

Ministry of Higher Education and  
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Diyala University College of medicine



# Evaluation Of Serum Level Of TG, Cholesterol, HDL, LDL Ratio In Patient With Ischemic Heart Disease


Submitted to the Council of the College of Medicine, Diyala  
University, In Partial Fulfillment of Requirements for the Bachelor  
Degree in medicine and general surgery.

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# بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

{ هُوَ الَّذِي جَعَلَ الشَّمْسَ ضِيَاءً وَالْقَمَرَ نُورًا وَقَدَرَهُ مَنَازِلَ لِتَعْلَمُوا عَدَدَ  
السِّنِينَ وَالْحِسَابَ مَا خَلَقَ اللَّهُ ذَلِكَ إِلَّا بِالْحَقِّ يُفَصِّلُ الْآيَاتِ لِقَوْمٍ يَعْلَمُونَ }

سورة يونس - الآية 5.

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## Dedications

*This project is especially dedicated to the doctors who helped and guided us to successfully complete this project work.*

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## Abstract

**Background:** Coronary Heart Disease (CHD) is widely prevalent across the globe and significantly high level of Cholesterol in circulation is a single major risk factor associated with Coronary Heart Disease. It is well established that cardiovascular disease is associated with hypertension and elevated blood levels of low-density lipoprotein (LDL), total cholesterol, and triglycerides. In disparity, a low level of high density lipoprotein (HDL) is a risk factor for mortality from cardiovascular disease. The present study was conducted with the aim to assess the changes in the lipid profile of coronary heart disease patients.

**Aim:** this study was performed to estimate the prevalence and to find out the association of lipid profile with CHD in Baqubah.

**Subject and methods:** The present study was conducted in Baqubah general hospital from September 2022 to January 2023 on 30 patients diagnosed with myocardial infarction admitting the cardiac care unit (CCU) after receiving the agreement from the hospital office. Each patient was submitted to laboratory investigation for cholesterol, triglyceride and lipoproteins diagnosis.

**Results:** The total sample of study is (30) the highest mean for cholesterol was  $169.5 \pm 27.4$  in age group (61-70), for TG was  $209.8 \pm 72.8$  in age group (41-50), highest HDL level  $43 \pm 13.5$  was for age group (51-60) and the lowest LDL level was  $70.4 \pm 11.4$  for age group 51-60. There is no significance difference was observed between the serum cholesterol levels of both groups in all age range. the Mean  $\pm$  SD of Cholesterol in female was  $138.3 \pm 52.6$ , for TG  $141.7 \pm 45.7$ , HDL  $39.0 \pm 17.2$  and LDL  $70.3 \pm 27.7$  and for male the Cholesterol was  $158.8 \pm 57$ , for TG  $193.3 \pm 65.6$ , HDL  $38.4 \pm 16.8$  and LDL  $96.2 \pm 32.3$ . There is no significance between male and female in Cholesterol level, while in the

TG there is significance variation between male and female. For the HDL and LDL there is no significance between male and female both of them in the normal range.

**Conclusions:** In this study, it was found that the total cholesterol, triglycerides, and LDL cholesterol concentrations were not significantly higher in coronary heart disease (CHD) patients. HDL concentrations were lower in patients with CHD, and that not scientifically and this due to small sample size. And when compare with other studies the results of this study suggested that the lipid profile could affect the progression of MACE, all-cause mortality, and cardiac death in patients with CHD.

## Introduction

Coronary heart disease (CHD) or cardiovascular diseases are recognized to be one of the most important reasons of morbidity and mortality and imposes tremendously heavy socio-economic burden worldwide. There are varieties of risk factors in the literature which increases the incidence of CHD such as hyperlipidemia. By the year 2020, World Health Organization (WHO) is predicting more than 11.1 million deaths from CHD, it is projected that the annual number of deaths due to cardiovascular disease will increase from 17.5 million in 2012 to 25 million in 2030. Approximately out of 14 million Indians affected with coronary heart disease (CHD), 1.5 million develop Acute Myocardial Infarction (AMI), and 500,000 of these individuals die annually [1].

This increase is due to industrialization, urbanization and related lifestyle changes which is called epidemiologic transition, Coronary heart disease occurs when cholesterol accumulates on the artery walls, creating plaques. Reduced blood flow occurs when one or more of these arteries become partially or completely blocked. The four primary coronary arteries are located on the surface of the heart are: right, left main coronary artery, left circumflex artery and left anterior descending artery [2].

CHDs are the most predictable cause of sudden death, for many years, CHD prevalence was believed to be relatively low in developed countries. Recent studies have indicated a remarkably high proportion of mild to severe CHD in a number of patients. CHD is more prevalent in men than in women. However its prevalence interrelates with age, it is about 0.7% in 18 to 45 year olds. Whereas 13.3% in the 55 years and onwards. According to the Global Burden of Disease study estimate of

age-standardized CVD death rate of 272 per 1,00,000 population in India is higher than the global average of 235 per 100,000 population [3].

According to the guidelines of the American Heart Association, the following values are prescribed for the above-mentioned risk factors for cardiovascular disease: total cholesterol: <200 mg/dL; triglycerides: <200 mg/dL; HDL: >40 mg/dL; and LDL: <130 mg/dL [4].

The term cardiovascular diseases are a group of disorders of the heart or blood vessels, and include mainly ischemic heart disease, rheumatic heart disease and cerebrovascular disease or strokes. The lipid profile is a group of tests that are often done together to identify the risk of heart disease. These tests are good indicators of whether someone is likely to have a heart attack or stroke caused by the blockage of blood vessels or hardening of the arteries. The lipid profile usually includes: high levels of cholesterol in blood circulation are strongly associated with progression of heart disease, for a person of about 68 kg typical total blood cholesterol synthesis is about 1g (1000mg) per day [5].

CHD requires an integrated approach to the reduction of its risk factors, identification and management of risk factors are essential for preventing CHD in asymptomatic individuals mainly over 40 years of age as primary prevention, and for preventing recurrent events in patients with established disease as secondary prevention. Risk factors management should be conceived as prevention or treatment of the atherosclerotic disease process itself. CHD risk factors are modifiable and unmodifiable; the presence of unmodifiable risk factors may necessitate more intense management of modifiable risk factors [6].

Blood lipid levels are modifiable risk factors for atherosclerosis and CHD, being hydrophobic in nature, cholesterol, cholesterol esters,



triglycerides and phospholipids are transported to the other tissues in the form of lipoproteins. Major classes of lipoproteins are chylomicrons (CM), low density lipoproteins (LDL) and high density lipoproteins (HDL), named by the site of their assembly and type of lipid and apo protein they have [7].

Excess fatty acids (FA) in the liver are converted into triacylglycerols which along with phospholipids, free and esterified cholesterol are packaged into very low density lipoprotein (VLDL) along with a variety of apo proteins, while travelling through the peripheral tissues, triacylglycerol content is hydrolysed with the help of lipoprotein, lipase (LPL) into FA and VLDL remnants, VLDL remnants through further hydrolysis of triglyceride contents give rise to intermediate density lipoproteins (IDL) and LDL [8].

LDL having apoB100 apo protein component is the major cholesterol carrier in peripheral circulation, elevated plasma levels of these non HDL lipoproteins are major CHD risk factors, it has been observed that many lipid/lipoprotein abnormalities are prevalent in obesity and heart problems, collectively termed as dyslipidemia, however, these dyslipidemias are often hyperlipidemia where in majority of lipids are shifted towards the upper limits of range or higher than the range [9]. Over the past twenty years, considerable advances have been achieved in the determination and improvement of CHD risk factors including diabetes and hypertension. Lipids and lipoproteins have become increasingly important in clinical practice, primarily because of their association with CHD, in case of their abnormalities known as dyslipidemia, and became the major risk factor for the development of this disease, according to epidemiological studies, especially in prosperous countries where fat consumption is high [10].

Hence, this study was performed to estimate the prevalence and to find out the association of lipid profile with CHD in Baqubah.

## Methods

The present study was conducted in Baqubah general hospital from September 2022 to January 2023 on 30 patients diagnosed with myocardial infarction admitting the cardiac care unit (CCU) after receiving the agreement from the hospital office. Each patient was submitted to laboratory investigation for cholesterol, triglyceride and lipoproteins diagnosis. The lipids were obtained in the morning after an overnight fast. Enzymatic methods were performed to measure cholesterol and triglyceride levels by using clinical laboratory kits, and direct methods were conducted to determine HDL-C and LDL-C levels. The absorbance of samples was detected using spectrophotometer and the calculated parameters were transferred to excel sheet.

Data was analyzed for means and standard deviation (SD) for all parameters. Data analysis was done by Microsoft excel and all quantitative data were expressed as the means  $\pm$  SD.

## Results

The results (Table 1) shows that the highest mean for cholesterol was  $169.5 \pm 27.4$  in age group (61-70), for TG was  $209.8 \pm 72.8$  in age group (41-50), highest HDL level  $43 \pm 13.5$  was for age group (51-60) and the lowest LDL level was  $70.4 \pm 11.4$  for age group 51-60.

There is no significance difference was observed between the serum cholesterol levels of both groups in all age range.

**Table 1.** Age-wise distribution of serum lipid profiles levels between the age groups (n=30).

Age group (years)	Cholesterol mg/dl Mean $\pm$ SD	TG mg/dl Mean $\pm$ SD	HDL mg/dl Mean $\pm$ SD	LDL mg/dl Mean $\pm$ SD
41-50	$146.3 \pm 5.1$	$209.8 \pm 72.8$	$37.4 \pm 9.1$	$76.5 \pm 6.6$
51-60	$157.9 \pm 65.6$	$149.8 \pm 51$	$43 \pm 13.5$	$70.4 \pm 11.4$
61-70	$169.5 \pm 27.4$	$148.7 \pm 52.1$	$41.4 \pm 16.6$	$117.8 \pm 23.6$
>70	$131.9 \pm 39$	$186.4 \pm 49.3$	$34.3 \pm 15.5$	$73.5 \pm 26.5$

Table 2 shows that the Mean  $\pm$  SD of Cholesterol in female is  $138.3 \pm 52.6$ , for TG  $141.7 \pm 45.7$ , HDL  $39.0 \pm 17.2$  and LDL  $70.3 \pm 27.7$  and for male the Cholesterol was  $158.8 \pm 57$ , for TG  $193.3 \pm 65.6$ , HDL  $38.4 \pm 16.8$  and LDL  $96.2 \pm 32.3$ .

**Table 2.** Age-wise distribution of serum lipid profiles levels based on the gender of the patients.

Gender	Cholesterol mg/dl Mean $\pm$ SD	TG mg/dl Mean $\pm$ SD	HDL mg/dl Mean $\pm$ SD	LDL mg/dl Mean $\pm$ SD
Female	$138.3 \pm 52.6$	$141.7 \pm 45.7$	$39.0 \pm 17.2$	$70.3 \pm 27.7$
Male	$158.8 \pm 57$	$193.3 \pm 65.6$	$38.4 \pm 16.8$	$96.2 \pm 32.3$

There is no significance between male and female in Cholesterol level, while in the TG there is significance variation between male and female.

For the HDL and LDL there is no significance between male and female both of them in the normal range.

## Discussion

In the present study, the highest mean for cholesterol was  $169.5 \pm 27.4$  in age group (61-70), for TG was  $209.8 \pm 72.8$  in age group (41-50), highest HDL level  $43 \pm 13.5$  was for age group (51-60) and the lowest LDL level was  $70.4 \pm 11.4$  for age group 51-60.

While in study was conducted in Bangladesh [11], the serum Mean  $\pm$  SD cholesterol concentration in the age group of 41 - 50 was  $197.16 \pm 28.85$  mg/dL, in the age group 51 - 60, it was  $207.11 \pm 18.65$  mg/dL, and in the patients older than 60, it was  $263.91 \pm 23.73$  mg/dL. In the control group, it was  $168.92 \pm 25.24$  mg/dL,  $118.75 \pm 17.15$  mg/dL, and  $193.81 \pm 20.88$  mg/dL respectively.

The Mean  $\pm$  SD distribution of triglyceride concentration in the age group of 41 - 50 was  $167.13 \pm 26.83$  mg/dL, in the age group of 51 - 60 it was  $210.71 \pm 42.17$  mg/dL, and in the participants aged over 60, it was  $152.56 \pm 34.64$  mg/dL. In the control group, it was  $109.33 \pm 20.44$  mg/dL,  $125.64 \pm 31.71$  mg/dL, and  $157.74 \pm 37.73$  mg/dL respectively.  $<150$  mg/dL is considered normal,  $150 - 199$  mg/dL is considered borderline high, and  $200 - 499$  mg/dL is considered high levels of triglyceride concentration. All the age groups had higher-than-normal triglyceride concentrations in the case group. In the control group, only the oldest age group of  $>60$  years had a higher-than-normal mean triglyceride concentration level.

In the case group, the Mean  $\pm$  SD distribution of HDL concentration in the age group of 41 - 50 was  $40.52 \pm 5.77$  mg/dL. In the age group of 51 - 60, it was  $47.44 \pm 5.91$  mg/dL, and in the participants aged over 60, it was  $43.73 \pm 8.93$  mg/dL. In the control group, it was  $50.71 \pm 6.39$  mg/dL,  $75.32 \pm 9.19$  mg/dL, and  $86.74 \pm 10.48$  mg/dL respectively. For men, less

than 40 mg/dL is considered increased risk, and 40 - 50 mg/dL is considered average risk level, and >60 mg/dL is considered low risk.

LDL concentration in the age group of 41 - 50 was  $99.88 \pm 20.73$  mg/dL. In the age group of 51 - 60, it was  $104.71 \pm 21.95$  mg/dL, and in the participants aged over 60, it was  $107.66 \pm 22.74$  mg/dL. In the control group, it was  $75.87 \pm 12.56$  mg/dL,  $90.11 \pm 11.84$  mg/dL, and  $97.82 \pm 15.77$  mg/dL respectively. Basic LDL concentration standards are <100 mg/dL as optimal, 100 - 129 mg/dL as above optimal, 130 - 159 mg/dL as borderline high and 160 - 189 mg/dL as high.

This mean and SD disagree with our study may be due to the small size of study when compare with other studies.

In the present study, the Mean  $\pm$  SD of Cholesterol in female was  $138.3 \pm 52.6$ , for TG  $141.7 \pm 45.7$ , HDL  $39.0 \pm 17.2$  and LDL  $70.3 \pm 27.7$  and for male the Cholesterol was  $158.8 \pm 57$ , for TG  $193.3 \pm 65.6$ , HDL  $38.4 \pm 16.8$  and LDL  $96.2 \pm 32.3$ .

There is no significance between male and female in Cholesterol level, while in the TG there is significance variation between male and female.

For the HDL and LDL there is no significance between male and female both of them in the normal range.

While in study of Birmingham [12], the Mean  $\pm$  SD of Cholesterol in female was  $221.4 \pm 41.3$ , for TG  $199.1 \pm 70.4$ , HDL  $30.6 \pm 20.5$  and LDL  $120.5 \pm 33.9$  and for male the Cholesterol was  $142.2 \pm 50$ , for TG  $140.5 \pm 58.5$ , HDL  $36.6 \pm 15$  and LDL  $89.1 \pm 22.5$ , according to this study there is significance between male and female and the variation between this study and study of Birmingham [12] may be due to small size of sample in this study.

## Conclusions

In this study, it was found that the total cholesterol, triglycerides, and LDL cholesterol concentrations were not significantly higher in coronary heart disease (CHD) patients. HDL concentrations were lower in patients with CHD, and that not scientifically and this due to small sample size.

And when compare with other studies the results of this study suggested that the lipid profile could affect the progression of MACE, all-cause mortality, and cardiac death in patients with CHD.



## Recommendations

This was a single-centered study with a small-sized sample. So the findings of this study may not reflect the exact scenario of the whole country. For getting more specific information we would like to recommend conducting more studies in several places with a larger sized sample.

Further large-scale prospective studies should be conducted with a focus on patients with specific characteristics to investigate the secondary prevention of major cardiovascular outcomes and mortality.

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