

Serum Lipid Profiles with Patients of Myocardial Infarction (MI)Anil Meena¹, Shailendra Singh Solanki², Shailendra Singh Chouhan³¹Associate Professor, Department of Pathology, Government Medical College Ratlam Madhya Pradesh, India.²Assistant Professor, Department of Pathology, Government Medical College Ratlam Madhya Pradesh, India.³Associate Professor, Department of Pathology, Government Medical College Ratlam Madhya Pradesh, India.

Received: 04-05-2021 / Revised: 09-06-2021 / Accepted: 30-07-2021

Abstract

Background: Serum lipids and lipoproteins are estimated in 50 patients with myocardial infarction (MI). Serum total lipids, total cholesterol (TC), and LDL-cholesterol (LDLc) revealed a significant change in patients with myocardial infarction (MI). TC/HDLc and LDLc/HDLc ratios expressed a substantial increase on a predischarge day compared to the day of admission. Serum triglycerides showed an increasing trend after developing myocardial infarction. Aim of the present study is to evaluate the significant change in serum lipid profile in patients with myocardial infarction (MI). **Materials and methods:** It was a prospective, cross-sectional study conducted in the pathology department and ICU of cardiology, Jaya Arogya Hospital Gwalior Madhya Pradesh state, India focusing on patients admitted with myocardial infarction. The patient's demographic and lipid profile with cardiac events were recorded. **Result:** In this study, average serum total cholesterol, serum triglycerides, serum high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol estimated in myocardial infarction patients were 202.98±37.87mg/dl, 236.48±41.62mg/dl, 35.84±5.07mg/dl, 124.76±32.23mg/dl respectively. **Conclusion:** The serum lipid profiles are observed after myocardial infarction. Dyslipidemia is more prevalent in cardiac patients as compared to healthy persons. Elevated low-density lipoprotein cholesterol level, lower level of high-density lipoprotein cholesterol associate with cardiac events

Keywords: Biomarkers, Serum lipoprotein, myocardial infarction

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Myocardial infarction (MI) is the basic form of ischemic heart disease, and it is the leading cause of death in the United States. Nearly 1.5 million individuals in the US suffer from acute MI annually, and approximately one-third die [1]. Lipid profile is a valuable diagnostic tool and a risk factor for cardiovascular disease in myocardial infarction patients. Low-density lipoprotein cholesterol and high-density lipoprotein cholesterol play an essential role in developing atherosclerotic changes in blood vessels [2]. The epidemiological record has demonstrated that atherosclerotic changes due to dyslipidemia are directly connected to cardiac diseases. Coronary artery disease (CAD) has been directly correlated to hypercholesterolemia, elevated plasma levels of cholesterol in low-density lipoproteins (LDL-C) [3-4]. The gravity of IHD and its resultant mortality can be reduced by controlling modifiable risk factors. Among the variable risk factors of IHD, Hypertension, diabetes mellitus (DM), cigarette smoking, dyslipidemia, and severe obesity-dyslipidemia (hyperlipidemia and hypercholesterolemia) have been given the most excellent attention recently [5]. Lipid profile evaluation, including total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL-C), and high-density lipoprotein (HDL-C), allows an assessment of CVD risk. Pieces of evidence indicate that elevated TG concentrations, TC, LDL-C, and decreased HDL-C accelerate the development of atherosclerotic plaques [6-9].

Correspondence*Dr. Anil Meena**

Associate Professor, Department of Pathology, Government Medical College Ratlam Madhya Pradesh, India.

E-mail: meenaanil10@gmail.com

The aetiopathogenesis of myocardial infarction (MI) is multifactorial; however, several studies have implicated impaired lipid metabolism as one of the deciding factors in developing this disease. Significantly higher total cholesterol (TC) and triglyceride (TG) levels and lower high-density lipoprotein cholesterol (HDL) levels in AMI patients [10].

Material and methods

It was a prospective, cross-sectional study conducted simultaneously in the pathology and cardiac ICU of Gajra Raja Medical College and Jaya Arogya Hospital Gwalior Madhya Pradesh state, India, from September 2008 to October 2009. Ethical clearance was taken by the institutional Ethics Committee and obtained informed consent from adult research participants. The aim of the present study was to find out the pattern of lipid profile in patients with myocardial infarction. We have observed 50 cases of myocardial infarction and 50 healthy subjects included as a control. The patients with myocardial infarction (MI) were selected from the cardiac ICU of the medicine department and admitted to the intensive care unit of Jaya Arogya Hospital. In all cases, routine and special investigations are done. Routine investigations included haemogram, urine examination, blood urea blood sugar ECG, and X-ray. The special investigation included total serum cholesterol, serum triglyceride, serum high-density lipoprotein cholesterol, and serum low-density lipoprotein cholesterol.

Data collection and analysis:Data were collected prospectively, such as sex, age and obesity, hypertension, diabetes, and family history. Peripheral venous blood samples were collected for measuring lipid profiles. Lipid profiles were tested by the selective solubilization method (AU5400 analyzer). The categorical variables and continuous variables were expressed as mean ± standard deviation, as %, or frequencies with percentage, respectively. IBM SPSS Statistics 21.0 was used for all statistical analyses.

Results

Table 1: Distribution of patients group of myocardial infarction (n=50)

| S. No. | Groups | No. of patients (n=50) |
|--------|--------------------|------------------------|
| 1 | Male | 39 |
| | Female | 11 |
| 2 | Below 40yr | 11 |
| | Above 40yr | 39 |
| 3 | Tobacco addict | 22 |
| | Tobacco non addict | 28 |
| 4 | Alcohol addict | 10 |
| | Alcohol non addict | 40 |
| 5 | Normotensive | 15 |
| | Hypertensive | 26 |
| | Diabetic | 09 |

There were 50 adult patients with MI enrolled in this study. The average age was 53 years and male patients were 39, and female patients were 11. The rates of smoking and hypertension were significantly different between males patients and female patients.

Out of 50 patients, 11 were below 40 years, and 39 patients were above 40 years of age. Tobacco addict patients were 22, and non-tobacco addict patients were 28, and only 09 patients had diabetes out of 50 patients [Table 1].

Table 2: Mean of serum total cholesterol, serum triglyceride, serum high density lipoprotein cholesterol, low density lipoprotein in control and in myocardial infarction patient (n=50)

| | No. of cases | Mean TC mg/dl (S.D) | Mean TG mg/dl(S.D) | Mean HDL-C mg/dl (S.D) | Mean LDL-C mg/dl (S.D) |
|-----------------------------------|--------------|---------------------|--------------------|------------------------|------------------------|
| Control | 50 | 160.16 ±26.93 | 107.30 ±25.53 | 46.06 ±5.37 | 94.04 ±20.76 |
| Patients of myocardial infarction | 50 | 202.98 ±37.87 | 136.48 ±41.62 | 35.84 ±5.07 | 124.76 ±32.23 |
| P | | <0.05 | <0.05 | <0.05 | <0.05 |
| T | | 6.52 | 4.23 | 7.66 | 5.67 |
| Significance | | Highly significant | Highly significant | Highly significant | Highly significant |

[TG = Triglyceride, TC = Total Cholesterol, HDL-C = High Density Lipoprotein Cholesterol, LDL-C= Low Density Lipoprotein Cholesterol]

Many clinical and epidemiological studies in the past few decades have pointed to the importance of serum lipoprotein concentration in the development of myocardial infarction hypertension and complicating diseases like diabetes mellitus and obesity. In this study, average serum total cholesterol, serum triglycerides, serum high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol estimated in myocardial infarction patients were 202.98 ±37.87mg/dl, 236.48±41.62mg/dl, 35.84±5.07mg/dl, 124.76± 32.23 mg/dl respectively [Table 2]. In the control group, average serum total cholesterol, serum triglycerides, serum high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol were 160.16± 26.93 mg/dl, 107.30±25.53 mg/dl, 46.06±5.73 mg/dl, and 94.04± 20.76 mg/dl, respectively. On comparing serum lipid levels of myocardial infarction patients with control, significantly high level of total serum cholesterol level [p<0.05], high level of serum triglyceride [p<0.05], high level of low-density lipoprotein cholesterol [p<0.05], and low level of high-density lipoprotein [Table 2].

Discussion

Main cardiovascular events are the leading cause of death globally. One of the most crucial relationships is diet and lifestyle habits, including the proportion of carbohydrate and fat intake, enhanced physical activity, day-to-day stress, and stress coping mechanism. About researchers have shown a keen interest in the relationship between serum lipid profile and cardiovascular disease. This study highlights the parameters of lipid profiles in cardiac patients. The lipid profile modification early after acute myocardial infarction was first reported by Biorck et al. back in 1957[11]. Even though a change in lipid levels has been reported repeatedly, the data is not consistent. Dahlen et al. [12] and v Chopra et al. [13], in their study, observed that coronary artery disease mean values of lipoprotein, total cholesterol, low-density lipoprotein cholesterol, and very-low-

density lipoprotein cholesterol were high (P<0.05) than in control. These findings are consistent with the result of the present study. The multivariate logistic regression analysis showed elevated levels of low-density lipoprotein cholesterol as vital independent risk factors.

We observed that total cholesterol and triglyceride were higher in patients with myocardial infarction as compared to control (p<0.05). These results also correlated well with a study conducted by Simmi Kharb et al. [14].

Salahuddin Mohammad Aslam et al. [15] observed in their study that the value of high-density lipoprotein cholesterol of coronary artery disease patients was significantly low (p<0.001) as compared to control objects. The value of low-density lipoprotein cholesterol of coronary artery disease patients was significantly high (p<0.01) compared to control subjects, but the values of serum triglyceride and total cholesterol of patients with coronary artery disease were not significant. Results of the Study conducted by Rosenson R S et al. [16] and Nigam PK et al. [17] correlated well with the present study.

Conclusion

Lipid profile should be assessed in every patient admitted with coronary artery disease. Our study found that cardiac disease patients had higher levels of low-density lipoprotein cholesterol, low levels of high-density lipoprotein cholesterol, and high triglyceride than controls. Elevated low-density lipoprotein cholesterol level, lower level of high-density lipoprotein cholesterol associate with cardiac events.

References

1. <https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm>.
2. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med. 2006;3:e442.
3. Cannon CP, Braunwald E, McCabe CH. Intensive versus moderate lipid lowering with statins after acute coronary syndromes. N Engl J Med. 2004; 350:1495-1504.

4. Rasheed SJ, Samad A. Effect of statins on triglycerides in the management of hypercholesterolemia in patients with coronary heart disease. *Pak J Cardiol*. 2002; 13:65-72
5. De Backer G, Ambrosioni E, Borch-Johnsen K. European guidelines on cardiovascular disease prevention in clinical practice: Third joint task force of European and other societies on cardiovascular disease prevention in clinical practice. *Eur Heart J*. 2003; 24:1601-1610.
6. Yong W, Qi B, Xu J, Zhou G, Chen S, Ping O, Liu S. Age- and sex-related difference in lipid profiles of patients hospitalized with acute myocardial infarction in East China. *J Clin Lipidol*. 2014;8:562-7.
7. Perk J, Backer GD, Gohlke H, Graham I, Reiner Ž, Verschuren WMM, Albus C, Benlian P, Boysen G, Cifkova R, Deaton C, Ebrahim S, Fisher M, Germano G, Hobbs R, Hoes A, Karadeniz S, Mezzani A, Prescott E, Ryden L, Scherer M, Syväne M, Scholte Op Reimer WJM, Vrints C, Wood D, Zamorano JL, Zannad F. Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *European Guidelines on Cardiovascular Disease Prevention in Clinical Practice (Version 2012)*. *Int J Behav Med*. 2012;19:403-88.
8. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, McQueen M, Budaj A, Pais P, Varigos J. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *OrvHetil*. 2006;147:675.
9. Schenkein HA, Loos BG. Inflammatory mechanisms linking periodontal diseases to cardiovascular diseases. *J Clin Periodontol*. 2013;40:S51.
10. Kumar A, Nagtilak S, Sivakanesan R, Gunasekera S. Cardiovascular risk factors in elderly normolipidemic acute myocardial infarction patients—a case controlled study from India. *Southeast Asian J Trop Med Public Health*. 2009;40:581-92.
11. Biörck G, Blomqvist G, Sievers J. Cholesterol values in patients with myocardial infarction and in a normal control group. *Acta Med Scand*. 1957; 156:493-497.
12. Dahlen Shrinivasan et al. the importance of serum lipoprotein as an independent risk factor for premature coronary artery disease in middle age black and white women from the united state journal of medicine. 1998; 244(5):417-424.
13. V Chopra, S vasisht et al. serum level of lipoprotein and other lipid in angiographically defined coronary artery disease patients and healthy blood bank donors. *Indian J Med sci*. 2000; 54:284-9.
14. Simmi Kharb. Low blood glutathione level in acute myocardial infarction *Indian journal of medical science*. 2003; 57(8):335-337.
15. Salahuddin, Mohammad Aslam Siddiqui, Ahmad SI. *Pakistan journal of pharmaceutical sciences*. 2004; 17(2):85-92.
16. Rosenson RS. Myocardial injury the acute phase response and lipoprotein metabolism. *J Am Coll Cardiol*. 1993; 22:933-940.
17. Nigam PK, Narain VS, Hasan M. Serum lipid profile in patients with acute myocardial infarction. *Indian J Clin Biochem*. 2004; 19:67-70.

Conflict of Interest: Nil

Source of support: Nil