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DEMOGRAPHIC PROFILE AND RISK FACTORS ASSOCIATED WITH CARDIOVASCULAR DISEASES: A RETROSPECTIVE STUDY IN A TERTIARY CARE HOSPITAL

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ARTICLE INFO	ABSTRACT
<p>Article History: Received 21st January, 2024 Received in revised form 30th January, 2024 Accepted 18th February, 2025 Published online 28th February, 2025</p>	<p>Background: Cardio vascular diseases (CVDs) are the leading cause of global health burden, with India facing a significant increase due to rising prevalence and unique biological factors. The study will focus on assessing the prevalence of CVDs and associated risk factors, including hypertension and diabetes, to provide insights for effective public health interventions and policymaking. Methodology: A cross sectional study at tertiary care hospital in metropolitan city conducted to analyse the data of patients suffering with cardiovascular diseases. Retrospective data of 18+ adult patients for the period from 1 January 2021 to 31 December 2022 were included in the study. Variables like age, gender, residence, comorbidity, and hospital stay were tested to check association with cardio vascular diseases. Results: Two years data collection covering 1,297 cases of CVD shows a rise in cardiovascular diseases with stroke increasing from 56.58% to 61.39%. Stroke was the most common condition across all age groups and urban settings, while myocardial infarction (MI) and intracranial (IC) bleed remained relatively stable. Seasonal variations in disease peaks and dips were noted, and a significant association was found between hospital stay duration and disease type (p=0.047). Conclusion: The study reveals a rise in cardiovascular diseases, particularly stroke, with connections to age, urban settings, seasonal trends, comorbidities, and hospital stay duration, highlighting the need for focused public health strategies.</p>
<p>Key words:</p> <p>Cardio vascular diseases, stroke, myocardial infarction, IC bleed, risk factors</p>	
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INTRODUCTION

Cardiovascular diseases (CVD) are the leading cause of death globally and in India, with South Asia being the largest contributor. Despite a slight decline in India, CVD remains a significant cause of death and disability, driven by unique biological factors in the population. In India, CVD-related deaths rose from 15.2% in 1990 to 26.6% in 2017, with DALYs nearly doubling. The prevalence of ischemic heart disease and stroke increased 2.3-fold between 1990 and 2016, with CVD cases more than doubling from 25.7 million to 54.5 million.^{1,2} CVD prevalence is strongly linked to a country's stage of epidemiological transition, especially when high rates in middle age continue into later life. Population-based surveys from 2003 estimated CVD prevalence in rural India at 3–4% and 8–10% in urban areas.^{3,4}

Conventional risk factors like hypertension, diabetes, dyslipidaemia, and smoking are linked to higher coronary artery diseases prevalence in Indians. The INTERHEART study found nine factors, including lifestyle habits and stress, explaining over 90% of acute myocardial infarctions in South Asians, yet they don't fully account for the higher prevalence or earlier onset in Indians.¹ These risk factors are rapidly increasing in India. In 2017, India had over 73 million diabetes cases, the highest globally, with a prevalence of 8.8% in adults aged 20-70 years, driven by urbanization and lifestyle changes.⁵ Hypertension affects 1 in 4 adults, contributing to 10.8% of all deaths in India, with its prevalence expected to double by 2025, significantly impacting ischemic heart disease and stroke rates.⁶ Coronary artery disease (CAD) shows a strong familial link, with studies identifying 109 genetic loci associated with CAD, though findings are inconsistent. Emerging risk factors include high homocysteine levels, air pollution, temperature variations, psychosocial factors, and elevated high sensitivity C-reactive protein levels, indicating inflammation.¹

In light of the rapidly growing burden of CVDs in India and the complex interplay of risk factors, this study aims to comprehensively assess

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the prevalence of CVDs and associated risk factors. By identifying the key risk factors and their prevalence, this study seeks to provide valuable insights into the current CVD landscape in India, ultimately guiding public health interventions and policymaking to curb the CVD epidemic.

Objectives

To determine the demographic profile of patients suffering from cardiovascular diseases (CVDs) in the tertiary care hospital of Thane district.

1. To identify the prevalence of major CVD risk factors such as age, gender, residence, hypertension, diabetes and other comorbidities.
2. To assess the association between risk factors and the prevalence of CVDs.

MATERIAL AND METHODS

A cross sectional study at (tertiary care hospital in metropolitan city) Chhatrapati Shivaji Maharaj Hospital and Rajiv Gandhi Medical College, Thane, conducted to analyse the data of patients suffering with cardiovascular diseases. Retrospective data of 18+ adult patients for the period from 1 January 2021 to 31 December 2022 were included in the study. The study was conducted at Medical Record Department of hospital after obtaining the permission from Institutional Ethics Committee. Data with incomplete records and patients with known chronic illnesses other than CVDs that might confound the results were excluded. Variables assessed included age, gender, residence, comorbidity, and duration of hospital stay. Data were entered into Microsoft Excel for statistical analysis, with descriptive statistics used to summarize prevalence and chi-square tests performed to assess associations between CVD prevalence and risk factors at 5% level of significance.

RESULTS

Retrospective collection of data for two years period included 1,297 cases of CVD. Out of 1297 cases, 39.32% female patients were found with 60.67% of male patients. The range of age of all patients were from 18 years to 100 years. 95% Confidence interval for the age of all patients was seen as 59.24 ±14.21 years. While male patients age range was 57.34 + 13.77 years with that of female patients as 62.17 + 14.39 years.

There is a 6.24% increase in CVD cases from 2021 to 2022. Stroke was the most common cardio-vascular disease, showing up 56.58% of total cases of 2021 while 61.39% from cases of 2022. In comparison of two consecutive years, Myocardial infarction (MI) cases slightly dropped from 33.72% to 30.77%, Intra-cranial (IC) bleed remained steady around 5%, and cases of MI with stroke decreased from 4.61% to 3.34% (Table 1).

The gender-wise distribution of cases, as shown in figure 1, reveals that stroke is the most common condition for both males and females, with a higher incidence in males (59.97%) compared to females (57.84%)

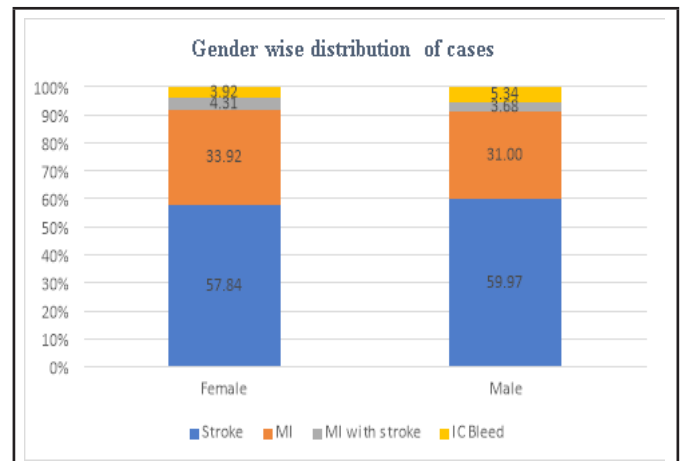


Figure 1. Gender wise distribution of cases

Table 2 highlights that stroke dominates across all age groups, with its incidence increasing from 55.97% in the 18-40 age group to 63.64% in those over 80. MI is most prevalent in the 41-60 age group (35.10%) but decreases in older populations. IC bleed is relatively stable but shows a higher proportion (10.61%) in individuals over 80. MI with stroke remains consistently low across all age groups, peaking slightly in the 61-80 age group (5.09%). Only 7.24% patients from rural area and 92.75% were from urban area were found in this study. All conditions are more prevalent in urban areas compared to rural areas. Stroke is the most common condition in both settings, with a higher incidence in urban areas 59.60%.

The majority of patients (74.28%) stay in the hospital for more than 48 hours, with stroke being the most common condition in this category (57.56%). Shorter stays of less than 24 hours are relatively rare and less commonly associated with stroke (50.46%). Most patients (82.42%) stay less than 1 week in the hospital, with stroke being the most common condition in this group (58.37%). Longer hospital stays of 1-3 weeks and over 3 weeks are more associated with stroke but less frequent overall (Table 2)

Significant associations between hospital stay duration and cardiovascular disease types (p<0.05) have been observed. Other factors like age, gender, residential area, and comorbidity status did not show significant associations, indicating that hospital stay length is notably linked to disease type (Table 2).

Stroke peaked in October for both years, with 2022 showing a higher peak, and dipped in March 2021 and May 2022, highlighting seasonal differences in dip months (Figure 2).

Year	IC bleed	MI	MI with stroke	Stroke	Total
2021	31(5.10)	205(33.71)	28(4.6)	344(56.57)	608
2022	31(4.49)	212(30.76)	23(3.33)	423(61.39)	689

Table 2. Association of Socio-Demographic Factors with cardio-vascular disease types

Variables	IC Bleed	MI	MI with Stroke	Stroke	Chi square value	P value
Age-group (Years)						
18 – 40	8(5.10)	44(32.83)	7(5.22)	75(55.97)	15.461	0.079
41- 60	22(4.17)	185(35.10)	14(2.65)	306(58.06)		
61- 80	25(4.38)	172(30.17)	29(5.09)	344(60.35)		
>80	7(10.61)	16(24.24)	1(1.51)	42(63.64)		
Gender						
Female	20(3.92)	173(33.92)	22(4.31)	295(57.84)	2.665	0.446
Male	42(5.33)	244(31)	29(3.68)	472(59.97)		
Residential Area						
Rural	4(4.25)	35(37.23)	5(5.31)	50(53.19)	1.974	0.577
Urban	58(4.82)	382(31.75)	46(3.82)	717(59.60)		
Comorbidity Status						
Absent	43(4.76)	288(31.89)	37(4.09)	535(59.24)	0.276	0.964
Present	19(4.82)	129(32.74)	14(3.55)	232(58.88)		
Hospital stays						
<1 week	46(4.30)	361(33.76)	38(3.55)	624(58.37)	12.74	0.047*
1-3 weeks	14(6.66)	54(25.71)	12(5.71)	130(61.90)		
>3weeks	2(11.11)	2(11.11)	1(5.55)	13(72.22)		

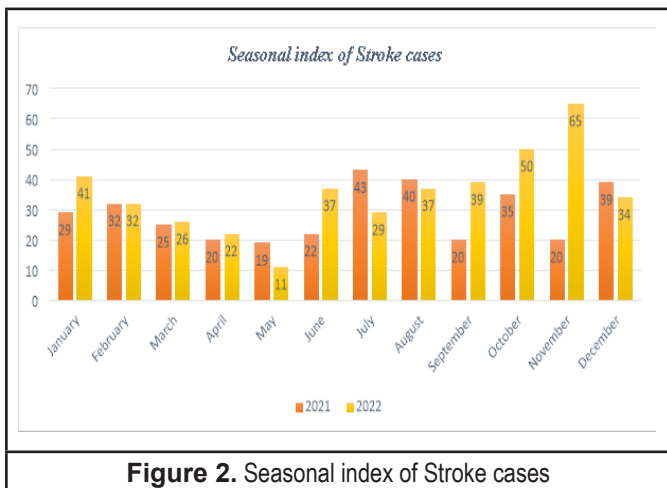


Figure 2. Seasonal index of Stroke cases

Total 69.62% patients were found with comorbidity status. Hypertension (HTN) is most prevalent among patients with stroke (58.82%) and also affects a significant number with IC bleed (6.30%) and myocardial infarction (MI) (31.93%). Diabetes mellitus (DM) is notably high in patients with myocardial infarction (40.35%) and stroke (50.88%). Patients with both DM and HTN have a higher prevalence of stroke (61.80%) and MI with stroke (3.37%). Other comorbidities are rare but are most associated with stroke (80.00%) as seen in table 3.

Type of Comorbidity	IC Bleed	MI	MI with Stroke	Stroke	Grand total
DM	1(1.75)	23(40.35)	4(7.02)	29(50.88)	57(14.47)
DM+HTN	2(2.25)	29(32.58)	3(3.37)	55(61.80)	89(22.59)
HTN	15(6.30)	76(31.93)	7(2.94)	140(58.82)	238(60.41)
OTHERS	1(10.00)	1(10.00)	0(0.00)	8(80.00)	10(2.54)
Grand total	19(4.82)	129(32.74)	14(3.55)	232(58.88)	394(100.00)

DISCUSSION

Our study observed a rise in stroke cases and overall cardiovascular disease incidence from 2021 to 2022, aligning with findings by Prabhakaran D, potentially due to aging populations, increased urbanization, and improved diagnostic capabilities.⁷ The decline in myocardial infarction (MI), similar to Kalra A's findings, may reflect advancements in prevention and treatment.¹ The stable rate of intracranial (IC) bleed indicates persistent underlying risk factors.

Our study identified that stroke is common across all age groups, with higher rates in older populations due to age-related vascular changes, as noted by Kamalakannan S and Kundu J.^{3,8} Myocardial infarction (MI) is most prevalent among middle-aged individuals, likely influenced by lifestyle and comorbidities. IC bleed remains stable but is more frequent in the elderly, reflecting increased fragility. MI with stroke remains low overall, peaking slightly in older age groups due to complex risk factor interactions.

In our study, the gender distribution reveals that stroke is more prevalent in males, likely due to higher risk factors or lifestyle differences, similar to findings by Kaur P.⁹ Myocardial infarction (MI) is more common in females, reflecting different cardiovascular risk profiles, as noted by Hochman JS.¹⁰ IC bleed is marginally higher in males, suggesting gender-specific variations in disease presentation,

as observed by Hsieh JT in their multi-ethnic Asian population study.¹¹

The higher prevalence of cardiovascular conditions in urban areas compared to rural areas in our study may be attributed to increased exposure to risk factors prevalent in urban settings, such as lifestyle and environmental factors, consistent with findings by Kundu J.³

In our study, seasonal patterns reveal shifts in peak months for cardiovascular diseases, with stroke consistently peaking in October. These variations likely reflect seasonal environmental factors and differing temporal disease patterns aligning with Patel JC's findings.¹²

Our findings show that stroke prevalence is consistent across comorbidity groups, while IC bleed is marginally higher in those with comorbidities. Hypertension and diabetes mellitus are notably more prevalent among stroke and myocardial infarction patients, indicating these factors contribute to higher cardiovascular risk, similar to findings by Sreeniwas Kumar A.¹³

Our study found that stroke patients typically have longer hospital stays, indicating a need for specialized care and resource allocation. This aligns with Lin KH's observation that prolonged stays in severe acute ischemic stroke cases often involve more complex care needs.¹⁴

CONCLUSION

The study highlights a rise in cardiovascular disease cases from 2021 to 2022, with stroke becoming more prevalent. Stroke is more common across all age groups and urban areas, with seasonal variations in disease peaks. Comorbidities like hypertension and diabetes are significantly linked to stroke and myocardial infarction (MI). Hospital stay duration correlates with disease type, particularly for stroke. Addressing urban prevalence, managing seasonal patterns, enhancing comorbidity screening, and improving discharge planning for prolonged stays can help optimize patient care and resource use.

Limitations:

The study's limitations include reliance on hospital records, which may not fully represent community-level cases and limit the generalizability of the findings.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee.

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