Frequencies of Hypertension, Diabetes Mellitus, and Chronic Kidney Disease Among Coronary Artery Disease Patients : A prospective observational study

ABSTRACT

Background*:* Coronary artery disease (CAD) has emerged as a significant cause of both mortality and morbidity in both developing and developed nations. Among the various comorbidities associated with CAD patients, hypertension, diabetes mellitus, and chronic kidney disease (CKD) are of notable concern. However, there is limited research-based information available regarding the prevalence of these conditions among individuals with coronary artery disease. Aim of the Study: This study aimed to assess the prevalence rates of hypertension, diabetes mellitus, and chronic kidney disease among patients diagnosed with coronary artery disease. Methods: Conducted as a prospective observational study, the research took place in the Department of Cardiology at Sheikh Hasina Medical College, Tangail, Bangladesh, spanning from June 2020 to May 2021. The study included 63 patients diagnosed with coronary artery disease, selected through purposive sampling techniques. Demographic and clinical data were collected using a predefined questionnaire and processed using MS Office software. Results: Among the participants, the analysis revealed that 10% had hypertension, 7% had diabetes, and 6% had chronic kidney disease as standalone conditions. Additionally, comorbidities such as hypertension with diabetes, hypertension with CKD, and diabetes with CKD were present in 11%, 8%, and 6% cases, respectively. Furthermore, 5% of participants exhibited all three conditions (hypertension, diabetes, and CKD), while 47% did not have any of these comorbidities. Conclusion: Hypertension has become the most common accompanying health condition among patients with coronary artery disease when examined separately.More than half of the CAD patients exhibited one or more of the comorbidities, including hypertension, diabetes mellitus, or CKD.

Keywords: Chronic kidney disease, CKD, Coronary artery disease, CAD, Hypertension, Diabetes mellitus

1. INTRODUCTION

In recent times, cardiovascular disease (CVD) has become a significant health challenge, especially in developing nations [1]. Among the different heart-related illnesses, coronary artery disease (CAD) is notably prominent as a primary cause of death and illness in both developed and developing nations. According to recent epidemiological research, it is anticipated that over 50% of the worldwide burden of cardiovascular diseases will be concentrated in the Indian subcontinent in the next few decades [2]. A recent study emphasized that countries in South Asia, such as Bangladesh, experience the highest occurrence of coronary artery disease globally [3]. According to the global burden of disease study, the South Asian region, by the year 2020, was projected to have the highest number of patients with atherosclerotic coronary artery disease compared to other parts of the world [4]. However, specific data regarding various aspects of CAD in Bangladesh are limited, despite its high prevalence in the country [5]. Among individuals of Asian Indian descent, CAD tends to manifest at an earlier stage with more extensive angiographic involvement due to a combination of genetic, metabolic, and both conventional and unconventional risk factors [6,7]. A study conducted "in Bangladesh found that diabetes mellitus was the only risk factor in 7.13% of cases, and when combined with hypertension, it affected 22.25% of patients" [8]. Additionally, various studies have identified diabetes mellitus, hypertension, and chronic kidney disease (CKD) as noteworthy comorbidities and risk factors linked to coronary artery disease. This research aimed to assess the prevalence rates of hypertension, diabetes mellitus, and chronic kidney disease among individuals diagnosed with coronary artery disease.

2. METHODOLOGY

This study, conducted between June 2020 and May 2021 at the Department of Cardiology, Sheikh Hasina Medical College, Tangail, Bangladesh, employed a prospective observational approach. A total of 63 participants diagnosed with coronary artery disease (CAD) were enrolled, identified through echocardiography based on the inclusion criteria. Individuals with cardiomyopathy or concurrent valvular heart disease were not included in the study. The research received ethical approval from the hospital's ethics committee, and informed

consent was obtained from all participants, following the ethical standards outlined in the Helsinki Declaration [9] and the General Data Protection Regulation (GDPR) [10]. Data collected included age, gender, smoking history, CAD risk factors, and body mass index (BMI). Dyslipidemia was defined as patients on lipid-lowering agents or with total cholesterol levels >240 mg/dl, triglycerides >150 mg/dl, low-density lipoprotein (LDL) >130 mg/dl, and high-density lipoproteins <50 mg/dl (Female) and <40 mg/dl (Male). Diabetes mellitus was diagnosed with fasting blood sugar levels >126 mg/dl (7.0 mmol/L) or 2-hour post-prandial glucose levels >200 mg/dl (11.1 mmol/L). Hypertension was determined by systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg and/or use of antihypertensive medications. Obesity was defined as BMI >25. The study also documented clinical manifestations, hematologic indices, left ventricular ejection fraction (EF), and treatment strategies. Data were collected and analyzed using a pre-designed questionnaire and MS Office software.

3. RESULT

In this study involving 63 participants, 66% were male, while the remaining 34% were female, indicating a male predominance with a ratio of 2:1. Examination of participants' ages revealed that the majority (48%) fell within the 41-50 years age group. Additionally, 18% and 23% belonged to the 30-40 years and 51-60 years age categories, respectively, which is noteworthy. Regarding the extent of coronary artery disease (CAD), 34% had single vessel involvement, 20% had double vessel involvement, 28% had triple vessel involvement, 17% had normal coronary arteries, and 1% had insignificant CAD. The study also provided mean measurements for various parameters, including waist circumference (89.31 cm), hip circumference (104.52 cm), fasting blood sugar (FBS) levels (7.38 mmol/l), and HbA1C levels (6.57). Additionally, mean values for total cholesterol (172.36 mg/dl), low-density lipoprotein (LDL) levels (113.62 mg/dl), high-density lipoprotein (HDL) levels (35.78 mg/dl), and triglycerides (186.39 mg/dl) were reported. Serum creatinine levels were measured at 1.5 mg/dl, and erythrocyte sedimentation rate (ESR) was recorded as 27.34 mm in the first hour. Regarding comorbidities, the analysis revealed that 10% of participants had hypertension, 7% had diabetes, and 6% had chronic kidney disease (CKD) as standalone conditions. Additionally, 11% had both hypertension and diabetes, 8% had hypertension and CKD, and 6% had diabetes and CKD. Remarkably, in 5% of cases, all three conditions (hypertension, diabetes, and CKD) were present, while 47% of participants were free from these diseases.

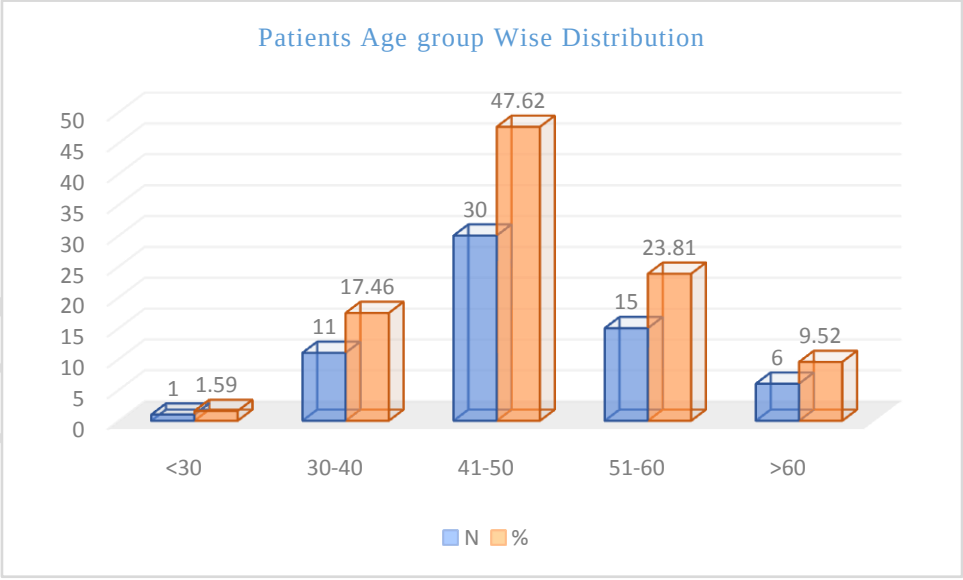

Figure 1: Distribution of participants as per age in the year. (N=63)

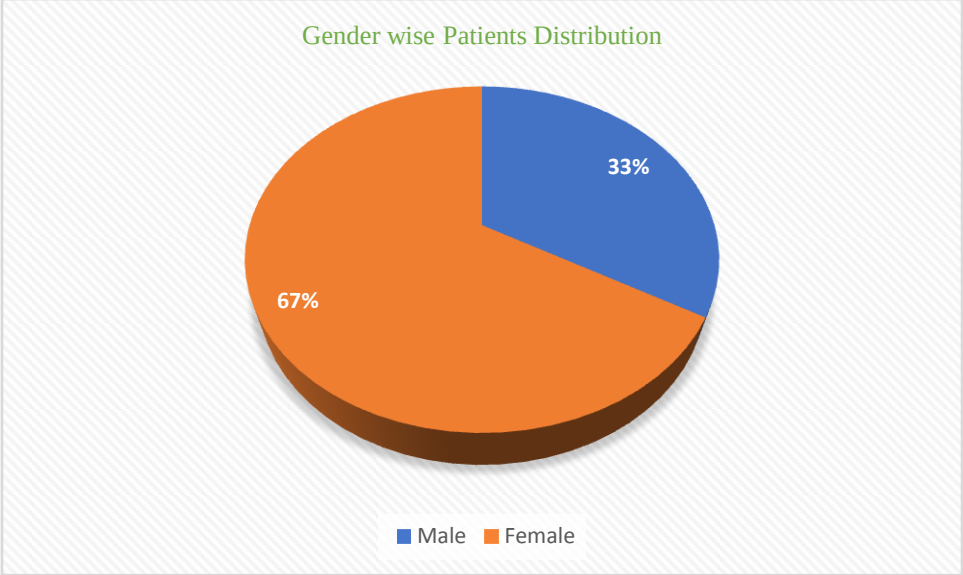

Figure 2: Distribution of participants as per gender. (N=63)

Table 1: Extent of disease among participants. (N=63)

Extent of disease	n	%
Single vessel	21	33.33
Double vessel	12	19.05
Triple Vessel	18	28.57
Normal coronaries	11	17.46
Insignificant CAD	1	1.59

Table 2: General laboratory findings among participants. (N=63)[23]

Variable	Mean	SD
Waist Circumference(cm)	88.31	12.42
Hip Circumference(cm)	104.52	19.06
FBS (mmol/l)	7.38	1.11
HbA1C	6.57	1.28
T. Cholesterol (mg/dl) (%)	172.36	32.34
LDL (mg/dl)	113.62	23.42
HDL (mg/dl)	35.78	6.37
TG (mg/dl)	186.39	26.18
S creatinine (mg/dl)	1.5	0.1
ESR (mm in 1st hour)	27.34	3.21

Table 3: Hypertension, diabetes and CKD distribution among participants. (N=63)

Diseases	n	%
Only hypertension	6	9.52
Only diabetes	4	6.35
Only CKD	4	6.35
Hypertension & diabetes	7	11.11
Hypertension & CKD	5	7.94
Diabetes & CKD	4	6.35

Hypertension, diabetes and CKD	3	4.76
Free from 3 diseases	30	47.62

4. DISCUSSION

This study aimed to investigate the prevalence of hypertension, diabetes mellitus, and chronic kidney disease among patients diagnosed with coronary artery disease (CAD). Several studies have noted an increase in CAD cases in Bangladesh, coinciding with the rise in conventional risk factors [9]. In our research, we observed that a significant portion (48%) of patients fell within the 41-50 years age group, with 18% and 23% in the 30-40 and 51-60 years age groups, respectively. This trend indicates a propensity for CAD to manifest aggressively at a younger age [10]. The mean age of our study participants was comparable to similar studies conducted by Maqbool Jafary et al. [11], Sahed et al. [12], and the COURAGE trial in the USA [13]. In our study, there was a notable male predominance, with a male-female ratio of 2:1, consistent with reports suggesting CAD as primarily affecting men [14,15]. Analyzing the comorbidities, we found that 10% of participants had hypertension, 7% had diabetes, and 6% had chronic kidney disease as individual conditions. Combinations such as hypertension with diabetes, hypertension with CKD, and diabetes with CKD were present in 11%, 8%, and 6% cases, respectively. In 5% of cases, all three conditions (hypertension, diabetes, and CKD) coexisted, while 47% of participants had none of these diseases. Additionally, hypertension and dyslipidemia have been recognized as significant risk factors for CAD [16,17], with their prevalence reported as 35% and 60% in CAD patients [18]. Diabetes mellitus, present in 16% of our study population, is also a well-established risk factor for CAD, affecting prognosis adversely [19]. Patients with chronic kidney disease (CKD) have been underrepresented in clinical trials, leading to limited evidence supporting recommendations, a trend mirrored in our study [20]. The findings of our research could provide valuable insights for future studies in this area.

Limitation of the study:

The study was carried out at a solitary facility and included a comparatively limited number of participants. Moreover, the research period was short. Consequently, the outcomes might not accurately represent the overall situation across the entire country.

5. CONCLUSION & RECOMMENDATION

According to the results obtained from this study, it can be inferred that hypertension stands out as the most common comorbidity among patients diagnosed with coronary artery disease when considered as a singular additional health condition. Additionally, over half of the individuals with coronary artery disease exhibit one or more comorbidities, including hypertension, diabetes mellitus, or chronic kidney disease. To obtain more precise and detailed findings, we suggest conducting similar research in multiple locations with larger and more diverse sample sizes.

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