

Association Between Dyslipidemia Patterns and the Risk of Cardiac Complications in Adults. A Cross-Sectional Clinical Study

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ABSTRACT

Background: Dyslipidemia has already been confirmed as a modifiable risk factor of cardiovascular diseases and it is a significant factor leading to cardiac complications development. The researchers tried to define the correlation that prevailed existing between the un-reverent lipid profiles and heart troubles in the grown-ups.

Methods: A cross-sectional clinical trial was done on 100 participants between 25 and 70 years old. A clinical examination that included the examination of the cardiac complications- ischemic heart disease, arrhythmia, dysfunction of left ventricles and heart failure- were conducted. Rapid lipid profiling had also been conducted and cardiac lab test also conducted. The abnormal lipids were also recognized based on the NCEP-ATP III. The analysis of the data was performed by the use of the required statistical tests with the value of $p = 0.05$ as notable.

Results: sixty-three per cent of the participants had heart related problems. The mean total cholesterol ($218.6 \pm 34.5\text{mg/dl}$), LDL-C ($142.7 \pm 28.4\text{mg/dl}$), triglycerides ($186.4 \pm 42.7\text{mg/dl}$) were significantly elevated and the HDL-C ($38.9 \pm 6.8\text{mg/dl}$) were lower among patients with cardiac complications compared with none. The patients who had cardiac complications had higher density of dyslipidemia (85.7) than the patients who did not (48.6) ($p = 0.001$).

Conclusion: The cardiac problems and dyslipidemia have close dependence, according to the research. There is a high cardiac morbidity associated with the rise in LDL-C, total cholesterol, and triglycerides and the fall in HDL-C. It is essential to screen and initially treat dyslipidemia to reduce the risks of the cardiovascular system.

Keywords: Dyslipidemia, lipid profile, cardiac complications, LDL-C, HDL-C, triglycerides, ischemic heart disease.



Received: 29/07/2025
Revised: 28/09/2024
Accepted: 27/10/2024
Published: 31/10/2024

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INTRODUCTION

High morbidity and mortality of cardiovascular diseases (CVDs) are global and the disease burden is rising fast in the low- and middle-income countries [1]. The lipid profile abnormalities are considered to be among the primary modifiable risk factors, and dyslipidemia is also one of the most significant risk factors in the pathogenesis of cardiac complications [2]. Dyslipidemia is characterized by high total cholesterol levels, high levels of low-density lipoprotein cholesterol (LDL-C), high levels of triglycerides (TG) and low levels of high-density lipoprotein cholesterol (HDL-C). These lipid disruptions hasten the process of atherosclerotic plaque development, stimulate endothelial

damage, enhance vascular inflammation and eventually heighten the danger of myocardial ischemia, arrhythmias, heart failure and acute cardiac events [3].

Over the last few years, alterations in eating patterns, sedentary life, obesity, and comorbid metabolic conditions like diabetes mellitus have led to the development of dyslipidemia to an unprecedented extent in the South Asian populations [4]. There is some evidence to indicate that a relatively high LDL-C and triglyceride level are also hazardous to the cardiovascular system, particularly in genetically susceptible populations. Similarly, the low level of HDL-C levels inhibits reverse cholesterol transport, causes instability of the plaque, and increases the thrombosis risk. Despite the existence of effective lipid-

lowering treatments, a significant number of people are not diagnosed or treated well, and they are at risk of preventable heart incidents [5].

It is imperative to understand the relationship between the elements of lipid profiles and cardiac complications to be able to stratify the risk early and make an appropriate clinical decision on time [6]. Determining dyslipidemia patterns that are greatly associated with cardiac morbidity may help clinicians prioritize an intervention, encourage lifestyle change, and achieve ideal pharmacological control [7]. Thus, the research is expected to help in evaluating the connection between various lipid disorders and cardiac morbidity in adults, which can be used to enhance cardiovascular prevention efforts [8].

MATERIALS AND METHODS

This was a cross-sectional clinical study done in the Departments of Cardiology and Internal Medicine, Shaikh Zayed Hospital, Lahore (11 months, March 2024 to January 2025). The objective of the study was to identify the relationship between cardiac complications and dyslipidemia patterns in adult patients with presentations of suggestive cardiovascular symptoms. A sample population of 100 adults between the ages of 25 and 70 years was recruited using non-probability consecutive sampling strategy. Male and female patients who came with a report of chest pain, palpitations, dyspnea, exertional fatigue, or a decrease in exercise tolerance were invited to participate. All people were asked to give informed consent before enrollment, which was written. Individuals who had chronic liver disease, chronic kidney disease, pregnant and within the last three months had acute infections were eliminated to eliminate confounding factors on lipid levels. Following the consent, an elaborate clinical examination of every subject was conducted by demographic profile, medical and family history, lifestyle issues, and smoking status. Vital signs including blood pressure and heart rate were measured under controlled conditions whereas anthropometric data including body mass index (BMI) and waist circumference measured using calibrated instruments. After 10-12 hours of an overnight fast, a fasting venous blood sample (approximately 10 mL) was taken and lipid parameters such as total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C) were measured using an automated biochemical analyzer by conventional enzymatic colorimetric reactions. Dyslipidemia was established in reference to National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) criteria that included TC 200 mg/dL or above, LDL-C 130mg/dl or above, HDL-C 40mg/dl or less, or TG 150mg/dl or above. The cardiac complications were assessed on the basis of clinical observations, 12 lead electrocardiography (ECG), echocardiography, cardiac biomarkers, and other appropriate studies. The cardiac complications were grouped into conditions, which were ischemic heart disease,

arrhythmias, left ventricular dysfunction, and heart failure. On these results, the participants were grouped into two based on cardiac complication and non-cardiac. The Statistical Package of the Social Sciences (SPSS) version 25 was used to enter all the data and analyze it. Continuous variables were stated as the mean standard deviation, but the categorical variables were in the form of frequencies and percentages. To compare the mean lipid parameters of the groups, independent samples t-test was used, and Chi-square test was carried out to identify the relationship between dyslipidemia and cardiac complications. The statistical significance of a p-value was taken to be 0.05. The study obtained ethical approval of the Institutional Review Board of Shaikh Zayed Hospital, Lahore (Ethical Ref. No. SZH/ERC/2024/053 and carried out all procedures in accordance with the Declaration of Helsinki being sure of confidentiality and voluntary participation during the research period.

RESULTS

There were one hundred adult patients who participated in the study. Male and female 52.4/10.6: The mean age of the subjects was 52.4, SD of 10.6; there were 58 males and 42 females. The heart problems were identified in the research population 63 percent of the research subjects as ischemic heart disease, left ventricular dysfunction, arrhythmias and heart failure. Dyslipidemia was found in seventy two percent of the respondents and the most common abnormalities were an increase in LDL- C and a decrease in HDL-C. The amount of total cholesterol, LDL- C and triglycerides and HDL-C were observed to be significantly greater and lesser respectively in patients with cardiac complications and healthy patients respectively. This issue between dyslipidemia and heart dysfunctions was found to be significant ($p < 0.05$).

A comprehensive comparison of the values of lipid profile is given in table 1 between individuals who had cardiac complications and those who do not. These findings demonstrate that deviant lipid parameters and cardiac complication are positively correlated in a positive and significant clinical relationship. The total cholesterol was also very high in the patients with cardiac complications with the mean outcome of 218.6 34.5 compared to the 184.3 29.1 of the patients with no cardiac issues. This high rise means that the people are at a high risk of atherosclerosis. Similarly, bad cholesterol LDL-C was much higher in the complication group (142.7 mg/dL) when compared to the non-complication group (118.5 mg/dl). The elevated LDL-C was an established determinant that may lead to the formation of plaque, arterial constriction and ischemic events and this is indicative that the cardiac patients had exaggerated lipid-related risk profile.

On the other hand, the cardiac complication group levels of the protective in nature HDL-C (aided in the reverse transportation of cholesterol) (38.9 ± 6.8 mg/dl) were significantly lower than those of the no complication

group (47.2 ± 8.1 mg/dl). This lowers the good cholesterol and this predisposes the individual to the presence of an unstable plaque, which is likely to cause coronary artery disease. Furthermore, comparing the outcomes of the patients with and without cardiac complications, the results of triglycerides levels were significantly higher in patients

with cardiac issues (186.4 ± 42.7 mg/dL) as compared to members with no-cardiac issues (152.8 ± 37.9 mg/dL) that proves the existence of a higher degree of metabolic imbalance that likely contributes to the development of endothelial dysfunction and predisposes to cardiovascular risks.

Table 1: Comparison of Lipid Profile Parameters in Patients with and Without Cardiac Complications

Lipid Parameter	Patients With Cardiac Complications (n=63)	Patients Without Cardiac Complications (n=37)	p-value
Total Cholesterol (mg/dL)	218.6 ± 34.5	184.3 ± 29.1	0.001*
LDL-C (mg/dL)	142.7 ± 28.4	118.5 ± 24.3	0.003*
HDL-C (mg/dL)	38.9 ± 6.8	47.2 ± 8.1	0.001*
Triglycerides (mg/dL)	186.4 ± 42.7	152.8 ± 37.9	0.004*
Dyslipidemia Present (n, %)	54 (85.7%)	18 (48.6%)	0.001*

*Statistically significant ($p \leq 0.05$)

The table also demonstrates that dyslipidemia, which is any abnormality of lipid parameters, was far much greater in cardiac complications having 85.7 percent patients with abnormality in lipid parameters and 48.6 percent patients with no coincidence with cardiac complications had the same abnormality. This difference ($p = 0.001$) is extremely big, which indicates the extremely high rate of correlation between lipid abnormalities and cardiac morbidity. Overall, Table 1 is a strong indicator of the fact that lipid profile indicators, including high total cholesterol, LDL-C and triglycerides and significantly lower HDL-C were always worse in the patients having cardiac complications. The general conclusion that dyslipidemia is one of the main factors in the development and the further progression of the cardiac complications is highly supported by these tendencies.

DISCUSSION

The findings of this study demonstrate that dyslipidemia has a significant and significant association with the development of cardiac complications in adult individuals. Patients with cardiac complications showed much better results in terms of total cholesterol, LDL-C and triglycerides, and a significant and drastically lower HDL-C levels, as compared to patients who had no cardiac events [1]. These results agree with the existing literatures which revealed that lipid abnormalities are significant determinable risk factors in the pathogenesis of cardiovascular diseases [2]. High LDL-C is firmly proven as one of the key factors of atherosclerosis as it facilitates the deposition of cholesterol in the lining of arteries. The observed significantly increased LDL-C in the complication group is in line with international evidence that shows that even small increases in LDL-C significantly raise the risk of myocardial infarction, coronary artery disease, and ischemic stroke [3].

Equally, high levels of triglycerides associated with our study population have been known to play a role in endothelial dysfunction, inflammation and insulin resistance which in turn increases the cardiovascular risk;

which is of particular concern in South Asian populations where metabolic syndrome and central obesity is very common [4]. The cardioprotective effect of HDL-C is also emphasized in the fact that the HDL-C levels were very low in the patients with cardiac complication. HDL promotes reverse cholesterol transportation, and it also exhibits antioxidant and anti-inflammatory effects; therefore, low levels of HDL-C encourage instability of the plaque and thrombosis [5]. The reduced levels of HDL-C in the complication group support the past studies that show that low HDL-C is independent risk factor of poor cardiac events even in persons with borderline LDL-C levels [6].

Our study demonstrated that dyslipidemia (85.7) is very prevalent in patients with cardiac complications and therefore emphasizes the need to screen lipids, identify early risks, and administer timely therapeutic interventions. Lifestyle changes such as changes to the diet, maintaining normal weight, and physical exercise remain to be used as a first-line management approach to dyslipidemia [7]. Moreover, statins and other lipid-lowering drugs have been proved to dramatically decrease cardiovascular risk, in both cases by enhancing lipid profiles and atherosclerotic plaque stabilization. Nevertheless, local populations still have many individuals who are underdiagnosed and untreated because of the lack of related awareness and low adherence to follow-up [8].

This study is cross sectional, which is only useful in establishing associations, but it does not allow one to establish causality [9]. The 100 participants are also a limitation to generalization. More serious prospective cohort studies should be conducted to determine the long-term impact of dyslipidemia on cardiac functioning [10]. In spite of these shortcomings, the standardized and statistical power of our results confirms once again the cardiac-related central status of dyslipidemia [11]. Early diagnosis, alteration of risk factors, and the proper management of lipid abnormalities are some of the critical elements that are required in areas where the prevalence of cardiovascular diseases is on the rise. Prevention, based on early screening, formal lifestyle, and timely pharmacology can play a

significant role in risk minimization of cardiac complications and enhanced long-term cardiovascular outcomes [12].

CONCLUSION

Current studies were found to conclude that the dyslipidemia has a significant connection with the existence of cardiac complications in the adulthood. The patients reported to have heart complications registered extremely high amounts of total cholesterol, LDL-C and triglycerides and exceedingly low amounts of the HDL-C levels. The significance of lipid abnormalities in the etiology and pathogenesis of the cardiovascular diseases is reinforced by the fact that dyslipidemia is very high in individuals with cardiac events. The timely diagnosis, frequent observation and the proper management of lipid disorders through lifestyle indications and the right pharmacological treatment is critical as a way of reducing cardiac morbidity and mortality. Increasing health awareness and screening of lipids regularly among people would make a significant contribution in ensuring that cardiac complications are prevented in future.

Conflict of Interest: The authors report no conflicts of interest.

Funding: No external funding was received for this study.

Acknowledgments: The authors acknowledge the support of Shaikh Zayed Hospital, Lahore, for facilitating data collection and laboratory analysis. The contribution of all clinical and technical staff involved in patient evaluation is gratefully appreciated.

Authors' Contributions

A.U.R.&U.A.: Study design, data interpretation, manuscript drafting.

F.R.&SAK.: Data analysis, literature review, manuscript revision.

Data Availability Statement: The data used in this study are available upon reasonable request from the corresponding author, subject to ethical and institutional guidelines.

REFERENCES

1. Abera A, Worede A, Hirigo AT, et al. Dyslipidemia and associated factors among adult cardiac patients: a hospital-based comparative cross-sectional study. *Eur J Med Res.* 2024;29:237. doi:10.1186/s40001-024-01802-x
2. Addisu B, Bekele S, Wube TB, et al. Dyslipidemia and its associated factors among adult cardiac patients at Ambo University Referral Hospital, Oromia region, West Ethiopia. *BMC Cardiovasc Disord.* 2023;23:321. doi:10.1186/s12872-023-03348-y
3. Xi Y, Niu L, Cao N, et al. Prevalence of dyslipidemia and associated risk factors among adults aged ≥ 35 years in northern China: a cross-sectional study. *BMC Public Health.* 2020;20:1068. doi:10.1186/s12889-020-09172-9
4. Najafi M, Mozaffari H, Yahya J, Mokhtari P, Teymouri M, Faghih S. The associations between dietary patterns and cardiovascular risk factors among adults: a cross-sectional study. *Clin Nutr ESPEN.* 2020;40:300–308. doi:10.1016/j.clnesp.2020.09.001
5. Xing L, Jing L, Tian Y, et al. Epidemiology of dyslipidemia and associated cardiovascular risk factors in northeast China: a cross-sectional study. *Nutr Metab Cardiovasc Dis.* 2020;30(12):2262–2270. doi:10.1016/j.numecd.2020.07.032
6. Abdissa D, Hirpa D. Dyslipidemia and its associated factors among adult diabetes outpatients in West Shewa zone public hospitals, Ethiopia. *BMC Cardiovasc Disord.* 2022;22:39. doi:10.1186/s12872-022-02489-w
7. Achila OO, Fessahye N, Mengistu ST, et al. Prevalence of dyslipidemias and 10-year cardiovascular risk scores in adults in Asmara, Eritrea: a community-based cross-sectional study. *Sci Rep.* 2022;12:5567. doi:10.1038/s41598-022-09446-9
8. Liu C, Xue Y, Wang Y, et al. Association between dietary patterns and dyslipidemia in adults from the Henan Rural Cohort Study. *Asia Pac J Clin Nutr.* 2020;29(2):299–308. doi:10.3316/informit.286537850635052
9. Hong N, Lin Y, Ye Z, et al. Relationship between dyslipidemia and inflammation among adults in East Coast China: a cross-sectional study. *Front Immunol.* 2022;13:937201. doi:10.3389/fimmu.2022.937201
10. Al Quran TM, Bataineh ZA, Al-Mistarehi AH, et al. Prevalence and pattern of dyslipidemia and its associated factors among patients with type 2 diabetes mellitus in Jordan: a cross-sectional study. *Int J Gen Med.* 2022;15:7669–7683. doi:10.2147/IJGM.S377463
11. Nikparvar M, Khaladeh M, Yousefi H, et al. Dyslipidemia and its associated factors in southern Iranian women: Bandare-Kong Cohort Study. *Sci Rep.* 2021;11:9125. doi:10.1038/s41598-021-88680-z
12. Zheng C, Liu Y, Xu C, et al. Association between obesity and the prevalence of dyslipidemia in middle-aged and older people: an observational study. *Sci Rep.* 2024;14:11974. doi:10.1038/s41598-024-62892-5
13. Gebreegziabihir G, Belachew T, Mehari K, Tamiru D. Prevalence of dyslipidemia and associated risk factors among adult residents of Mekelle City, Northern Ethiopia. *PLoS One.* 2021;16(2):e0243103. doi:10.1371/journal.pone.0243103
14. Zhu J, Zhang Y, Wu Y, et al. Obesity and dyslipidemia in Chinese adults: a cross-sectional study in Shanghai. *Nutrients.* 2022;14(11):2321. doi:10.3390/nu14112321
15. Haile K, Timerga A. Dyslipidemia and its associated risk factors among adult type 2 diabetic patients at Jimma University Medical Center, Southwest Ethiopia. *Diabetes Metab Syndr Obes.* 2020;13:4589–4597. doi:10.2147/DMSO.S283171
16. Zhang H, Kwapong WR, Shao MM, et al. Predictors of the prevalence of dyslipidemia among young adults: a cross-sectional survey. *Front Public Health.* 2020;8:400. doi:10.3389/fpubh.2020.00400
17. Kifle ZD, Alehegn AA, Adugna M, Bayleyegn B. Prevalence and predictors of dyslipidemia among hypertensive patients in Lumame Primary Hospital, Amhara, Ethiopia. *Metab Open.* 2021;11:100108. doi:10.1016/j.metop.2021.100108
18. Yadegar A, Mohammadi F, Rabizadeh S, et al. Prevalence of different patterns of dyslipidemia in patients with type 2 diabetes in an Iranian population. *Transl Med Commun.* 2022;7:23. doi:10.1186/s41231-022-00129-1
19. Haile K, Haile A, Timerga A. Predictors of lipid profile abnormalities among patients with metabolic syndrome in Southwest Ethiopia: a cross-sectional study. *Vasc Health Risk Manag.* 2021;17:461–469. doi:10.2147/VHRM.S319161
20. El Alami H, Haddou I, Benaadi G, et al. Prevalence of dyslipidemia and relationship between HbA1c and lipid profile in Moroccan patients with type 2 diabetes mellitus: a cross-sectional study. *Pan Afr Med J.* 2022;43:1. Available from: <https://www.ajol.info/index.php/pamj/article/view/249314>

This article may be cited as: Rehman AU, Rafaqat F, Khan SA, Ahmad U. Association between dyslipidemia patterns and the risk of cardiac complications in adults: a cross-sectional clinical study. *Dev Med Life Sci.* 2025;2(10):29-33. doi:10.69750/dmls.02.010.0169.

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