Spectrum of Cardiovascular Diseases in the Cardiology Unit of Bharatpur Hospital

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ABSTRACT

Background: Cardiovascular diseases (CVDs) are a leading cause of morbidity and mortality worldwide and its burden is on rise. CVDs encompass a range of disorders, including ischemic heart disease, valvular heart diseases, heart failure, arrhythmias, and hypertensive heart disease. Understanding the patterns of CVDs in our setting, where advanced interventional care is unavailable, can inform strategies for improving patient care, optimizing resources, and guiding healthcare policy. The study aimed to evaluate the spectrum of cardiovascular diseases (CVDs) in the cardiology unit of Bharatpur Hospital.

Methods: A retrospective observational study was designed and conducted at the cardiology unit of Bharatpur Hospital from September 1, 2023, to August 31, 2024. A total of 294 subjects were included in the study. Data were collected from hospital records and cardiovascular conditions were categorized into major groups: heart failure, ischemic heart disease, valvular heart diseases, arrhythmias, hypertensive heart disease. Descriptive statistics were used to analyze the data, with continuous variables summarized as means and standard deviations, and categorical variables presented as frequencies and percentages..

Results: Mean ±SD of age was 65.2± 12.8 years. Hypertension (40.14%), diabetes mellitus (29.93%), and smoking (25.17%) were the common comorbidities. Among cardiovascular conditions, heart failure was the commonest (46.60%) followed by ischemic heart Disease (18.03%), valvular heart disease ((16.33%) and hypertensive heart disease: (6.46%). Arrhythmias was noted in 6.12% with paroxysmal supraventricular tachycardia as the commonest one. In-hospital mortality was 6.12%, highest in those with decompensated heart failure and advanced valvular heart disease.

Conclusion: The study highlights the significant burden of heart failure, ischemic heart disease and valvular heart disease in cardiology unit. Other less common conditions included hypertensive heart disease and arrhythmias. The study emphasizes the need for improving cardiovascular disease management, advocating for the establishment of advanced interventional cardiology facilitiesand better management strategies for chronic risk factors.

Keywords: *cardiovascular disease; spectrum; heart failure; ischemic heart disease.*

INTRODUCTION

Cardiovascular diseases (CVDs) are among the leading causes of morbidity and mortality globally, accounting for an estimated 17.9 million deaths each year.[1] In recent decades, the burden of CVDs has steadily increased, particularly in low- and middle-income countries where health systems often face challenges in managing complex and resource-intensive conditions.[2] The spectrum of cardiovascular diseases encompasses a variety of conditions including ischemic heart disease, valvular hear diseases, heart failure, arrhythmias, hypertensive heart disease, and other less common cardiac conditions, each with its own set of clinical and management challenges. Understanding the spectrum and characteristics of these diseases in specific healthcare settings can provide valuable insights for improving diagnosis, treatment, and resource allocation. In hospitals with dedicated cardiology units, such as Bharatpur Hospital with a 500-bedded facility including a coronary care unit (CCU) and cardiology ward, patterns in CVD presentations may reflect broader epidemiological trends as well as local healthcare capacities. Moreover, this information can be crucial for further planning as there is no catheterization laboratory at present and being considered in near future. So, we designed this study to evaluate the spectrum of various cardiiovascular diseases in current context in our unit.This study focuses on the spectrum of cardiovascular diseases observed in the coronary care unit and cardiology ward of a hospital with 10 beds specifically allocated to cardiology but without an advanced mode of cardiology care – catheterization laboratory. By examining the types, frequencies, and outcomes of CVD cases in this setting, we aim to shed light on the burden and clinical characteristics

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of CVDs managed within a mid-sized hospital in context without cath lab. Additionally, this analysis could serve as a reference for enhancing patient care strategies, optimizing the use of cardiology resources, and guiding policy decisions in similar healthcare settings. The data obtained can also contribute to the broader understanding of CVD patterns within resource-limited environments, helping to identify gaps in healthcare delivery and suggesting areas for targeted intervention and resource strengthening including the establishment of catheterization laboratory and other advanced modalities of coronary and cardiovascular care.

METHOD

This study was conducted in the cardiology unit of Bharatpur Hospital, a 500-bed tertiary care facility in Bharatpur, Nepal, with 10 beds specifically allocated to cardiology patients. The cardiology unit includes a coronary care unit (CCU) and a general cardiology ward, where patients with various cardiovascular conditions are admitted and managed. This descriptive, retrospective study aimed to assess the spectrum of cardiovascular diseases (CVDs) among patients admitted to this unit over a defined period. A retrospective observational study design was employed. Data were collected from patient records over a one-year period, from September 1, 2023 to August 31, 2024. The study included all patients admitted to the cardiology unit during the study period. Patients aged 15 years and older, diagnosed with any cardiovascular condition, and admitted to the CCU or cardiology ward were included in this study while patients with incomplete medical records, those transferred to other departments for non-cardiovascular conditions, noncardiac cases admitted to cardiology unit because of vacant beds and cases discharged from the emergency room without admission to the cardiology unit were excluded from the study.

Data were obtained from hospital records and included patient demographics, medical history, presenting symptoms, diagnosis, treatment interventions, and outcomes. The primary cardiovascular diagnoses were categorized into major groups, including ischemic heart disease, valvular heart diseases, heart failure, arrhythmias, hypertensive heart disease, and other less common cardiovascular conditions. Secondary data included coexisting conditions (e.g., diabetes, hypertension) and relevant laboratory and imaging findings. Descriptive statistics were used to analyze patient demographics, the frequency of various cardiovascular diagnoses, and treatment modalities. Continuous variables were summarized as means and standard deviations, while categorical variables were presented as frequencies and percentages. For data analysis, we used MS Excel 2010. Ethical approval for this study was obtained from the Institutional Review Committee of Bharatpur Hospital. As this was a retrospective study based on previously collected data, patient consent was waived. Confidentiality was strictly maintained, with all patient data anonymized prior to analysis to ensure privacy and compliance with ethical standards.

RESULTS

A total of 294 patients were admitted to the cardiology unit at Bharatpur Hospital during the study period. The demographic features are displayed in the table 1. The mean age of the patients was 65.2 years (SD ± 12.8 years), with a range from 15 to 96 years. There was a slight female predominance, with 60.54% (n = 178) female patients and 39.46% (n = 116) male patients. Comorbidities were common, with 40.14% of patients (n = 118) having a history of hypertension, 29.93% (n = 88) having diabetes mellitus, and 25.17% (n = 74) reporting a history of smoking. The distribution of primary cardiovascular diagnoses (Table 1).

Table 1. Demographic parameters of the study subjects.	
Parameters	**Values**
Mean Age	65.2±12.8
M:F Ratio	116:178
Age range (Years)	15-96
Hypertension	118 (40.14%)
Diabetes	88 (29.93%)
Smoking	74 (25.17%)

Heart failure was the most commonest cause for hospital, it was diagnosed in 46.60% (n = 137) of patients. Of these, more than 50.36% (n = 69) had

heart failure with reduced ejection fraction (HFrEF), 7.30% (n=10) had heart failure with mid rannge EF, while remaining 42.70% (n = 58) had heart failure with preserved ejection fraction (HFpEF). Majority of heart failure cases were associated with VHD, IHD and hypertensive heart diseases. The distribution of primary cardiovascular conditions are summarized in (Figure 1).
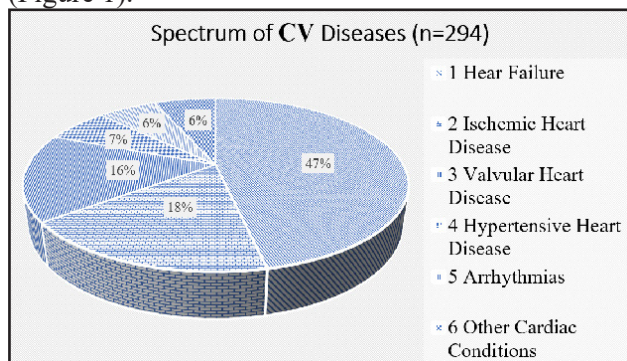

Figure 1. Distribution of primary cardiovascular (CV) disease among admitted subjects.

The Ischemic Heart Disease was the second most common, accounting for 18.03% (n = 53) of cases. Among these, 71.70% (n = 38) presented with acute coronary syndrome (ACS), including ST-elevation myocardial infarction (STEMI) in 12 patients and non-ST elevation myocardial infarction (NSTEMI) in 18 patients and 8 unstable angina. The remaining 28.3% (n = 15) had stable angina. Valvular heart disease was the next common CV diagnosis among admitted subjects, accounting for 16.33% (n=48) of cases. Mitral regurgitation was the most prevalent valvular lesion followed by tricuspid regurgitation, then aortic regurgitation followed by aortic stenosis and mitral stenosis. Multivalvular involvement was the rule, nearly 83.33%% (n=40) subjects had multiple valve involvement. Diffrentiation between rheumatic and degenerative valvular disease was not possible based on the available data. Hypertensive heart disease was identified in 6.46% (n = 19) of patients. Most of these cases were associated with uncontrolled blood pressure and all had left ventricular hypertrophy. Arrhythmias accounted for 6.12% (n=18) of admissions in cardiology unit. Paroxysmal ventricular tachycardia was the most common arrhythmia, found in 55.55% (n = 10) of these cases. Other types of arrhythmias included atrial fibrillation in 4 patients, frequent ventricular extrasystole with bigeminy in 1 and ventricular tachycardia (VT) in 1 patients. Two cases had complete heart blocks requiring permanent pacemakers and were referred to other centers. Less common conditions, including peripartum cardiomyopathies, congenital heart diseases, pulmonary hypertension, pulmonary embolism and pericardial diseases were observed in 6.46% (n = 19) of cases.

treatment and interventions
Treatment interventions varied based on diagnosis: Medical therapy, including antiplatelet agents, anticoagulants, beta-blockers, ACE inhibitors, and statins, was provided to the majority (90.14%, n = 265) of patients. As the catheterization laboratory was lacking in our setup, cases requiring intervention were referred to other centres. Most of such cases, especially requiring immediate intervention such as ST elevation myocardial infarction and ACS requiring coronary angiography were likely referred from emergency department and representation of such cases in our study might be biased. Five cases were referred to other centers for coronary intervention. Another five patients with severe valvular disease requiring surgical intervention, including valve replacement or repair were also referred to other centers. A small percentage (1.36%, n = 4) required device implantation, including permanent pacemakers (n=2) and cardioresynchronization therapy (n=2), they were referred to other centers for further needful management. The average length of hospital stay was 7.2 days (SD ± 5.1 days). In-hospital mortality was observed in 6.12% (n = 18) of the admitted patients, with the highest mortality rate seen in those with decompensated heart failure and advanced valvular heart diseases. Most patients (89.12%, n = 262) were discharged in stable condition, while 4.76% (n = 14) required referral to specialized centers for advanced care.

DISCUSSION
This study provides a comprehensive overview of the spectrum of cardiovascular diseases observed in the cardiology unit of Bharatpur Hospital, highlighting the prevalence and clinical characteristics of common conditions in a tertiary care setting in Nepal. The findings underscore the significant burden of heart failure, ischemic heart diseases, valvular heart diseases, arrhythmias and hypertensive heart diseases in our population, mirroring trends observed in both global and regional studies. The burden of ischemic heart disease in our study was low, this uniqueness, we suppose is largely due the current infrastructure and facilities available in our center; nonavailability

of catheterization laboratory and cardiothoracic surgery. Nevertheless, the understanding of the disease patterns in this context can aid in developing targeted strategies for managing cardiovascular diseases in similar resource-limited environments. Our results indicate that heart failure was the most prevalent condition, accounting for 46.6% of patients. Although the in-depth etiological differentiation of heart failure was not possible in our study, a significant number of heart failure cases had ischemic and valvular heart diseases. Notably, few studies including the update from the Global Burden of Cardiovascular Diseases (GBD) 2019 study and Ziaeian B and Fonarow GC had also reported heart failure as a significant burden among cardiovascular diseases and significant proportion of these patients had heart[6] failure with reduced ejection fraction (HFrEF), frequently associated with ischemic, valvular and hypertensive heart disease. [2,3] Studies in similar settings have also shown a comparable distribution, with ischemic heart disease and hypertension being primary contributors to heart failure. [4,5] The presence of heart failure in a substantial portion of admissions highlights the need

for enhanced outpatient and chronic care services, as well as better management of underlying conditions to prevent disease progression. IHD was the second most prevalent condition, accounting for 18.03% of admissions. This finding was in consistent with global data showing that ischemic heart disease is the leading cause of cardiovascular morbidity and mortality worldwide.[6,7] This discrepancy can be explained based on the absence of infrastructure requiring for the management of ischemic heart disease. Our center lacks catheterization laboratory, a basic requirement for the management of ischemic heart diseases. This might have caused redirection of subjects requiring interventional services to other centers with catheterization laboratory services. Comparable studies from other South Asian countries have also reported a high prevalence of IHD among admitted cardiovascular patients, likely due to shared risk factors such as hypertension, diabetes, and smoking.[5] In our study, the proportion of patients presenting with

ACS was negligible, particularly the low incidence of ST-elevation myocardial infarction. The low rate of ACS cases underscores the need for upgrading of our center in terms of infrastructure by adding advance catheterization laboratory services which can provide improved access to rapid diagnostic and therapeutic interventions and may attract needy patients to our center. VHD was the third most common condition, accounting for 16.33% of admissions. This finding is comparable to other studies conducted in various parts of the world. In a hospital-based study, the burden of valvular heart disease leading to heart failure was 15.8%, second to ischemic heart disease in Japan.[8] Another study, a population based one from USA, the prevalence increased with age, from 0.7% in 18-44 year to 13.3% (11.7-15.0) in the 75 years and older group. 9 These studies, although from the developed nations, were in par with our study. The data from the countries comparable to our setting, such as from India, are also comparable to our data showing similar burden of valvular heart disease.[10] HHD was the fourth most common conditions, accounting for 6.46% of cases in our study. Hypertensive heart disease is a significant health concern all over the world, reflecting the high prevalence of hypertension in the population. Hospital-based studies suggest that the prevalence of hypertensive heart disease varies but is notably high. The prevalence of hypertension was 18.8% in a community-based study among a professional group in Nepal.[11] A systematic review and meta-analysis indicated that the prevalence of hypertensive heart disease among patients with hypertension was around 25-40% in various studies across India.[12] This is higher than in our observation, that could be partly because of different settings in these studies and also due to omission of mild and moderate cases in our study as these mild cases were managed either in general medical wards or on OPD basis. Arrhythmias accounted for 6.12% of cases, with PSVT being the most common. This is in contrast with global trends, where atrial fibrillation is increasingly recognized as a significant[7] health concern due to its association with stroke and heart failure.[13-15] This discrepancy could be due to the

reason that most of the atrial fibrillation cases were related to heart failure or valvular heart diseases in our study and they were classified differently. The relatively low number of ventricular arrhythmias and the need for device implantation in our study could be due to biased admission of cardiovascular cases. As our center was lacking advanced equipment for the CV disease management, such cases might have been referred to other centers for the management of complex arrhythmias including advanced diagnostics and therapeutic options such as pacemaker insertion and defibrillators. Apart from these mentioned conditions, few number of subjects in our study also had peripartum cardiomyopathies, congenital heart diseases, pulmonary embolism, various pericardial diseases and pulmonary artery hypertension. The findings from this study highlight several key areas for resource allocation and service improvement. The unavailability of invasive procedures like PCI and other interventional procedures at Bharatpur Hospital might have cause our data skewed towards less ischemic heart disease in contrast to global trend. [16,17] This may reflect limitations in both resources and the availability of trained personnel, suggesting that expanding capacity for interventional cardiology could improve outcomes for ischemic heart disease subjects in our setup. Additionally, while few cases of severe valvular disease required surgical management and such cases were referred to other centers might emphasize the need of such specialized cardiac services in our hospital. This underscores the importance of expanding and enhancing in- hospital capabilities for managing such complex cases. Strengthening outpatient services to manage risk factors could help reduce the burden on the inpatient cardiology unit. Public health initiatives aimed at early detection, lifestyle modification, and patient education could be particularly valuable in this context, potentially decreasing hospital admissions for preventable CVDs. [18,19]

Limitations

Several limitations should be considered while interpreting the findings of this study. First, as a single-center study conducted in a tertiary care setting, the results may not fully represent the cardiovascular disease spectrum across the general population or in rural areas of Nepal. Moreover, the lack of advanced catheterization lab in our hospital might have caused our data skewed due to diversion of major chunk of ischemic heart disease subjects requiring this service to other centers. This might have led to lesser number of ischemic heart diseases patients in our study. Additionally, the retrospective nature of the study may introduce data collection biases, particularly if there were missing or incomplete records. Similarly, the lack of in-depth study and analysis of causes of heart failure, valvular heart diseases and arrhythmias and arbitrary grouping of various CV conditions in our study might have led to different data outcomes. Future studies involving multiple centers and in-depth analysis of various causes and also inclusion of outpatient data would offer a broader view of the CVD burden in Nepal.

CONCLUSION

This study underscores the significant burden of heart failure, ischemic heart disease, valvular heart disease, hypertensive heart disease and arrhythmias in the cardiology unit of Bharatpur Hospital, highlighting the need for strengthened diagnostic, interventional, and preventive services. With the growing prevalence of risk factors such as hypertension, diabetes and obesity in Nepal, there is an urgent, need for enhanced public health initiatives and hospital resources dedicated to managing cardiovascular disease. Addressing these gaps will be crucial to improving patient outcomes and reducing the overall burden of cardiovascular diseases in similar settings. Hospital management's effort to establish advanced catheterization laboratory would be crucial for the improvement in coronary care.

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REFERENCE

1. World Health Organization. (2021). Cardiovascular diseases (CVDs). [Link]

2. Roth GA, Mensah GA., Johnson CO, Addolorato G, Ammirati E, Baddour LM, et al. Global burden of cardiovascular diseases and risk factors, 1990–2019: Update from the GBD 2019 study. Journal of the American College of Cardiology 2020;76(25):2982-3021. [DOI]

3. Ziaeian B, Fonarow GC. (2016). Epidemiology and aetiology of heart failure. Nature Reviews Cardiology 2016;13(6):368-78. [DOI]

4. Gupta R, Gaur K, Sinha A. Burden of coronary heart disease in India. Indian Heart Journal 2016; 64(6):531-7. [DOI]

5. Dhungana RR, Thapa P, Devkota S, Banik PC, Gurung Y, Mumu SJ, et al. Prevalence of cardiovascular disease risk factors: A community-based cross-sectional study in a peri-urban community of Kathmandu, Nepal. Indian Heart J. 2018;70(3):S20-S27. [DOI]

6. Visseren FLJ, Mach F, Smulders YM, Carballo D, Koskinas KC, Bäck M, et al. ESC National Cardiac Societies; ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. Eur Heart J. 2021;42(34):3227-337. [DOI]

7. Prasad K. Current Status of Primary, Secondary, and Tertiary Prevention of Coronary Artery Disease. Int J Angiol. 2021;30(3):177-86. [DOI]

8. Izumi C, Matsuyama R, Yamabe K, Iwasaki K, Takeshima T, Murphy SME, et al. In-Hospital Outcomes of Heart Failure Patients with Valvular Heart Disease: Insights from Real-World Claims Data. Clinicoecon Outcomes Res. 2023;15:349-60. [DOI]

9. Nkomo VT, Gardin JM, Skelton TN, Gottdiener JS, Scott CG, Enriquez-Sarano M. Burden of valvular heart diseases: a population-based study. Lancet. 2006;368(9540):1005-11. [DOI]

10. Aluru JS, Barsouk A, Saginala K, Rawla P, Barsouk A. Valvular Heart Disease Epidemiology. Med Sci (Basel). 2022;10(2):32. [DOI]

11. Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callaway CW, Carson AP, et al; American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association. Circulation. 2019 Mar 5;139(10):e56-e528. [DOI]

12. Rahman F, Kwan, GF. Atrial fibrillation: Current management strategies and challenges in low- and middle-income countries. The Lancet 2021;397(10280):1892-904. [DOI]

13. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics--2015 update: a report from the American Heart Association. Circulation. 2015;131(4):e29-322.[DOI]

14. Gautam MP, Ghimire U, Shrestha KM, Paudel B, Khatiwada P, Adhikari B. Prevalence, awareness and control of hypertension in a well-educated professional group in Nepal. Nepalese Heart Journal 2017;14(1): 21-4.[DOI]

15. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, Prabhakaran D. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. J Hypertens. 2014 Jun;32(6):1170-7. [DOI]

16. Yusuf S, Rangarajan S, Teo K, Islam S, Li W, Liu L, et al. Cardiovascular risk and events in 17 low-, middle-, and high-income countries. New England Journal of Medicine 2014;371(9):818-27. [DOI]

17. Townsend N, Kazakiewicz D, Wright JS. Prevention of cardiovascular disease in low-resource settings: Review of the literature and emerging concepts. Global Heart 2022;17(1):1-8. [DOI]

18. Nepal Health Research Council. Non-communicable diseases risk factors survey Nepal 2021. Kathmandu: NHRC. [Link]

19. Khanal S, Gautam A, Dhital S. Patterns and outcomes of patients presenting with

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