Vol. 5 No. 1 (2026)

Pakistan Journal of Medical & Cardiological Review

https://pakjmcr.com/index.php/1/about

Online ISSN 3007-2387

Print ISSN 3007-2379

Relationship of Lipid Profile and Hypertension With Coronary Arteries Disease in Lady Reading Hospital (LRH) Peshawar

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Received on 02 March, 2026
Accepted on 2 March, 2026
Published on 30 March, 2026

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Abstract

Background: Coronary artery disease (CAD) is the leading cause of cardiovascular morbidity and mortality worldwide. Hypertension and dyslipidemia are among the most important modifiable risk factors contributing to the development and progression of CAD. This study aimed to determine the association of hypertension and lipid profile abnormalities with coronary artery disease among patients attending a tertiary care hospital. **Methods:** A hospital-based cross-sectional study was conducted at the Cardiology Unit of Lady Reading Hospital, Peshawar. A total of 200 participants diagnosed with CAD were selected through convenient sampling. Demographic characteristics, blood pressure status, and lipid profile parameters were recorded using a structured proforma. Data were analyzed using IBM SPSS version 22. Descriptive

statistics were used to summarize the data, while Chi-square test was applied to determine the association between categorical variables. A p-value of <0.05 was considered statistically significant. **Results:** The mean age of the participants was 54.45 ± 12.97 years (range: 20–95 years), with males accounting for 62% of the study population. Hypertension was present in 152 (76%) participants, of whom 78% had CAD, demonstrating a significant association between hypertension and CAD (p<0.001). Dyslipidemia was identified in 125 (62.5%) participants, with 80% showing CAD compared to 40% among participants with normal lipid profiles (p<0.001). CAD prevalence increased with advancing age, and males were slightly more affected than females. **Conclusion:** Hypertension and dyslipidemia are strongly associated with coronary artery disease and remain major modifiable cardiovascular risk factors. Early detection, routine screening, and effective management of blood pressure and lipid abnormalities are essential to reduce the burden of CAD and improve cardiovascular outcome.

2. INTRODUCTION

Coronary artery disease (CAD) is the most common form of cardiovascular disease and remains a leading cause of morbidity and mortality worldwide. It is characterized by the accumulation of atherosclerotic plaques within the coronary arteries, resulting in reduced myocardial blood flow (ischemia) that may progress to myocardial infarction, heart failure, or sudden cardiac death (1). According to the World Health Organization (WHO), cardiovascular diseases accounted for approximately 17.9 million deaths in 2016, representing 31% of all global deaths (2). Clinical manifestations of CAD range from asymptomatic disease to angina, dyspnea, acute myocardial infarction, and sudden

cardiac death. Major risk factors include advanced age, male sex, hypertension, diabetes mellitus, smoking, obesity, family history, and dyslipidemia.

Dyslipidemia is one of the strongest modifiable risk factors for CAD. Elevated low-density lipoprotein cholesterol (LDL-C) and triglycerides, together with reduced high-density lipoprotein cholesterol (HDL-C), promote atherosclerosis and increase the risk of coronary events (3). LDL-C contributes to cholesterol deposition within arterial walls, whereas HDL-C facilitates reverse cholesterol transport and exerts a protective effect against atherosclerosis. Elevated triglyceride levels further accelerate plaque formation and cardiovascular complications (3).

Hypertension is another major determinant of CAD and is defined as a persistent systolic blood pressure ⩾140 mmHg and/or diastolic blood pressure ⩾90 mmHg on repeated measurements (4). WHO estimates that approximately 1.13 billion people worldwide have hypertension, with fewer than one in five achieving adequate blood pressure control (5). Hypertension is classified as essential (primary), secondary, or malignant, with essential hypertension accounting for nearly 90–95% of all cases. Persistent hypertension accelerates endothelial dysfunction and atherosclerotic plaque formation, thereby markedly increasing the risk of coronary artery disease and other adverse cardiovascular outcomes.

Considering the high prevalence of hypertension and dyslipidemia among patients with CAD, understanding their association is essential for early diagnosis, risk stratification, and implementation of preventive strategies aimed at reducing cardiovascular morbidity and mortality.

3. Materials & Methods

3.1 Study Settings & Design

A cross sectional study was performed at cardiology unit, Lady Reading hospital (Medical Teaching Institute) Peshawar. The said hospital was selected because it is the largest hospital of the province and moreover the flow of patients which come to seek treatment is up to the mark. This act of selection provided immense data easily for the study. The study was carried out after proper approval from head of cardiology department of the hospital.

3.2 SAMPLING TECHNIQUE

Convenient sampling technique, a type of non-random sampling was used for collection of data from the subjects. People, who were easily available in the study settings and not assigned as subjects prior to their inclusion in the study were taken as samples.

3.3 PARTICIPANTS

Participants of the study were selected from Lady Reading hospital, Peshawar. A pre-formed proforma was filled from all the subjects marked as participants in this study. The subjects were selected after inquiring about their will becoming part of the study. Patients admitted in wards, CCU and OPD were selected for this study.

3.4 Inclusion Criteria

- Candidates with coronary arteries disease with or without hypertension and altered lipid levels
- Both male and female with all age groups willing to participate in the study
- Subjects only came to seek treatment in Lady Reading hospital Peshawar were included in the study.

3.5 Exclusion Criteria

- Non cooperative candidates those who do not want to participate in this study
- Candidates having other pathologies like cancer, lung disease etc.
- Candidates with congenital heart disease

3.6 DATA COLLECTION PROCEDURE

Data collection tool was developed and approved by the consultation of supervisor. The study was carried out after the approval from institutional ethics review committee and the written consent was taken from the head of the cardiology department. The informed consent was obtained from the participants, and data was collected through interviewing and information filled in pre-designed questionnaire.

3.7 STATISTICAL ANALYSIS

Collected data was entered and analyzed using SPSS version 22 software. Descriptive statistic such as mean & standard deviation was used for continuous variables while frequencies and Percentages for categorical variables. Chi square test was used for analysis of categorical variables. P value of less than 0.05 was taken as significant.

4. RESULTS

After collecting data from the participants through pre-formed proforma, it was analyzed using IBM SPSS software version 22. Various statistical tools and tests were applied for finding out the results. The analyses and their interpretation is discussed one by one in the given passages.

A total of 200 participants from both male and female gender were selected for the study with age ranging from 20 years to 95 years. The mean age was 54.45 years with a standard deviation of ±12.97. The minimum age was 20 years while maximum age was 95 years. Among all 200 participants, male subjects were 124 (62%) and female

subjects were 76 (38%). Ages were subdivided into subgroup 1(20-39 years), subgroup 2(40-59years), subgroup 3(60-80 years), subgroup 4(above 80 years).

4.1 Age wise distribution of research participants

Table 2: *Chi-Square Tests*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.697[a]	3	.053
Likelihood Ratio	7.317	3	.062
Linear-by-Linear Association	4.200	1	.040
N of Valid Cases	200		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.50.

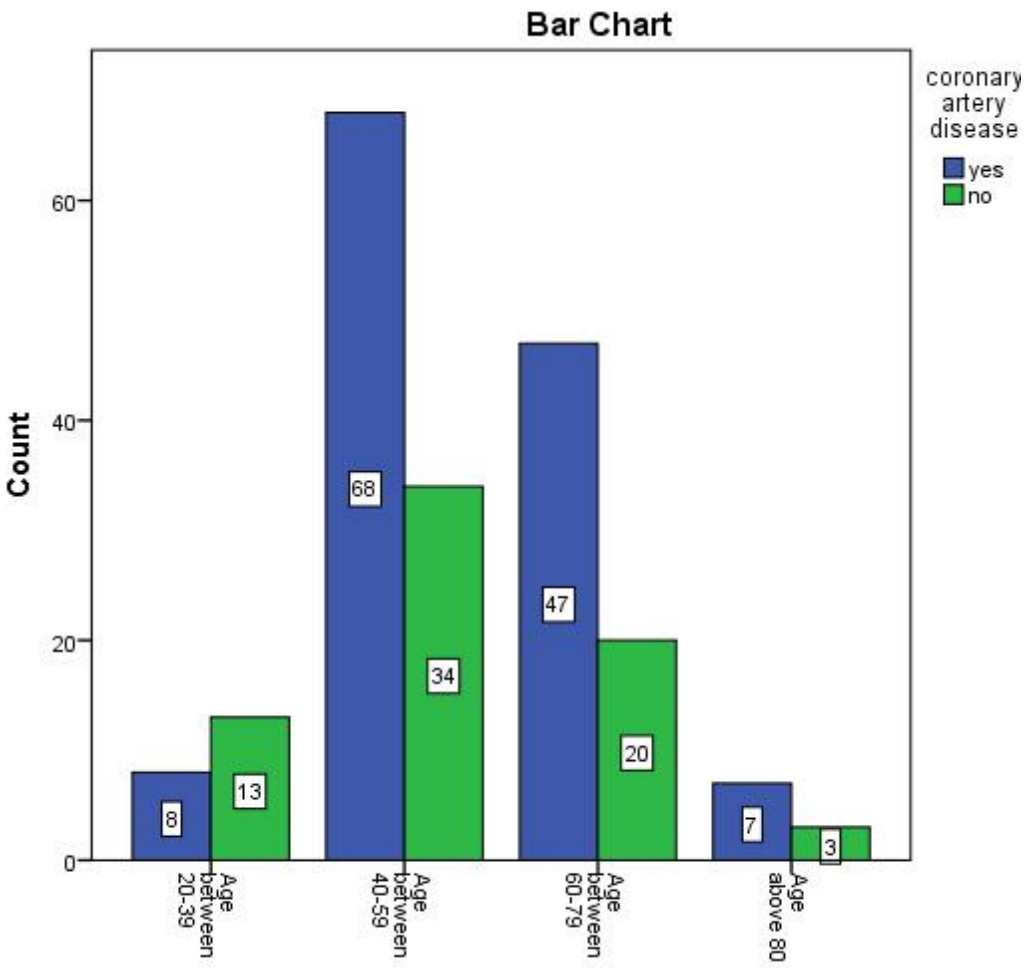


Fig 1: Bar chart for age of the subjects

A total of 200 participants from both male and female gender were selected for the study with age ranging from 20 years to 95 years. The mean age was 54.45 years with a standard deviation of ±12.97. The minimum age was 20 years while maximum age was 95 years. Among all 200 participants, male subjects were 124 (62%) and female subjects were 76 (38%). Ages were subdivided into subgroup 1(20-39 years), subgroup 2(40-59years), subgroup 3(60-80 years), subgroup 4(above 80 years).

In age group 1 the CAD was 38%, in age group 2 CAD was 66%, in age group 3 CAD was 70% while in age group 4 CAD was 70%.

Age groups are associated with CAD because P value is equal to 0.05(0.05)

4.1 Gender association with CAD

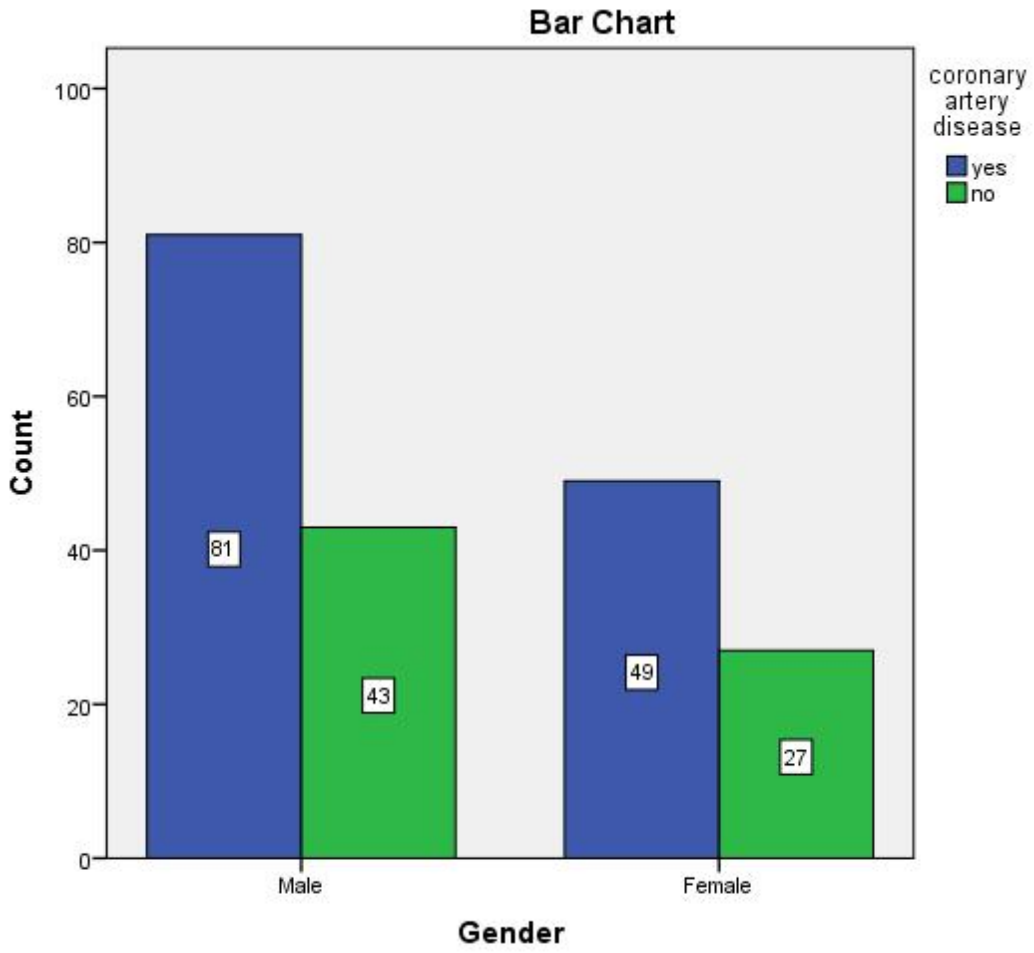


Fig. 2:

A total of 200 research participants participated in this study in which 124 (62%) were male and 76 (38%) were female. Among male 65% were having CAD and among female 64% were having CAD.

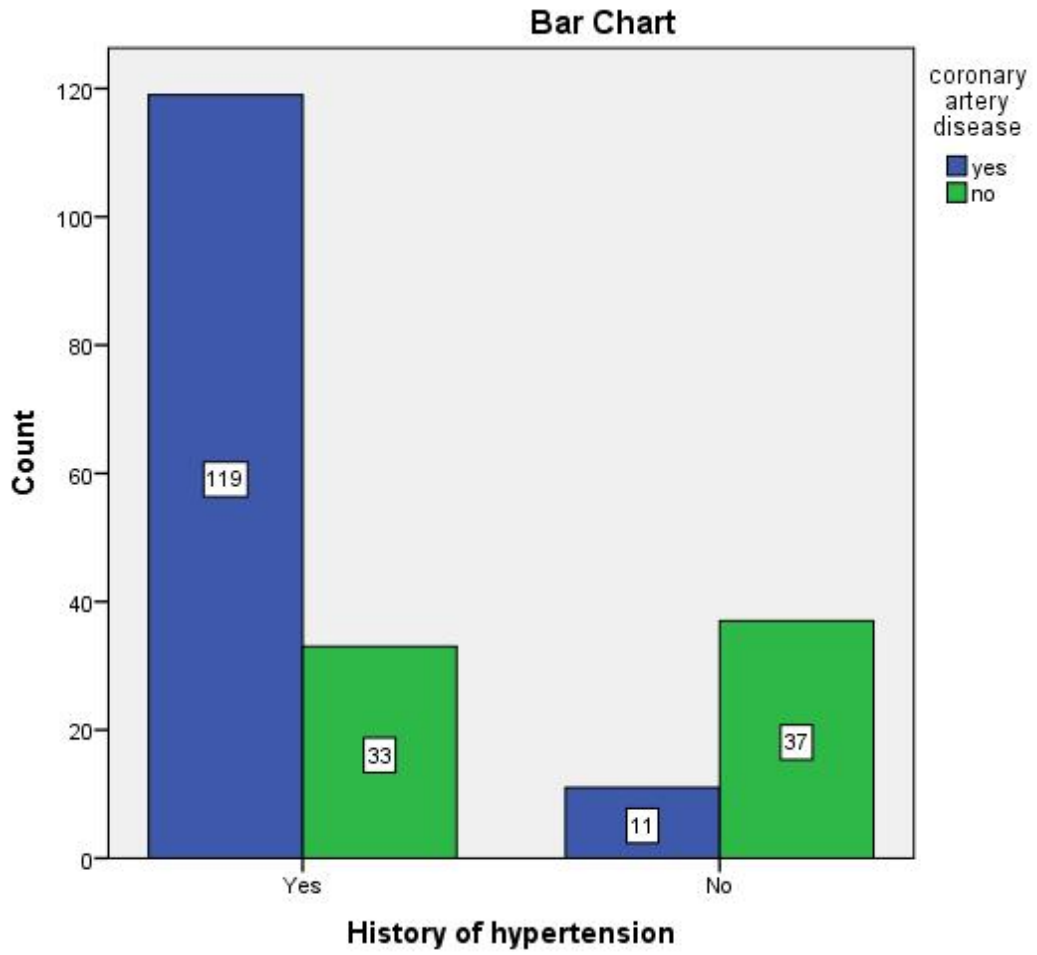
4.2 History of hypertension with CAD.

Table 3: *Chi-Square Tests for history of HTN with CAD*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	49.166[a]	1	.000		
Continuity Correction[b]	46.762	1	.000		
Likelihood Ratio	48.246	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	48.920	1	.000		
N of Valid Cases	200				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.80.

b. Computed only for a 2x2 table



Among 152 hypertensive participants the percentage of CAD participants were 78%, and out of 48 non hypertensive participants the percentage of CAD participants were 22%. As P value is less than 0.05(0.00) the test is highly significant, hence hypertension is associated with CAD.

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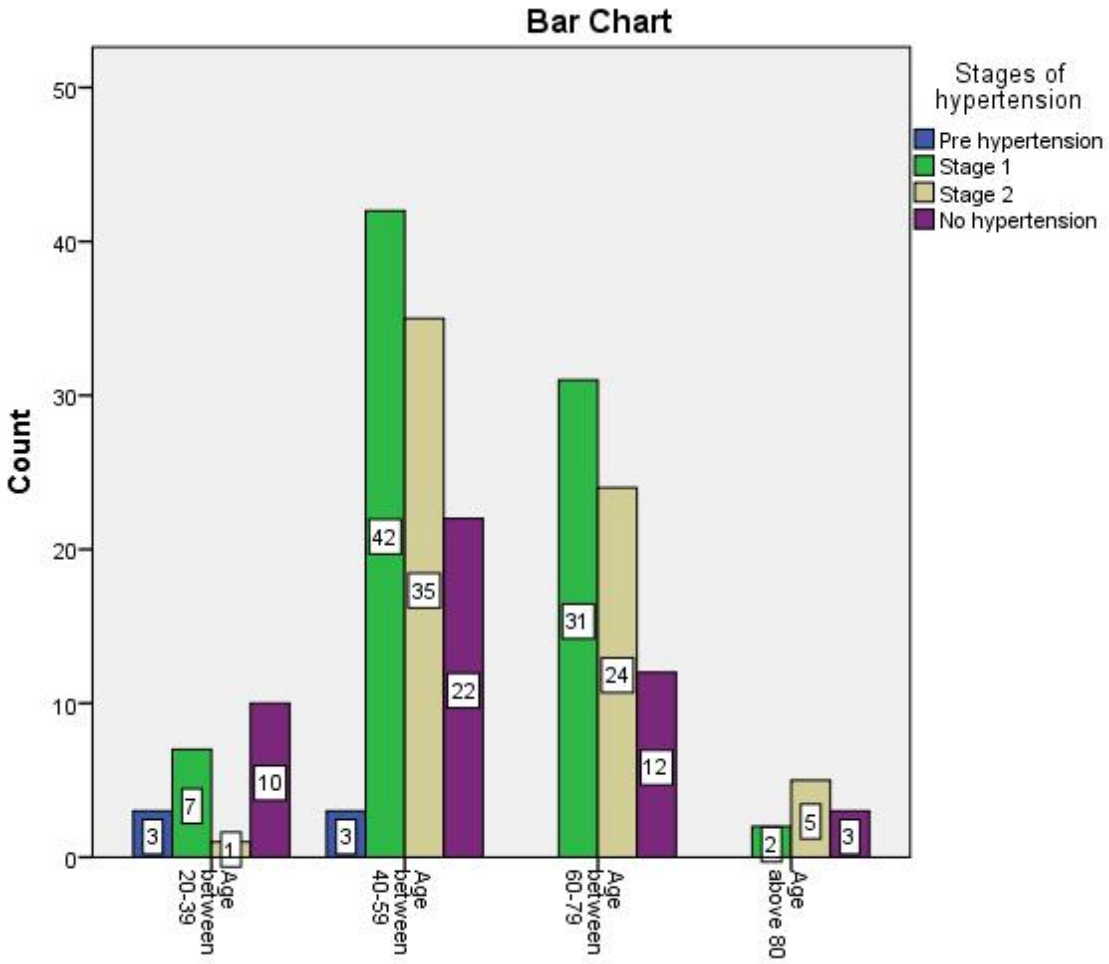
4.3 Stages of hypertension in different age groups



A total of 200 participants having CAD with different age groups took part in the study. In age group 1(20-39yrs) 3 members were having prehypertension, 7 were hypertensive stage 1, 1 was stage 2 hypertensive and 10 members were non hypertensive. In age group 2 (40-59 yrs) 3 were having prehypertension, 42 were hypertensive stage 1, 35 were stage 2 and 22 were non hypertensive. In age group 3(60-79) 31 participants were stage 1 hypertensive, 24 were stage 2 and 12 were non hypertensive. While in age group

4(above 80yrs) 2 candidates were hypertensive class 1, 5 were stage 2 hypertensive and 3 were non hypertensive.

4.4 Lipid profile with CAD

Table 4: *Chi-Square Tests for lipidemic status*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	32.967[a]	1	.000		
Continuity Correction[b]	31.232	1	.000		
Likelihood Ratio	32.926	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	32.802	1	.000		
N of Valid Cases	200				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 26.25.

b. Computed only for a 2x2 table

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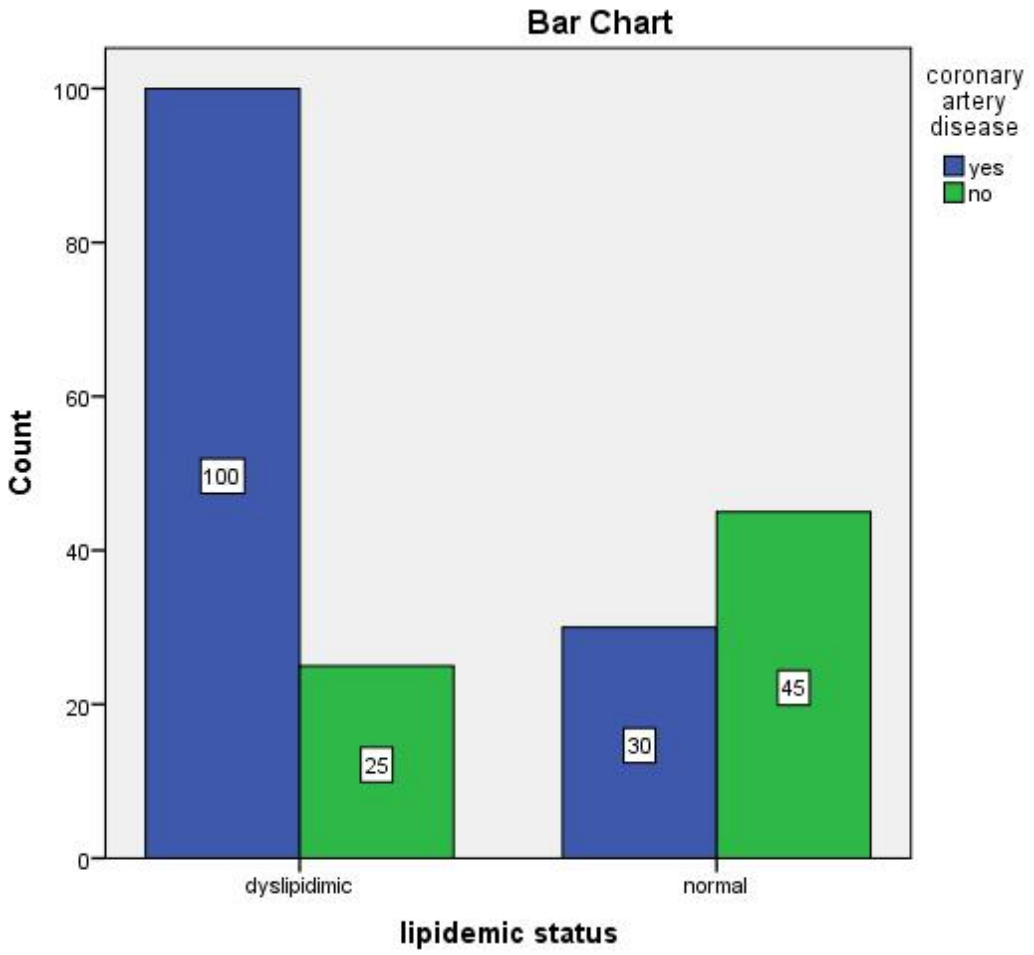

Out of 125 dyslipidemic participants the percentage of CAD was 80%, and among 75 normal lipidimic participants the percentage of CAD was 40%. As P value is less than 0.05(0.00) the test is highly significant which shows lipid profile has association with CAD.

5. Discussion

My study shows very high prevalence of hypertension and altered lipid level among research participants having CAD. This trend correlate with research done in Pakistan, India, china, and japan, as well as in Africa.

5.1 Age groups and CAD: To study age wise distribution of Coronary Artery Disease risk factors the data for this study was collected from Baroda Heart Institute & Research Centre (BHIRC) India. The total 208 patients were considered for study of CAD. The majority of the patients were from age group of 60-69 years i.e. 67 (32.21%) and only 10 patients (4.32%) were in the age group of ⩾80 years. Amongst all patients, 93.27% were lacking exercise, 39.42% were hypertensive, 28.85% were obese, 27.88% diabetic, 10.58% had family history of CAD and 5.28% were smokers**(16)**

5.2 Gender and CAD: To investigate whether women presenting with suspected angina would show less severe coronary artery disease in than men as determined by the extent score we examined 994 participants of the Australian Heart Eye Study presenting for coronary angiography in the investigation of chest pain from June 2009 to February 2012. Women compared to men without infarction had a lower burden of CAD with up to 50% having normal coronary arteries in the 30–44 year group and 40% in the 45–59 year group. Compared to men, women with chest pain had lower mean extent scores (19.6 vs 36.8; P b 0.0001) and lower vessel scores (0.7 v 1.3; P b 0.0001). Although the mean extent score was lower in women than men with myocardial infarction, this was not statistically significant (34.8 vs 41.6 respectively; P = 0.18**)(17)**

5.3 Lipid profile and CAD: 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 in india with the aim to assess the changes in the lipid profile of

coronary heart disease patients. It was found that the total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides concentrations were significantly higher ($p < 0.05$) in coronary heart disease patients. **(13)**

5.4 Hypertension and CAD: The present study evaluated the effect of hypertension (HT), dyslipidemia and diabetes mellitus (DM) on the development of coronary atherosclerosis in the Japanese population, using a cross-sectional study of 433 patients (254 men and 179 women) aged 30 years or older who underwent coronary angiography for suspected or known coronary heart disease angina at 5 cardiology departments in the Fukuoka area between September 1996 and August 1997. Patients with a disease duration of 6 months or more were excluded. The main outcome measure was angiographically defined coronary artery stenosis and was found to a significant degree in 146 patients (33.7%). HT, DM, low levels of high-density lipoprotein cholesterol (HDL-C) and hypertriglyceridemia remained as significant coronary artery disease (CAD) risk factors even after controlling for age, sex, hospital, smoking, alcohol use, body mass index and leisure time physical activity. However, hypercholesterolemia was not a significant risk factor after adjusting for these variables. After controlling for these variables, DM, low HDL-C and hypertriglyceridemia were significant CAD risk factors for men, but only DM was a significant CAD risk factor in women. These results indicate that in Japan DM, low HDL-C and hypertriglyceridemia may be more important CAD risk factors than hypercholesterolemia **(14).**

6. Conclusion

- Conclusion of my study is the prevalence of hypertension and altered lipid profile is high among participants having CAD.
- Hypertension is the main risk factor for coronary artery disease.

- Low level of HDL, high level of cholesterol, LDL and triglyceride are the risk factors for plaque formation and blockage of the coronary vessels.
- Among gender men are at high risk for coronary artery disease as compared to women this trend may probably due to some other factors which need to be further studied and evaluated.

Recommendations. Hypertension and dyslipidemia is high risk factors for coronary artery disease. It should be treated in first stage before it may lead to cardiovascular problems.

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