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**Original Research Article**

# Association of Coronary Artery Disease with Hypertension, Diabetes and Chronic Kidney Disease

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**Abstract:** ***Background*:** It is well known that patients with chronic hypertension (HTN), diabetes mellitus (DM) and kidney disease (CKD) have a strong risk of coronary artery disease. However, the excess risk of coronary artery disease in patients with CKD is only somewhat explained by the presence of traditional risk factors, such as hypertension and diabetes mellitus. ***Objective*:** To find out the association between coronary artery diseases who have hypertension, diabetes, and chronic kidney disease. ***Methodology*:** This prospective observational study was conducted in a Tertiary medical college Bangladesh, the department of Cardiology, Dhaka Medical College, Bangladesh during the period from July 2021 to June 2022. Total 150 patients with coronary artery disease were included as the study subjects for this study. ***Results*:** The majority of patients were above 60 years (49%), and 40-59 years old (37%), followed by 18-39 years (35%). The female patients (n=79) were 65.3%% and male patients (n=42) were 34.7%. Gender, age and DM, P value was significant with hypertension, diabetes mellitus, and chronic kidney disease among coronary artery disease patients. Hypertension and DM also significant with predictors of chronic kidney disease (CKD) on a representative sample of adults. ***Conclusion*:** In Bangladesh, coronary artery disease is currently a serious public health issue. The increased rate of CAD is assumed to be caused by rapid lifestyle changes, harmful behaviors like smoking and sedentary behavior, economic development, nutritional variables, and a higher prevalence of hypertension, diabetes, and CKD. To get more granular results, we would advise conducting comparable more experiments with bigger samples in more places.*

**Keywords:** Coronary artery diseases, hypertension, DM, Kidney diseases.



## INTRODUCTION

Chronic hypertension (HTN), diabetes mellitus (DM) and kidney disease (CKD) have a strong risk of coronary artery disease (CAD). However, the excess risk of coronary artery disease in patients with CKD is only somewhat explained by the presence of traditional risk factors, such as hypertension and diabetes mellitus. The higher blood pressure levels, the more risk for other health problems [1]. Globally, the prevalence of diabetes mellitus (DM) has reached epidemic proportions and is growing [2, 3].

A diagnosis of diabetes has the same serious consequences as a diagnosis of coronary artery disease (CAD). Cardiovascular mortality rises equally in all age categories and for both sexes with diabetes

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or a history of myocardial infarction (MI), and the two are highly synergistic [4]. Chronic kidney disease is an independent risk factor for coronary artery disease (CAD) [5]. Coronary artery disease is the leading cause of morbidity and mortality in patients with CKD [6]. Coronary artery disease (CAD) is one of the most common causes of mortality and morbidity in both developed and developing countries. WHO ranked CAD third global burdened and leading fatal disease [7- 9].

As World Health Organization mentioned CVDs are the number one causes of death globally so annually more people were died from CVDs than from any other cause, which is estimated 17.9 million people died [10]. Non-communicable illnesses cause 60% of all death and 47% of the global disease burden; these rates are anticipated to escalate [11].

Almost half of the adult disease burden in South Asia is attributable to non-communicable diseases. And here NCDs account for an estimated 59% of total deaths in Bangladesh - 886,000 deaths a year. In Bangladesh, 48% of men smoke; 20% of men and 32% of women have raised blood pressure.

## OBJECTIVE

To find out the association between coronary artery disease who have hypertension, diabetes, and chronic kidney disease.

## METHODOLOGY

This prospective observational study was conducted in the department of Cardiology, Dhaka Medical College, Bangladesh during the period from July 2021 to June 2022. A total 150 patients with coronary artery disease were included as the study subjects for this study. This study was approved by the ethical committee of the mentioned hospital. According to the inclusion criteria of this investigation, only echocardiography-detected coronary artery disease patients were enrolled as study participants. Patients with cardiomyopathy and/or concurrent valvar heart disease were excluded from this study, per the exclusion criteria. The individuals' ages, sexes, cardiovascular disease risk factor profiles, smoking histories, and BMIs were recorded. Patients with total cholesterol >240 mg/dl, triglyceride level>150 mg/dl, low-density lipoprotein (LDL) level>130 mg/dl, and high-density lipoproteins level 126 mg/dl (7.0 mmol/L) or 2-hours postprandial glucose >200 mg/dl (11.1 mmol/L) were diagnosed with diabetes mellitus. In this study, hypertension was defined as systolic blood pressure (SBP)>140 mmHg and/or diastolic blood pressure (DBP) >90 mmHg and/or being on anti-hypertensive medication. Family history of CAD was taken. BMI >25 was considered as the obesity. As the clinical manifestations, left ventricular ejection fraction (EF), hematologic indices, and treatment strategy were reported. A predesigned questionnaire was used in data collection. All data were collected, processed and analyzed by using MS Office Excel and SPSS version 23 programs as per need.

## RESULTS

Out of total 150 patients, the patient's ages range was from 18 to 59 years. The majority of patients were above 60 years (40.5%), and 40-59 years old (30.6%), followed by 18-39 years (28.9%). The female patients (n=98) were 65.3%% and male patients (n=52) were 34.7%. The male female ratio was 2.18:1.66. According to the analysis, sex, age and DM, P value was significant with hypertension, diabetes mellitus, and chronic kidney (CKD) disease among coronary artery disease patients. Hypertension and DM also significant with predictors of chronic kidney disease (CKD) on a representative sample of adults. The following tables shows in details.

**Table 1: Socio-demographic characteristics profile of the Patients (N=150)**

| Variables | Frequency(n) | Percentage (%) | 95% Cl |
|---|---|---|---|
| **Age group (years)** | | | |
| 18-39 yrs. | 43 | 28.9% | 21.05-37.87 |
| 40-59 yrs. | 46 | 30.6% | 22.53-39.61 |
| ≥60 yrs. | 61 | 40.5% | 31.67-49.80 |
| **Sex** | | | |
| Male | 52 | 34.7% | 26.29-43.90 |
| Female | 98 | 65.3% | 56.10-73.71 |
| Male Female Ratio | 2.18:1.66 | | |

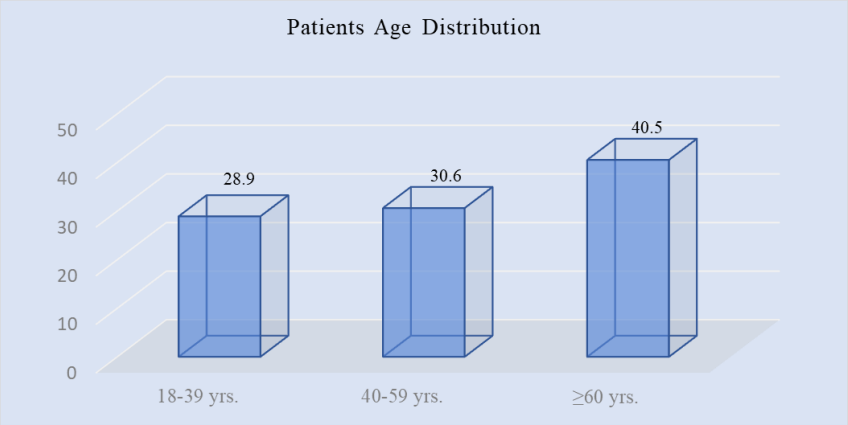


**Figure 1: Bar chart showed the age distribution of the Patients (N=150)**

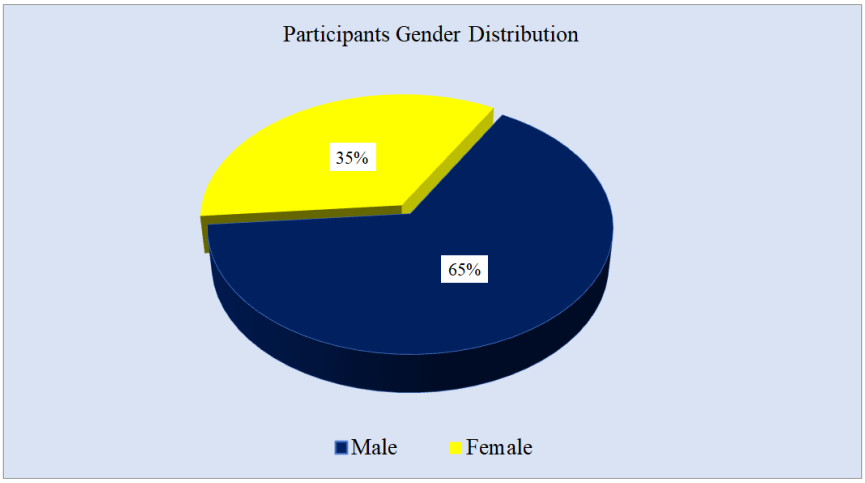


**Figure 2: Bar chart showed sex wise distribution of the Patients (N=150)**

**Table 2: Frequencies of Hypertension, Diabetes Mellitus, and Chronic Kidney Disease among Coronary Artery Disease Patients (N=150)**

| **Variables** | **Frequency (%)** | | **P-value** |
|---|---|---|---|
| **Sex** | | | |
| Male (n=101) | 53(91.4%) | 48(52.2%) | 0.001 |
| Female (n=49) | 5(8.6%) | 44(47.8%) | |
| | Male | Female | |
| **Age** | | | |
| <60 Years (n=96) | 47(49.0%) | 49(51.0%) | 0.001 |
| >60 Years (n=54) | 11(20.37%) | 43(79.63%) | |
| Diabetes Mellitus | Male | Female | |
| Yes (n=35) | 19(54.3%) | 16(45.7%) | 0.290 |
| No (n=115) | 37(32.17%) | 78(67.83%) | |
| **Hypertension(HTN)** | | | |
| Yes (n=23) | 9(39.13%) | 11(47.83%) | 0.001 |
| No (n=127) | 36(28.35%) | 91(71.65%) | |
| **CKD** | | | |
| Yes (n=19) | 21(14.3%) | 129(85.7%) | 0.011 |
| No (n=131) | 17(11.4%) | 133(88.6%) | |

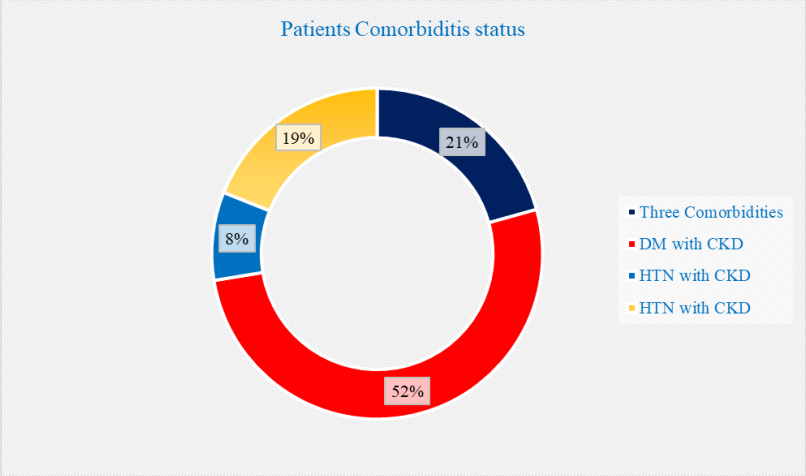


**Figure 2: Bar chart showed others comorbidities of the Patients (N=150)**

**Table 3: Socio-demographic characteristics of a representative by presence or absence of CKD (N=150)**

| Variables | All | With CKD | | Without CKD | |
|---|---|---|---|---|---|
| | n | n | % | n | % |
| **Sex** | | | | | |
| Male | 98 | 24 | 14.3% | 126 | 84.0% |
| Female | 52 | 17 | 11.4% | 24 | 16.0% |
| **Age group (years)** | | | | | |
| 18-39 yrs. | 43 | 4 | 8.6% | 39 | 91.4% |
| 40-59 yrs. | 46 | 1 | 3.0% | 45 | 97.0% |
| ≥60 yrs. | 61 | 13 | 20.8% | 48 | 79.2% |

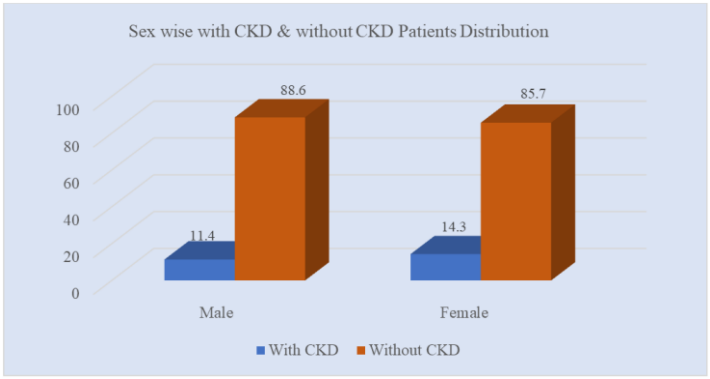


**Figure 4: Bar chart showed sex wise with CKD & without CKD of Patients (N=150)**

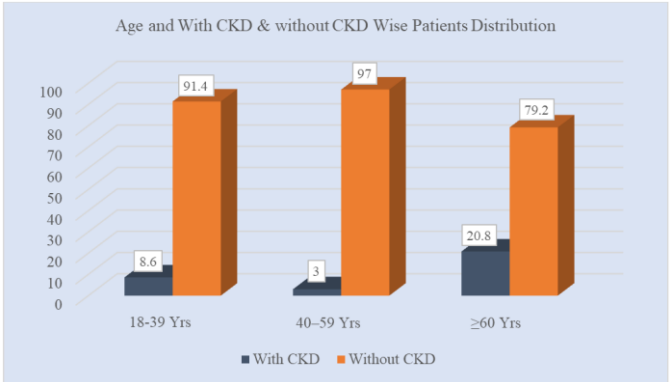


**Figure 5: Bar chart showed sex and age with CKD & without CKD of Patients. (N=150)**

**Table 4: Evaluated predictors of chronic kidney disease (CKD) of the Patients (N=150)**

| | CKD YES | | CKD NO | | OR | 95% Cl | P-value |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | | | |
| **Tobacco smoking** | | | | | | | |
| Yes | 3 | 25.0 | 9 | 75.0 | 2.69 | 0.63-11.34 | 0.16 |
| No | 12 | 11.0 | 97 | 89.0 | | | |
| **Chronic NSAID use** | | | | | | | |
| Yes | 7 | 14.0 | 43 | 86.0 | 1.28 | 0.43-3.79 | 0.65 |
| No | 8 | 11.3 | 63 | 88.7 | | | |
| **Family history of CKD** | | | | | | | |
| Yes | 0 | 0.0 | 3 | 100.0 | | | 0.50 |
| No | 15 | 12.7 | 103 | 87.3 | 0.00 | - | |
| **Hypertension** | | | | | | | |
| Yes | 9 | 20.9 | 34 | 79.1 | 3.17 | 1.04-9.64 | 0.03 |
| No | 6 | 7.7 | 72 | 92.3 | | | |
| **Diabetes mellitus** | | | | | | | |
| Yes | 6 | 42.9 | 8 | 57.1 | 8.16 | 2.31-28.77 | 0.00 |
| No | 9 | 8.4 | 98 | 91.6 | | | |
| **Overweight or obesity** | | | | | | | |
| Yes | 9 | 11.0 | 73 | 89.0 | 0.67 | 0.22-2.06 | 0.49 |
| No | 6 | 15.4 | 33 | 84.6 | | | |

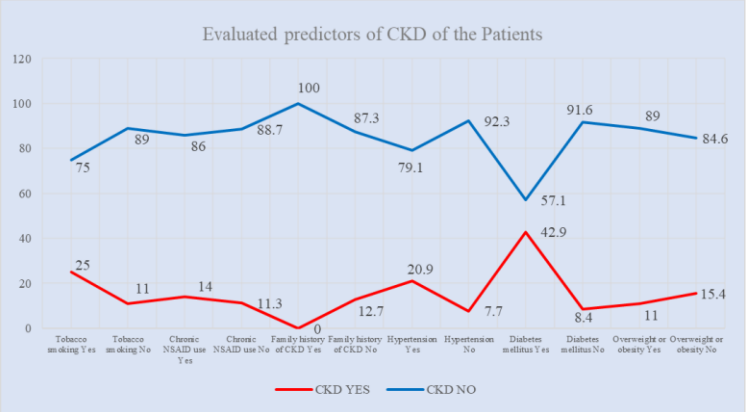


**Figure 6: Line chart showed predictors of CKD on of the Patients (N=150)**

## DISCUSSION

The study was aimed to evaluate the frequencies of having hypertension, diabetes mellitus and chronic kidney disease among coronary artery disease patients. Some studies have already revealed that, the prevalence of coronary artery disease is increasing along with the rising prevalence of its conventional risk factors in Bangladesh. In this study, we observed that, the highest number of patients were from above 60 years` age group which was 40.5%. Besides this, 30.6% and 40.5% were from 18-39 and 40-5 year's age groups respectively which was noticeable. In this study, among total patients of DM 35%, hypertension, 15% and CKD 13%. Among them 12% were with all the three comorbidities, 30% were with diabetes and CKD, 5% were with hypertension and CKD and 11% were with hypertension & diabetes. Diabetes mellitus was present in 43% in a study population, was also found as a major risk factor for CAD and was well known to have an adverse influence on the prognosis. As per the report of a previous study, patients with CKD are under-represented in clinical trials and as such the evidence to support recommendations is limited which also reflected in our study.

Although we found patients with CKD in a lower number than other diseases but the mortality and morbidity are usually found higher in cases with the associations of CKD in several studies. As per the findings of some other studies, cardiovascular disease (CVD) was found as the main cause of morbidity and mortality in CKD. So, findings of this study may not reflect the exact scenario of the whole country. At a younger age, coronary artery disease (CAD) is more aggressive [12].

The mean age of the study participants was close to that reported by Maqbool Jafary *et al.,* [13] Sahed *et al.,* [14] (in Pakistan), and COURAGE trial [15] (conducted in the USA), which found that the average age of participants was 62 years. In our study, men made up the majority of participants, with a male-to-female ratio of 3.5:1. According to several studies, CAD primarily affects men [16, 17].

The two other main risk factors for CAD, hypertension and dyslipidemia, were reported to be 35% and 60%, respectively, in patients with CAD [18, 19. In a research population, 16% of participants had diabetes mellitus, which was also identified as a significant risk factor for CAD and was known to have a negative impact on prognosis [20].

Patients with CKD are underrepresented in clinical trials, and as a result, there is little data to support recommendations, which was also reflected in our analysis, according to the report of a prior study [21].

Although we identified fewer patients with CKD than with other diseases, studies have shown that mortality and morbidity are typically higher in patients with CKD relationships. According to some other research findings, cardiovascular disease (CVD) was discovered to be the leading cause of morbidity and mortality in individuals with ESRD (end-stage renal disease) or CKD [22].

## CONCLUSION

Coronary artery disease is now a major health concern in Bangladesh. Rapid changes in lifestyle, unhealthy habits such as smoking, sedentary lifestyle, economic development, dietary factors, and a higher prevalence of hypertension, diabetes, and CKD are thought to be responsible for the rising rate of CAD. According to the findings of this study we observed a significant association between coronary artery disease between hypertension, diabetes and chronic kidney diseases. We would recommend conducting similar more studies with larger sized samples in multiple locations to obtain more specific findings.

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