.42 | 38.04 | 0.05 | 8.51 | 36.762 |
| | | Control | 103.79 | 14.22 | | 8.35 | 36.918 |
| 6 | Creatinine | Patients | 0.942 | 0.16 | 0.443 | 0.10 | 0.0481 |
| | | Control | 0.973 | 0.14 | | 0.10 | 0.0481 |
| 7 | AST | Patients | 122.09 | 452.44 | 0.06 | 67.23 | 247.53 |
| | | Control | 31.94 | 10.44 | | 70.31 | 250.61 |
| 8 | ALT | Patients | 160.97 | 654.39 | 0.273 | 100.46 | 354.7 |
| | | Control | 33.85 | 7.25 | | 104.92 | 359.17 |
| 12 | Total Cholesterol | Patients | 168.39 | 29.00 | 0.532 | 21.4 | 5.46 |
| | | Control | 176.39 | 25.67 | | 21.4 | 5.4 |
| 13 | TGL | Patients | 169.03 | 59.07 | 0.532 | 23.9 | 45.9 |
| | | Control | 158.03 | 81.46 | | 24.0 | 46.0 |
| 14 | VLDL | Patients | 33.80 | 11.81 | 0.532 | 4.7 | 9.1 |
| | | Control | 31.60 | 16.29 | | 4.8 | 9.2 |
| 15 | LDL | Patients | 95.89 | 24.36 | 0.320 | 21.45 | 7.11 |
| | | Control | 103.06 | 33.07 | | 21.48 | 7.14 |
| 16 | HDL | Patients | 38.70 | 3.869 | 0.008 | 4.9 | 1.134 |
| | | Control | 41.73 | 3.843 | | 4.9 | 1.134 |
| 17 | CK-MB | Patients | 138.58 | 108.01 | 0.01 | 214.2 | 204.8 |
| | | Control | 133.24 | 192.76 | | 217.7 | 208.4 |
| 19 | PT | Patients | 16.94 | 13.193 | 0.090 | 0.578 | 8.669 |
| | | Control | 12.89 | 1.651 | | 0.663 | 8.754 |

SBP : Systolic Blood Pressure, DBP: Diastolic Blood Pressure, BMI: Body Mass Index,

## DISCUSSION

The age distribution of the of patients shows a striking increase of the disease with ageing, even in young adults, which was a very clear fact which was seen in earlier studies also.[11]

One of the most dependable risk factors for coronary artery disease seems to be the male sex. The defensive effects of estrogens in preventing atherosclerosis have been clearly confirmed in various studies. In another study[12], a ratio of AMI in young patients showed a female: male ratio of 1:20[12,13,14], where as in our study, it was 1:4, but the trend remains the same. The end result of the Lipid Research Clinics Trail[15,16] established a direct association between the plasma cholesterol levels, lipoprotein profile, and the mortality and morbidity from ACS due to atherosclerosis. Hyperlipidemia, which is the universal common risk factor in young Asian adults as per earlier studies.[16,17] It was also confirmed in our study.

Diabetes and hypertension were common risk factors among the older MI patients but they were less common in young adults in our study, which was seen in earlier studies also. A positive family history of Ischemic Heart Disease had been found as a significant cause only among the young adults as compared to the older patients in earlier studies. But Indian studies reported BMI plays lesser role in risk of AMI, which was seen in our study also. Chest pain was the most common presentation in our study, which was similar to that which was seen in earlier studies also.[18]

Anterior wall MI was very common among the patients, irrespective of their ages. We could see that single vessel disease was evidently more common among the young adults, which had been reported by others also earlier.[19] Woo et al observed increased mean Total Cholesterol, LDL, and TGL, as well as reduced mean HDL in AMI patients; high HDL was among the protective factors.[20] Which was also observed in our study.

## CONCLUSION

Incidence of AMI remains high since 2001 for young women and men. Moreover, trends in the frequencies of co morbidities have increased for both women and men hospitalized with AMIs in the past decade, suggesting a greater need for intensive primary prevention efforts in the high-risk young population. This study confirms the independent association between Serum HDL-cholesterol levels with Acute Myocardial Infarction among young patients.

## ACKNOWLEDGEMENTS

We would like to thank the ethics committee of K.A.P.V. Government Medical College for approving this research.

**Funding:** No funding was received for this research.

**Conflict of interest**: Nil.

## REFERENCES

1. Fuster V, Pearson TA. Matching the intensity of the risk factors with the hazards for the coronary heart disease events. *J Am Coll Cardiol*, 1996; 27: 957-1047.
2. Cengel A, Tanindi A. Myocardial infarction in the young. *J Postgrad Med*., 2009 Oct- Dec; 55(4): 305-13.
3. The role of genetic polymorphisms in myocardial infarction in the young. *Clinical Hemorheology and Microcirculation*, 2010; 46(4): 291-98.
4. Kumar A, Nagtilak S, Sivakanesan R, Gunasekera S. Cardiovascular risk factors in elderly normolipidemic acute myocardial infarct patients-a case controlled study from India. *Southeast Asian J Trop Med Public Health*, 2009; 40: 581–92.
5. Kulsoom B, Nazrul SH. Association of serum C-reactive protein and LDL:HDL with myocardial infarction. *J Pak Med Assoc*., 2006; 56: 318–22.
6. Karthikeyan G, Teo KK, Islam S, et al. Lipid profile, plasma apolipoproteins, and risk of a first myocardial infarction among Asians: an analysis from the INTERHEART Study. *J Am Coll Cardiol*, 2009; 53: 244–53.
7. Tokuda Y. Risk factors for acute myocardial infarction among Okinawans. *J Nutr Health Aging*, 2005; 9: 272–6.
8. Lehto S, Palomaki P, Miettinen H, et al. Serum cholesterol and high density lipoprotein cholesterol distributions in patients with acute myocardial infarction and in the general population of Kuopio province, eastern Finland. *J Intern Med*., 1993; 233: 179–85.
9. Koro CE, Bowlin SJ, Stump TE, Sprecher DL, Tierney WM. The independent correlation between high-density lipoprotein cholesterol and subsequent major adverse coronary events. *Am Heart J*., 2006; 151: 755. e1–6.
10. Li JZ, Chen ML, Wang S, Dong J, Zeng P, Hou LW. Apparent protective effect of high density lipoprotein against coronary heart disease in the elderly. *Chin Med J*., 2004; 117: 511–5.
11. Popma JJ. "Coronary angiography and intravascular ultrasound imaging". Chapter 18. In Douglas P. Zipes, peter Libby, Robert O, Bonow, Eugene Braunwald (eds), *Braunwald's Heart Disease A textbook of Cardiovascular Medicine*, 7th edition, 2005; 423-55.
12. Siwach SB, Singh H, Sharma D. Profile of acute myocardial infarction in the young in Haryana. *J Assoc Physicians India*, 1998 May; 46(5): 424-26.
13. Mchill HC. Jr. Risk factors for atherosclerosis. *Adv Exp med Biol.*, 1978; 104: 273-80.
14. Barbash GI, White WD, Modan M. Acute myocardial infarction in the young; the role of smoking. *Eur Hart J.*, 1995 Mar; 16(3): 295-96.
15. Lipid Research Clinics Program, lipid metabolism, Atherogenesis branch, National Heart, Lung and Blood Institute. The Lipid Research Clinics Coronary Primary Prevention Trial results. JAMA, 1984; 251: 351-65.
16. Scandinavian Simvastatin Survival Study Group. Randomized trial of cholesterol lowering in 4444

patients with coronary heart disease. The Scandinavian Simvastatin Survival Study (4S). Lancet, 1994; 344: 1383-89.
17. McKeigue PM, Adlestein AM, Shipley MJ. The dietary and risk factors for CHD in Asian Indians in northwest London. Lancet, 1985; 11: 1086-90.
18. Woon VC, Lim KH. Acute MI in the elderly – the difference compared with the young. Singapore Med J., 2003 Aug; 44(8): 414-8.
19. Shah A, Sreenivasan S, Shah H, Lanjewar C, Nabas A, Nyayadhish P, et al. The clinical, biochemical and the angiographic profile of young (< or equal to 40 years) patients with acute myocardial infarction. Indian Heart Journal, 2005; 57: 423.
20. Woo J, Ho SC, Wong SL, et al. Lipids, lipoproteins and other coronary risk factors in Chinese male survivors of myocardial infarction. *Int J Cardiol*, 1993; 39: 195–202.