

## Examining Evolving Patterns of Cardiovascular Disease and Clinical Profiles: Insights from a Hospital-based Observational Study

Soham Chaudhari<sup>1</sup>, Sourav Kumar Mishra<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Cardiology, M.L.B. Medical College, Jhansi, India

<sup>2</sup>Assistant Professor, Department of Cardiology, M.L.B. Medical College, Jhansi, India

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Corresponding Author: Dr. Sourav Kumar Mishra

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### Abstract:

**Background:** Understanding the evolving patterns of cardiovascular disease (CVD) and clinical profiles is vital for addressing the shifting landscape of heart health globally. Despite advancements in healthcare, CVD remains the leading cause of mortality worldwide, demanding continuous evaluation of trends and risk factors.

**Methods:** This retrospective study was conducted. A total of 160 participants diagnosed with CVD, aged 18 years and above, were included. Data on demographic characteristics, clinical history, treatments, and outcomes were extracted from medical records. Statistical analysis included descriptive and inferential statistics using SPSS software.

**Results:** The study revealed a diverse demographic profile, with an average age of 55 years ( $\pm 10.2$ ) and a relatively balanced gender distribution (48% male, 52% female). Hypertension was the most prevalent comorbidity (72%), followed by diabetes mellitus (58%) and dyslipidemia (42%). Coronary artery disease (CAD) was the predominant cardiovascular diagnosis (45%), followed by congestive heart failure (CHF, 30%) and stroke (25%). Treatment patterns indicated widespread use of antihypertensive medications (68%) and statins (60%), with invasive procedures performed in a significant proportion of CAD patients (PCI: 25%, CABG: 15%). The study observed an overall mortality rate of 12%, with CHF patients exhibiting the highest mortality (18%). Multivariate regression analysis identified older age, diabetes mellitus, and prior myocardial infarction as significant predictors of poor outcomes.

**Conclusion:** This study provides insights into the dynamic shifts in the prevalence, clinical characteristics, and outcomes of CVD among patients. Understanding these trends is essential for guiding preventive strategies, improving clinical management, and reducing the burden of CVD.

**Recommendations:** Further research is warranted to explore emerging risk factors, evaluate the effectiveness of interventions, and tailor preventive measures to address the evolving challenges posed by CVD. Collaboration among healthcare providers, policymakers, and community stakeholders is crucial in implementing comprehensive strategies to combat CVD effectively.

**Keywords:** Cardiovascular disease, Clinical profiles, Risk factors, Mortality.

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### Introduction

Examining the evolving patterns of cardiovascular disease (CVD) and clinical profiles is crucial for understanding the shifting landscape of heart health globally. Cardiovascular diseases remain the leading cause of mortality worldwide, accounting for an estimated 17.9 million deaths annually, which represents 31% of all global deaths [1]. The burden of these diseases is not static; it evolves over time due to changes in societal behavior, healthcare practices, and demographic shifts.

Recent studies have highlighted significant changes in the incidence, prevalence, and mortality rates associated with cardiovascular diseases. For instance, a study observed a global shift in the burden of CVD, with developing countries experiencing an increase in CVD cases due to

urbanization, changes in diet, and decreased physical activity. This shift underscores the importance of examining the evolving clinical profiles of patients with CVD, as these changes have implications for prevention, diagnosis, and treatment strategies [2].

Furthermore, advancements in technology and healthcare have led to changes in the clinical profiles of cardiovascular diseases. Innovations in diagnostic techniques and treatment options have improved survival rates and quality of life for many patients. However, these advancements also bring to light new challenges, such as the management of long-term comorbidities and the need for personalized treatment plans. A study discusses the impact of these advancements on the management of CVD,

emphasizing the need for ongoing research to adapt to these changes effectively [3].

The prevalence of risk factors for cardiovascular diseases, such as hypertension, diabetes, obesity, and hyperlipidemia, has also evolved, influenced by both genetic and environmental factors. The INTERHEART study, a large case-control study of risk factors for acute myocardial infarction in 52 countries, identified several modifiable risk factors that account for most of the attributable risk for acute myocardial infarction globally [4]. This finding highlights the potential for preventive measures to significantly reduce the burden of CVD.

The evolving patterns of cardiovascular disease and clinical profiles necessitate a dynamic approach to research, prevention, and treatment. Understanding these patterns is essential for developing effective strategies to combat the global burden of CVD.

Hence, the aim of the study is to investigate the dynamic shifts in the prevalence, incidence, and clinical manifestations of cardiovascular disease (CVD), as well as to delineate the evolving clinical characteristics of CVD patients in a hospital-based setting.

### Methodology

**Study Design:** A retrospective design.

**Study Setting:** The study was conducted at M.L.B. Medical College, located in Jhansi, India, spanning from September 2022 to January 2024.

**Participants:** A total of 160 participants were included in the study. These participants were selected from the pool of patients who sought medical care for cardiovascular conditions at the aforementioned healthcare facility during the study period.

### Inclusion Criteria:

- Patients diagnosed with cardiovascular disease.
- Patients aged 18 years and above.

- Patients with complete medical records available for review.

### Exclusion Criteria:

- Patients with incomplete medical records.
- Patients with documented inaccuracies or inconsistencies in their medical history.
- Patients below the age of 18 years.

**Bias:** Efforts were made to minimize bias by ensuring thorough and systematic data collection and analysis.

**Variables:** Variables included demographic variables (age, gender, etc.), clinical variables (type of cardiovascular disease, comorbidities, clinical presentations, etc.), treatment variables (medications, procedures, interventions, etc.).

**Data Collection:** Medical records of eligible patients were retrospectively reviewed to extract relevant data. Data collection included information on demographic characteristics, clinical history, diagnostic tests, treatments received, and outcomes. Trained research personnel ensured accurate and standardized data extraction procedures.

**Statistical Analysis:** Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the characteristics of the study population and clinical variables. Inferential statistics, including chi-square tests, t-tests, or regression analysis, were employed to examine associations, trends, and predictors of cardiovascular disease and its clinical characteristics. Statistical significance was set at  $p < 0.05$ . Analysis was performed using appropriate statistical software (SPSS, ver. 18).

**Ethical Considerations:** The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

### Result

**Table 1: Demographic features of study participants**

Characteristic	Value, N (%)
Total Participants	160 (100%)
Age (years), Mean	55.2± 10.2
Gender	
Male	77 (48%)
Female	83 (52%)
Comorbidities	
Hypertension	115 (72%)
Diabetes Mellitus	93 (58%)
Dyslipidemia	67 (42%)
Cardiovascular Disorders	
Coronary Artery Disease (CAD)	72 (45%)
Congestive Heart Failure (CHF)	48 (30%)
Stroke	40 (25%)

The study enrolled 160 participants, with an average age of 55 years ( $\pm 10.2$ ), demonstrating a diverse demographic profile. Gender distribution was relatively balanced, with 48% male and 52% female participants. Hypertension emerged as the most prevalent comorbidity, affecting 72% of participants, followed by diabetes mellitus (58%) and dyslipidemia (42%). The predominant cardiovascular diagnoses included coronary artery disease (CAD) in 45% of cases, congestive heart failure (CHF) in 30%, and stroke in 25%. On average, patients presented with 2.5 ( $\pm 1.1$ ) comorbidities alongside their primary cardiovascular condition.

Treatment patterns revealed that 68% of patients received a combination of anti-hypertensive medications, with angiotensin-converting enzyme inhibitors (ACEIs) being the most frequently prescribed class (52%). Statins were prescribed to 60% of patients for managing dyslipidemia, while aspirin was administered to 45% for secondary prevention of cardiovascular events. Invasive procedures, including percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG), were performed in 25% and 15% of CAD patients, respectively.

Regarding outcomes, the study observed an overall mortality rate of 12%, with CHF patients exhibiting the highest mortality (18%). Among survivors, 35% experienced at least one hospital readmission within six months, primarily due to heart failure exacerbations.

Multivariate regression analysis identified several predictors of poor outcomes. Older age (OR = 1.08, 95% CI: 1.03-1.13,  $p < 0.001$ ), diabetes mellitus (OR = 2.34, 95% CI: 1.25-4.38,  $p = 0.008$ ), and prior myocardial infarction (OR = 3.21, 95% CI: 1.78-5.79,  $p < 0.001$ ) were significantly associated with increased mortality risk. Notably, patients who underwent PCI demonstrated a lower mortality risk compared to those managed medically (OR = 0.42, 95% CI: 0.21-0.83,  $p = 0.012$ ).

## Discussion

The study enrolled 160 participants, reflecting a diverse demographic profile with an average age of 55 years ( $\pm 10.2$ ) and a relatively balanced gender distribution. Hypertension was the most prevalent comorbidity, affecting 72% of participants, followed by diabetes mellitus (58%) and dyslipidemia (42%). CAD emerged as the predominant cardiovascular diagnosis, observed in 45% of cases, followed by CHF at 30% and stroke at 25%.

Treatment patterns revealed widespread use of antihypertensive medications, particularly ACEIs, and statins for managing dyslipidemia. Invasive procedures such as PCI and CABG were performed in a significant proportion of CAD patients. The study observed an overall mortality rate of 12%,

with CHF patients experiencing the highest mortality (18%).

The study's findings underscore the considerable burden of cardiovascular disease and its associated comorbidities in the study population. The high prevalence of hypertension, diabetes, and dyslipidemia highlights the urgent need for comprehensive risk factor management strategies. Moreover, the observed treatment patterns emphasize the importance of guideline-based pharmacotherapy and timely interventions, including revascularization procedures, in optimizing patient outcomes.

The identified predictors of poor outcomes, such as older age and comorbid conditions, underscore the importance of individualized risk assessment and aggressive management approaches. Additionally, the significant association between PCI and improved survival suggests the potential benefits of invasive interventions in selected patients with CAD.

The landscape of CVD management and outcomes is continually evolving, shaped by a diverse range of studies that delve into various aspects of care, from risk factor assessment to innovative treatment approaches. These studies collectively underscore the complexity of CVD management and the importance of a multifaceted approach to improve patient outcomes.

One critical area of focus is the assessment of risk factors in individuals, which is pivotal for early intervention and prevention strategies. A study conducted in a tertiary care setting revealed the heightened risk of CVD with advancing age, pinpointing prevalent risk factors such as obesity, dyslipidemia, and physical inactivity [5]. This underscores the necessity for regular health check-ups and lifestyle modifications as primary preventive measures against CVD.

The advent of digital therapeutics presents a promising avenue for enhancing patient care, particularly in improving medication adherence and blood pressure control among coronary artery disease patients. A real-world evidence study demonstrated the efficacy of software-driven digital therapeutics, marking a significant advancement in patient management and care delivery [6]. This approach leverages technology to foster better health outcomes and patient engagement.

Timely reperfusion therapy for ST-elevation myocardial infarction (STEMI) patients is another critical component of effective CVD management. A consensus statement highlighted the importance of efficient management strategies to improve care and outcomes for STEMI patients, advocating for a pharmaco-invasive approach [7]. This emphasizes the need for prompt and coordinated care to maximize the benefits of reperfusion therapy.

The potential of artificial intelligence (AI) and machine learning in predicting heart disease represents a groundbreaking shift towards more personalized and predictive healthcare. By harnessing these technologies, healthcare providers can gain deeper insights into patient risk profiles and tailor interventions accordingly [8]. This innovative approach could significantly enhance early detection and preventive strategies.

Lastly, the role of non-pharmacological interventions in post-surgical recovery, such as breathing exercises following coronary artery bypass grafting (CABG), highlights the importance of comprehensive care strategies. A study evaluating the immediate effects of breathing exercises on preventing early pulmonary complications post-CABG underscores the value of integrating such practices into patient recovery plans [9]. This approach emphasizes the holistic nature of CVD management, incorporating both medical and non-medical interventions to improve patient outcomes.

In brief, the collective insights from these studies illuminate the challenges and advancements in CVD treatment and management. They reflect a blend of traditional risk factor management, technological interventions, and innovative treatment methodologies, underscoring the dynamic and multifaceted nature of CVD care.

### Conclusion

The study sheds light on the evolving landscape of CVD, highlighting the prevalence, clinical characteristics, treatment patterns, and outcomes among patients. The findings underscore the importance of ongoing surveillance and research to adapt preventive and therapeutic strategies to the changing epidemiology of CVD. Addressing modifiable risk factors, optimizing clinical management, and enhancing healthcare delivery systems are imperative to mitigate the burden of CVD and improve patient outcomes in India.

**Limitations:** The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

**Recommendation:** Further research is warranted to explore emerging risk factors, evaluate the effectiveness of interventions, and tailor preventive measures to address the evolving challenges posed by CVD. Collaboration among healthcare providers, policymakers, and community stakeholders is crucial in implementing comprehensive strategies to combat CVD effectively.

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