



CASSIA AURICULATA: A COMPREHENSIVE REVIEW OF THE NUTRITIONAL, EXPLORING SERUM LIPID PROFILE IN PATIENTS DIAGNOSED WITH MYOCARDIAL INFARCTION AT HAYAT ABAD MEDICAL COMPLEX PESHAWAR

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ABSTRACT

Myocardial Infarction (MI) is a critical medical emergency necessitating early diagnosis for effective patient management and complication prevention. Blood biomarkers serve a pivotal role in predicting and preventing MI. This study, conducted in the cardiology department at Hayatabad Medical Complex, Peshawar, focused on investigating the serum lipid profile in MI patients. Using a non-probability convenient sampling technique, 109 diagnosed MI patients were recruited, and 3 to 5 ml blood samples were aseptically collected and processed at the tertiary healthcare hospital. The collected samples were centrifuged to obtain serum, and routine biochemistry analysis using a COBAS analyzer was employed to measure serum lipid levels, including cholesterol, triglyceride, high-density lipoprotein cholesterol (HDL), low-density lipoprotein cholesterol (LDL-C), and very low-density lipoprotein (VLDL-C). Statistical analysis revealed a male predominance (63.3% vs. 36.7%), with the age group of 51 to 60 years being commonly affected (29%). Dyslipidemia analysis indicated a prevalent abnormal elevation of VLDL-C in 57.8% of MI patients, accompanied by hypertriglyceridemia in 33.9%. Additionally, 46.8% of patients exhibited a significant decrease in HDL levels, while 11.9% showed elevated LDL cholesterol and 2.8% presented with hypercholesterolemia. In conclusion, this study highlights that abnormal increases in blood lipid levels contribute to the predisposition of patients to myocardial infarction. The identification of elevated blood lipids underscores the need for immediate management to mitigate further complications in MI patients.

Key words: Blood Biomarkers, Lipid profile, Myocardial Infarction.

INTRODUCTION

Myocardial infarction also known as heart attack, a clinical emergency happens due to decrease or sudden stoppage of blood to heart muscles that leads to necrosis of cardio myocytes. Myocardial infarction is commonly caused by the result of cholesterol plaque or blood clot in pericardial or coronary artery.¹ Acute myocardial infarction (AMI) causes large number of morbidity and mortality worldwide. The greater risk of deaths occurs within the first few hours of AMI. Immediate diagnosis of cardiac ischemia is essential for the successful treatment and prevention of lethal complications of AMI.² Heart attack predominantly reported in male as compare to female, commonly at the age of after sixty-five years. Mortality rate due to myocardial infarction is higher in females than males even the lower incidence in female. Additional risk factors associated with heart attacks includes, rich saturated fats in diet, high blood cholesterol and low density lipoprotein level, obesity, lack of exercise, diabetes, high blood pressure, lack of exercise and smoking. Family history is another factor

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that can cause heart attack.³ Death of cardio myocytes induced due inadequate supply of blood to the cardiac muscles that causes hypoxia. Blood supply to the heart muscles is reduced due to atherosclerosis plaque in coronary artery and thrombosis.⁴ A wide range of rare conditions may result in occlusion or severe narrowing of the coronary vessels causing non atherosclerotic MI. Coronary embolism can occur due to endocarditis, or prosthetic valve thrombosis, coronary artery dissection, and arteritis due to autoimmune or infectious causes are well-recognized causes of MI in the absence of atherosclerotic disease. Coronary vasospasm and endothelial dysfunction in the presence, or absence of an obstructive lesion. Severe anemia can cause reduction in delivery of oxygen to the myocardium.⁵ According to the World Health Organization (WHO), cardiovascular diseases are the most common cause of deaths worldwide. In 2019, CVD attributed 32% of deaths worldwide and 85% deaths were due to myocardial infarction (MI) and stroke.⁶ Saturated fat and trans-fat are unhealthy fats, solid at room temperature are the main cause of heart disease due to its ability to raise low-density lipoprotein cholesterol (LDL-C), whereas omega-3 and omega-6 polyunsaturated fatty acid (PUFA) has good for keeping heart healthy due to its ability to lower total and LDL-C. When replacing saturated fat with omega-6, it lowers total cholesterol. and LDL-C levels. So the omega-6 PUFA linoleic acid is beneficial to maintain heart healthy.⁷ Low-density lipoprotein (LDL) and other Apo lipoprotein B (Apo-B) containing lipoproteins transport cholesterol and other lipids throughout the body and play a central role in the initiation and progression of atherosclerosis. Hence, sustaining optimal lipid levels is a crucial element of achieving ideal cardiovascular health.⁸ The other risks factor of heart attacks includes cigarette smoking, high blood pressure, high cholesterol and LDL, saturated fats in diet (animal meats), obesity, lack of exercise, and diabetes. A family history is also contributing to cause heart attack, a spasm of muscles of arterial walls, narrowing of arteries, emotional stress, heavy exertion or exercises, such as snow shoveling and exposure to very cold weather or air, carrying heavy things up stairs, drug (cocaine or amphetamines) abuse, all these trigger a heart attack.⁹ Myocardial infarction was examined from seven points of view, pathological, biochemical, electro-cardio graphic, imaging, clinical trials, epidemiological, and public policy.¹⁰ In the 1990s, ST segment elevation MI (STEMI) and non-STEMI (NSTEMI) were adopted as the preferred terminology. This updated nomenclature establishes myocardial infarction by the observed ECG changes. Measurement of cardiac troponin levels, CK-MB, as part a team in transferase (AST) and lactate dehydrogenase (LDH)] as a marker of myocyte necrosis.¹¹ Cardiac troponin I and T (cTnI and cTnT) are specific biochemical serum markers for acute myocardial infarction (AMI), because they are highly sensitive and specific for myocardial injury.¹² Creatine phosphokinase myocardial band (CK-MB) is the most sensitive and specific indicator available for myocardial infarction. Creatine kinase follows similar as cTn. And also The diagnosis of the disorder is established and confirmed through a comprehensive approach, including clinical evaluation, electrocardiogram (ECG) analysis, biochemical testing, as well as both invasive and noninvasive imaging modalities.¹³ As Myocardial Infarction is a critical cardiovascular condition demanding immediate attention and accurate diagnostic approaches to enhance patient outcomes. Considering the pivotal role of blood biomarkers, particularly lipid profiles, in predicting and preventing MI, this study addresses the need for a comprehensive understanding of serum lipid abnormalities in MI patients. By specifically exploring cholesterol, triglyceride, HDL, LDL-C, and VLDL-C levels, the research aims to shed light on the prevalence and patterns of dyslipidemia associated with MI, therefore this study aims to determine serum lipid profile in patients diagnosed with Myocardial Infarction at the cardiology department of Hayatabad Medical Complex.

Material and Methods

Study design and subject selection

A descriptive cross-sectional study was conducted at Hayat Abad Medical Complex Peshawar. This study included 109 patients, diagnosed with acute myocardial infarction. The diagnosis of AMI was done at the cardiology unit of HMC through clinical history Electrocardiography, Echocardiography Troponin T/I and CK-MB. All the patients were acutely diagnosed with MI and had not started anti lipidemic drugs and were free of any other comorbidity by tracking thorough history of patients.

Sample collection procedure

After taking consent, 5 ml venous blood sample was collected following standard phlebotomy protocol from each patient diagnosed and admitted with myocardial infarction at Hayat Abad Medical Complex. Blood samples were squeezed and labeled in clot activate vacutainer (Gel tube) and centrifuged on 1000 rpm for 5 minutes to separate serums. Serums were separated from the blood in serum cups and immediately labeled, frozen and stored for further routine chemistry tests.

Testing procedure of different blood lipids.

Serum lipid profile including; Triglyceride(TG), Cholesterol(CH), High density lipoprotein(HDL), Low density lipoprotein(LDL) and Very low density lipoprotein(VLDL) was measured from the stored serums. Serum samples were first thawed and fetched to the room temperature. As per the routine care routing chemistry

analyzer COBAS was calibrated and serum lipid profile was performed. Results were noted and documented for further statistical analysis.

Statistical analysis

Statistical analysis of data was done through Microsoft excel and Statistical Package for Social Services (SPSS Version 22). Descriptive statistics and chi test was done to check the frequency of myocardial infarction according to age and gender, distribution of TG, CH, HDL, LDL and VLDL in MI patients.

Results

According to the statistical analysis of patients admitted in Hayat Abad Medical Complex Peshawar, males were predominantly appeared with myocardial infarction as compared to female (Table 1). Among 109 patients, males were counted 63.3% and female 36.7%. This showed myocardial infarction commonly occurred in male as compared to female.

Table 1. Gender wise distribution of patients

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	69	63.3	63.3	63.3
Female	40	36.7	36.7	100.0
Total	109	100.0	100.0	

Among 109 admitted patient’s. myocardial infarction was commonly noted in patients age group between 51 to 60 years. 32(29.4%) was presented to us with age range between 51 to 60 years, followed by 41 to 50 years, 61 to 70 years and 71 to 80 years (Table 2). Myocardial infarction was reported 8% in patients age range 31-40 years. Similarly, myocardial infarction was rarely (1.8%) reported in patients age group 81-90 years.

Table 2. Age wise distribution of patients in years

	Frequency	Percent	Valid Percent	Cumulative Percent
31-40	8	7.3	7.3	7.3
41-50	27	24.8	24.8	32.1
51-60	32	29.4	29.4	61.5
61-70	29	26.6	26.6	88.1
71-80	11	10.1	10.1	98.2
81-90	2	1.8	1.8	100.0
Total	109	100.0	100.0	

According to the blood cholesterol, blood cholesterol border line level, 201 -239 mg/dl was noted in 13(11.9%) patients and blood cholesterol level more than 240 mg/dl considered abnormal high, was documented in 3(2.8%) patients. The remaining 93 (85.3%) was counted with normal cholesterol level<200mg/dl (Table 3).

Table 3. Blood cholesterol level

	Frequency	Percent	Valid Percent	Cumulative Percent
<200 mg/dl Normal	93	85.3	85.3	85.3
201-239 mg/dl Border Line	13	11.9	11.9	97.2
>240 mg/dl Dangerous	3	2.8	2.8	100.0

Total	109	100.0	100.0
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Hypertriglyceridemia was commonly noted in MI patients as compared to other blood cholesterol level. 37(33.9%) patients were reported with TG level more than 200 mg/dl (Table 3). 23.9% patients were reported with TG level 150-200 mg/dl. The remaining 46 patients were presented to us with normal TG level.

Table 4. Blood Triglyceride level

	Frequency	Percent	Valid Percent	Cumulative Percent
<150mg/dl Normal	46	42.2	42.2	42.2
150-200mg/dl Border Line	26	23.9	23.9	66.1
>200mg/dl Dangerous	37	33.9	33.9	100.0
Total	109	100.0	100.0	

Abnormal decrease of HDL from 35 md/dl was noted in 46.8% patients (Table 5). HDL level more than 35 mg/dl was seen 53.2%.

Table 5. Blood HDL Level

	Frequency	Percent	Valid Percent	Cumulative Percent
>35mg/dl Good	58	53.2	53.2	53.2
<35mg/dl At Risk	51	46.8	46.8	100.0
Total	109	100.0	100.0	

Similarly, Low Density Lipoprotein normal level <100 mg/dl was noted 72.5%. LDL border line range 100-129 mg/dl was noted in 15.6% patients (Table 6). Abnormal high LDL level> 130mg/dl was documented in 11.9% patients.

Table 6. Blood Low Density Lipoprotein Level in MI Patients

	Frequency	Percent	Valid Percent	Cumulative Percent
<100 mg/dl Normal	79	72.5	72.5	72.5
100-129 mg/dl Border Line	17	15.6	15.6	88.1
>130 mg/dl High	13	11.9	11.9	100.0
Total	109	100.0	100.0	

Abnormal increase of very low density lipoprotein was noted in 57.8% patients and the remaining 42.8% patients showed normal blood VLDL level.

Table 7. Blood Very Low Density Lipoprotein Level.

	Frequency	Percent	Valid Percent	Cumulative Percent
30mg/dl	46	42.2	42.2	42.2
>30mg/dl	63	57.8	57.8	100.0
Total	109	100.0	100.0	

Discussion

Acute myocardial infarction (AMI) is the term usually stated as heart attack, usually caused by decline or complete stoppage of blood flow to the heart muscles that leads to necrosis of cardio myocytes. This is mostly instigated due to the result of atherosclerotic plaque or embolism in coronary arteries that supplies blood to the heart. Every living tissue, including heart muscle, needs continuous blood flow that is equivalent to the amount of oxygen the muscle required. The lipid profile should be evaluated for every patient admitted with acute coronary syndrome an initial 24 hours of myocardial infarction and subsequently at regular intervals until a stable healthy state is attained or receive. The alterations within the first 24 hours are minimal, and subsequent changes occur periodically.

According to a study conducted by Abdul Hadi, et al 2019 at DHQ hospital Timergara. This study included Three hundred's and thirty-one patients diagnosed with acute myocardial infarction. As per the statistical analysis of patient's data, Myocardial infarction was frequently reported in males (58.9%) as compared to female. Similarly, in our findings disease distribution in male was predominantly noted as compare to female. This showed myocardial infarction is frequently ensued in male as relate to female. Knowledge regarding age wise distribution of myocardial infarction is imperative to prevent the precarious age group people from myocardial infarction. According to our findings, myocardial infarction was commonly noted in patients age group between 51 to 60 years. 32(29.4%) was presented to us with age range between 51 to 60 years, followed by 41 to 50 years, 61 to 70 years and 71 to 80 years. Similarly, according to a study published by G. Channamma 2016, myocardial infarction was frequently reported (45%) in patients age more than 60 years. Myocardial infarction was reported 22.5% in patients age range 50 to 59 years. Similarly, 15% patients were appeared with myocardial infarction in age 30 to 39 years and 17.5% patients belongs to age group 15%. According to a report published by Naresh Kumar et al. (2019), numerous fluctuations in lipid levels have been reported, and the consistency of lipid profile values remain unclear. In an earlier study involving a series of 250 AMI patients, researchers recorded lipid profiles within the first 24 hours of the event and after 48 hours. Men constituted a higher percentage than women (75.6% vs. 24.4%). The results within the first 24 hours showed a 32% increase in total cholesterol, a 28% increase serum LDL, a 33.2% decrease serum HDL, and an almost 65.6% increase in serum TG. After 48 hours, the total cholesterol slightly elevated 35.6%, serum LDL increased 33.2%, serum HDL decrease 33.2%, and TG levels slightly increased 76.8%. Phasic fluctuations may be observed for a short period, but periodic evaluation of the lipid profile aids in understanding changing trends, initiating lifestyle measures to reach target lipid levels, and prescribing the choice of lipid-lowering therapy (10). According to our study dyslipidemia, abnormal elevation of VLDL-C was commonly noted, 57.8% in Myocardial infarction patients. Hypertriglyceridemia was noted in 33.9% patients. HDL level was significantly decreased in 46.8% patients. Increase level of LDL cholesterol was noted in 11.9% patients and hypercholesterolemia in 2.8%.

Conclusion

This study concluded that dyslipidemia specifically hypertriglyceridemia, high VLDL and abnormal decrement of HDL level can predispose the patient to myocardial infarction. early diagnosis and prompt management of dyslipidemia can prevent the patient from further consequences.

Declarations:

Author Contributions: Conceptualization, M. A., M, R and S. A.; methodology, M. k. and T. K.; Resources, M. R. and M.K.; writing—original draft preparation, M. R. M. K. T. K; writing—review and editing, M. A., S. A.; supervision, M. A.; All authors have read and agreed to the published version of the manuscript.”

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Availability of Data and Materials: All data set related to this study is available from the corresponding author on request.

Ethical Approval: This study was approved by Institutional Research committee of NCS University Peshawar

Conflicts of Interest: The authors declare no conflict of interest.

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