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EFFECT OF DYSLIPIDEMIA AND ITS ASSOCIATION WITH CORONARY ARTERY DISEASE ON ANGIOGRAPHIC FINDINGS

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Introduction: Dyslipidemia is an abnormal amount of lipids in the blood which act as a most common risk factor for CAD. In developed countries, most dyslipidemias are hyperlipidemias; that is, an elevation of lipids in the blood. This is often due to diet and lifestyle. Prolonged elevation of insulin levels can also lead to dyslipidemia. **Objective:** To assess the effect of dyslipidemia and its association with coronary artery disease on angiographic findings. **Methods:** This was a retrospective cross-sectional study was carried out at Cardiology Department, Bangladesh Medical College Hospital, Dhaka, Bangladesh from January to December 2021. Information was gathered from medical records of patients admitted for coronary angiography in our Hospital. During the study period 112 consecutive patients, suffering from CAD were examined. Coronary angiography was performed in the catheterization laboratory of the institute and interpreted by interventionist cardiologists. Reporting was done regarding the stenosis percentage of the main epicardial coronary arteries, and the extent of CAD was categorized as one-vessel, two-vessel, or three-vessel disease, according to the number of affected vessels. Statistical analysis was performed with SPSS version 20 (SPSS, Inc., Chicago, IL, USA) statistical software. **Results:** During the study period, we identified 112 patients who were subjected to coronary angiography. The mean age of patients were 54.40 years (±SD 8.78 years), where the minimum age was 28 and maximum age was 75. Majority of the patients were young, with around 40.1% (45) of the patients age 46-55 years. The study consisted

predominantly of males as represented by 84.82% of the patients, while 15.17% were females. The lipid profile analysis revealed that the mean total cholesterol was 182.60 ± 54.41 mg/dl, mean low-density lipoprotein cholesterol (LDL-C) was 105.46 ± 40.85 mg/dl, mean high density lipoprotein cholesterol (HDL-C) was low, 34.26 ± 7.234 mg/dl and mean triglyceride level was high, 207.64 ± 151.20 mg/dl. The mean levels of different lipids. the patients where dyslipidemia were present in 75.89% patients. Distribution of types of myocardial infarction among the patients. Among 112 patients there were patients of inferior MI 33%, anterior MI 22%, extensive anterior MI 10%, anteroseptal MI 18.5%, Inferolateral MI 9%, lateral MI 4%, high lateral MI 2% and anteroinferior 1.5%. In patients according to clinical findings where mean ± SD of systolic blood pressure was found 134.75 ± 19.25 and random blood sugar was found in 223.81 ± 72.18 mg/dl as well as gallop rhythm was found in 11% patients, those are remarkable. In this study, the most frequent form of dyslipidemia among the patients with significant CAD was found to be low levels of HDL-C (<40mg/dL) at 86.3%, followed by high TG levels (≥150mg/dL) to be 63.2%, high levels of total cholesterol (≥200mg/dl) at 31.6%, and high LDL-C (≥130mg/dL) to be 27.4%. In hospital stay of the patients where mean ± SD of hospital stay of the study patients was 6±0.88 days. 57.1% patients got improved with better outcome and discharged after treatment. **Conclusion:** It could be concluded that dyslipidemia, particularly high triglyceride and low HDL levels, is linked with CAD identified by coronary angiography; treating the condition effectively, therefore, would have a considerable impact on the outcome of the CAD patients. The hypertriglyceridaemia and hypercholesterolaemia are the most prevalent dyslipidaemia or lipid disorders in patients of CAD. We should recommend to pay more attention to serum lipids for prevention for CAD.

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INTRODUCTION

Dyslipidemia is an abnormal amount of lipids in the blood which act as a most common risk factor for CAD. In developed countries, most dyslipidemias are hyperlipidemias; that is, an elevation of lipids in the blood. This is often due to diet and lifestyle. Prolonged elevation of insulin levels can also lead to dyslipidemia. Dyslipidemia is divided up into primary and secondary types. Primary dyslipidemia is inherited. Secondary dyslipidemia is an acquired condition. That means it develops from other causes, such as obesity or diabetes. Dyslipidemia is a primary, widely established as an independent major risk factor for coronary artery disease (CAD) [1, 2]. Coronary artery disease (CAD) is the leading cause of mortality and morbidity in both developed and developing countries; hypertension (HTN), dyslipidemia (DLP) and diabetes mellitus (DM) are considered as major risk factors contributing to the condition [3,4]. Hyperlipidemia is a major risk factor for atherosclerotic heart disease-related mortality and morbidity [5]. Elevated serum triglyceride (TG) and decreased HDL cholesterol levels, the core component of the metabolic syndrome, are also commonly found in many

patients with established CAD [6,7]. Many studies have shown that treating hyperlipidemia lowers the cardiovascular morbidity and mortality [8, 9]. Coronary artery disease (CAD) particularly myocardial infarction secondary to atherosclerosis of coronary arteries remain the leading cause of morbidity and mortality worldwide. Atherosclerosis is a chronic, multifocal immuno-inflammatory; fibroproliferative disease of medium sized and large arteries mainly driven by lipid accumulation. Elevated levels of total and low-density lipoprotein cholesterol (TC and LDL-C), elevated levels of triglycerides (TG) and low levels of high-density lipoprotein cholesterol (HDL-C) are important risk factors for CAD.LDL-C is considered as 'bad cholesterol' since too high level of this cholesterol is associated with an increased risk of coronary artery disease and stroke. Bangladesh has been experiencing an epidemiological transition from communicable to non-communicable (NCD) and hence CAD poses as an emerging threat. Conventional cardiovascular risk factors, such as hypertension, diabetes, smoking, and dyslipidemia, increase the risk of developing coronary artery disease (CAD) [10,11,12]. Coronary Artery Disease (CAD) is defined as the occlusion of coronary arteries due to atherosclerosis which leads to impairment of blood supply to the heart. Although at different times, different lipoproteins have been associated with atherosclerosis, contrary to the previous believes as LDL being the predominant lipoprotein contributing to CAD, a number of epidemiological studies have portrayed a strong association between low levels of high density lipoprotein (HDL) cholesterol and development and progression of atherosclerotic Coronary Artery Disease. Primary prevention studies have shown that the early detection and aggressive treatment of risk factors prevent cardiovascular events. Dyslipidemia is a primary, widely established as an independent major risk factor for coronary artery disease (CAD) and may even be a prerequisite for CAD, occurring before other major risk factors come into play.

MATERIALS AND METHODS

This was a retrospective cross-sectional study was carried out at Cardiology Department, Bangladesh Medical College Hospital, Dhaka, Bangladesh from January to December 2021. Information was gathered from medical records of patients admitted for coronary angiography in our Hospital. During the study period 112 consecutive patients, suffering from CAD were examined. Coronary angiography was performed in the catheterization laboratory of the institute and interpreted by interventionist cardiologists. Reporting was done regarding the stenosis percentage of the main epicardial coronary arteries, and the extent of CAD was categorized as one-vessel, two-vessel, or three-vessel disease, according to the number of affected vessels. Only patients with significant CAD, defined as the presence of ≥50% stenosis of any of the epicardial vessels, were included in the study. Patients with normal coronary angiography or mild disease, defined as <50% stenosis in any of the epicardial vessels, were excluded. Lipid profile measurements were done routinely, within 24 hours of admission of the patients, in fasting state. All results were obtained from the same pathological laboratory (i.e. within the hospital) and thus ensured maintenance strategy and standardization. Lipid profile parameters namely Total Cholesterol (TC), TG, HDL-C/HDL, LDL-C/LDL were recorded as variables. Lipid. All relevant information for every individual study subject were recorded after obtaining informed written consent on a pre-formed data sheet. Collected information were checked repeatedly. Information were collected by the research worker himself.

Statistical analysis: Statistical analysis were performed with SPSS version 20 (SPSS, Inc., Chicago, IL, USA) statistical software.

Categorical variables were reported by frequency and percentage; groups were compared using the chi-square test. Continuous variables were reported as means and standard deviation. All p-values were reported as 2-tailed with statistical significance set at 0.05 and confidence intervals calculated at the 95%.

RESULTS

During the study period, we identified 112 patients who were subjected to coronary angiography. The mean age of patients were 54.40 years (±SD 8.78 years), where the minimum age was 28 and maximum age was 75. Majority of the patients were young, with around 40.1% (45) of the patients age 46-55 years. The study consisted predominantly of males as represented by 84.82% of the patients, while 15.17% were females.

Table-1: Age group distribution of the patients (N=112)

Age	N	%
<25	14	12.5
36-45	31	27.6
46-55	45	40.1
56-65	18	16.7
<65	4	3.47
Sex		
Male	17	84.82
Female	95	15.17

Table-2: Descriptive analysis of lipid parameters (N=112)

of lipid parameters	N	Minimum	Maximum	Mean	Std. Deviation
Total Cholesterol (mg/dL)	95	80	482	182.60	54.413
HDL (mg/dL)	95	21	64	34.26	7.234
Triglyceride (mg/dL)	95	48	948	207.64	151.200
LDL (mg/dL)	95	14	198	105.46	40.850

The lipid profile analysis revealed that the mean total cholesterol was 182.60 ± 54.41 mg/dl, mean low-density lipoprotein cholesterol (LDL-C) was 105.46 ± 40.85 mg/dl, mean high density lipoprotein cholesterol (HDL-C) was low, 34.26 ± 7.234 mg/dl and mean triglyceride level was high, 207.64 ± 151.20 mg/dl. The mean levels of different lipids are shown in Table-2.

Table-3: Distribution of risk factors for CAD in patients (N=112)

Risk Factors	N	%
Smoking	58	51.7
Hypertension	70	62.5
Dyslipidaemia	85	75.89
Obesity	26	23.21
DM	35	31.25
Family history	28	25.0
Sedentary life style	24	21.42

Table-3 shows risk factor analysis of the patients where dyslipidemia was present in 75.89% patients.

Table-4: Distribution of types of myocardial infarction among the patients (N=112)

Name	N	Percent
Inferior	37	33%
Anterior	25	22%
Extensive Anterior	11	10%
Antero-septal	21	18.5%
Inferolateral	10	9%
Lateral	4	4%
High lateral	2	2%
Anteroinferior	2	1.50%

In table-4 shows distribution of types of myocardial infarction among the patients. Among 112 patients there were patients of inferior MI 33%, anterior MI 22%, extensive anterior MI 10%, anteroseptal MI 18.5%, Inferolateral MI 9%, lateral MI 4%, high lateral MI 2% and anteroinferior 1.5%.

Table-5: Distribution of patients according to clinical findings (N=112)

Clinical Examinations	n=1112, Mean±SD/N(%)
Heart Rate (per minute)	87±15
Respiratory rate (bpm)	21±7
Systolic BP (mmHg)	134.75±19.25
Diastolic BP (mmHg)	87±11.52
BMI (Kg/m^2)	23.76±2.51
Raised JVP	14%
Gallop rhythm	11%
Basal crepitation	20%
LVEF (%)	52.82±9.99
RBS (mg/dl)	223.81±72.18
LDLC	213±24.9

In table-5 shows distribution of patients according to clinical findings where mean±SD of systolic blood pressure was found 134.75±19.25 and random blood sugar was found in 223.81±72.18 mg/dl as well as gallop rhythm was found in 11% patients, those are remarkable.

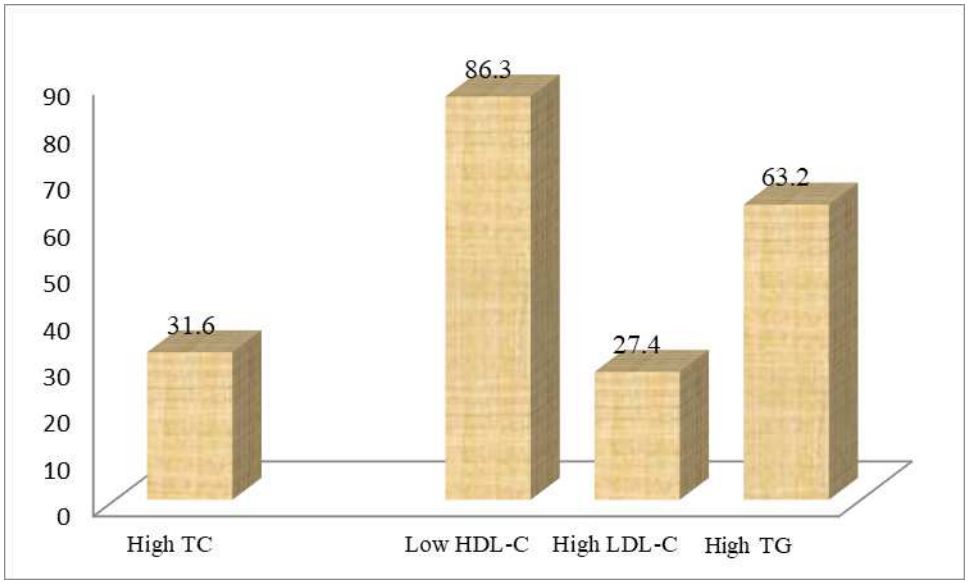

Fig-1: Proportion of dyslipidemia.

In this study, the most frequent form of dyslipidemia among the patients with significant CAD was found to be low levels of HDL-C (<40mg/dL) at 86.3%, followed by high TG levels (≥150mg/dL) to be 63.2%, high levels of total cholesterol (≥200mg/dl) at 31.6%, and high LDL-C (≥130mg/dL) to be 27.4%.

Table-6: Hospital stay (n=112)

Hospital Stay	(n=112)
Mean±SD	6±0.88

In table-6 shows hospital stay of the patients where mean±SD of hospital stay of the study patients was 6±0.88 days.

Table-7: Medical treatment commenced during hospital stay of the patients (N=112)

Drug	N	%
Aspirin MD	108	96%
Clopidogrel (75 mg)	104	93%
Statins	103	92%
Aspirin LD (162-325mg)	100	89%
Anticoagulant	95	85%
Beta blocker	93	83%
Angiotensin converting enzyme inhibitor	91	81%
Clopidogrel (300 mg)	86	77%
Nitriglycerine	45	40%
Morohine	18	16%
Calcium channel blockers	9	8%

In table-7 shows medical treatment commenced during hospital stay of the patients where Aspirin LD (162- 325mg) and Aspirin MD were used in 89% and 96% patients.

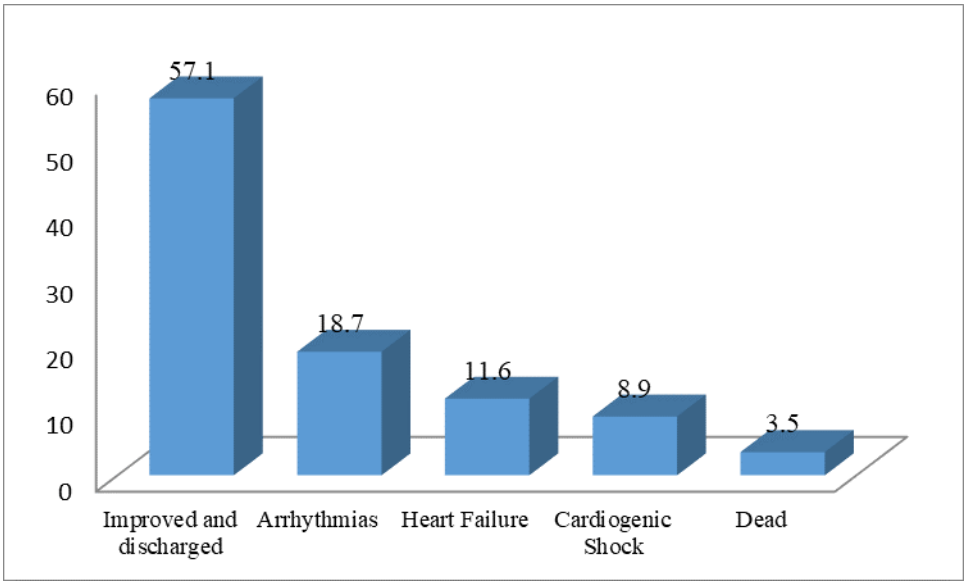

Fig-2: Treatment outcome of the patients.

In figure-2 shows treatment outcome of the patients. 57.1% patients got improved with better outcome and discharged after treatment.

DISCUSSION

Coronary heart disease (CHD) still remains a significant cause of morbidity and mortality in many countries despite the considerable advances made in the diagnosis, prevention and treatment of the condition [13]. HTN, DM and dyslipidemia are among the main risk factors contributing to coronary artery stenosis; certain studies, however, have shown that hypercholesterolemia has a greater influence on the severity of coronary artery lesions than the other two factors [14]. The mean age of patients were 54.40 years (±SD 8.78 years), where the minimum age was 28 and maximum age was 75. Majority of the patients were young, with around 40.1% (45) of the patients age 46-55 years. The study consisted predominantly of males as represented by 84.82% of the patients, while 15.17% were females. Therefore, the results of the present study were consistent with the previous reports [15,16]. The mean ± SD of age was 52.84 ±8.40 years, similar to another study done in Pakistan [17] where the mean age was 55.69±13.45. Thus the present results are in agreement that male population is more prone to CAD linked to any genetic or hormonal differences. The lipid profile analysis revealed that the mean total cholesterol was 182.60±54.41 mg/dl, mean low-density lipoprotein cholesterol (LDL-C) was 105.46 ± 40.85 mg/dl, mean high density lipoprotein cholesterol (HDL-C) was low, 34.26±7.234 mg/dl and mean triglyceride level was high, 207.64±151.20 mg/dl. The mean levels of different lipids. The ESC guideline along with other studies [18] acknowledges low HDL-C levels as an independent risk predictor for ACS, and recognizes a strong inverse association between HDL-C levels and ACS rates. We found that the most frequent form of dyslipidemia, among angiographically proven CAD patients was low HDL-C, occurring in 86.3% of the patients, with a mean of 34.26±7.234 mg/dl. This is similar to the findings of a number of studies in different regions of India, where all concluded that the different populations of CAD patients had low HDL-C levels as the commonest lipid abnormality with significantly low mean HDL-C level by Gupta R et al [19], Goel PK et al [20] and Mohan V et al [21]. The low HDL-C level found in our study is further

validated by other studies that have established that low HDL-C increases the risk of atherosclerotic progression, morbidity and mortality [22,23]. Regarding the evaluation of risk factors of CAD, dyslipidemia was present in 77%, hypertension was found in 62.5%, smoker was 53%, DM was found in 33%. The results of present study with reference to risk factors were similar to previous published papers [24]. In this study we found that 48% patients have hypertriglyceridemia followed by hypercholesterolemia (32%), raised LDL (28%) and low HDL (12%). These results are very much similar to the findings of one report where they had found hypertriglyceridemia as most common lipid abnormality in patients with dyslipidemia as it was found in 68.1% patients; followed by raised serum VLDL, hyper-cholesterolemia, raised serum LDL and low serum HDL found in 53.2%, 34.0%, 8.5% and 4.3% patients respectively. Another study conducted in patients with acute myocardial infarction reported that frequencies of hyper-cholesterolemia, hypertriglyceridemia, low high-density lipoprotein cholesterol and isolated low high-density lipoprotein cholesterol were found to be 30.6%, 30.1%, 48.6% and 34.1% respectively. In standard individuals from different communities, plasma levels of lipids vary due to differences in genetic background and diet [25. During the study Aspirin LD (162-325 mg) and Aspirin MD were used in 89% and 96% patients. Also we found only 4% died during the treatment. Which was supported by one study [26]. The present study concluded that dyslipidemia is a good predictor for the severity and the extent of coronary artery stenosis in CAD patients. It showed that while a large number of patients angiographically confirmed coronary artery disease are under treatment for dyslipidemia, lipid profiles are clearly not adequate in the great majority. Better patient identification means and treatment strategies for dyslipidemia along with certain dietary and lifestyle modifications added with the use of the available pharmaceutical agents play a critical role in improving the long-term outcome, reducing the need for subsequent coronary procedures, and is quite cost effective. Furthermore, the development of more potent drugs to treat hyperlipidemia particularly low HDL levels are required to prevent CAD mortality and morbidity [27].

CONCLUSION

It could be concluded that dyslipidemia, particularly high triglyceride and low HDL levels, is linked with CAD identified by coronary angiography; treating the condition effectively, therefore, would have a considerable impact on the outcome of the CAD patients. The hypertriglyceridaemia and hypercholesterolaemia are the most prevalent dyslipidaemia or lipid disorders in patients of CAD. We should recommend to pay more attention to serum lipids for prevention for CAD. Further research, in particular longitudinal studies, is needed to explore the complex interaction of these factors and to inform policies and programs for the prevention and management of CADs.

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