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Indian Journal of Pharmacy and Pharmacology

Journal homepage: https://www.ijpp.org.in/

Original Research Article

Prescribing patterns of antiplatelet drugs in patients with cardiovascular and cerebrovascular diseases

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Abstract

Background: Antiplatelet drugs play a crucial role in the management of the Cardiovascular and Cerebrovascular disease. This aim is to provide Evidence based treatment in the prevention of the worldwide health threat of this disease.

Objective: The Objectives is to assess the current prescribing practices of antiplatelet drugs for patients with cardiovascular and cerebrovascular diseases and to identify potential factors influencing prescribing patterns in patient with comorbidities.

Materials and Methods: At Superspeciality hospital, a 6-months cross sectional Prospective observational Research was conducted on impatient patient of Cardiology & Neurology Department,145 Prescription were examined and deemed inoperative.

Result: The study shows that cardiovascular and cerebrovascular diseases are more common in men (62.1%) than women (37.9%), with a sample of 90 males and 55 females. Cardiovascular diseases predominate over cerebrovascular diseases in both rural and urban areas, with a slightly higher incidence in urban populations. Young adults (18-30) have minimal risk, which increases with age, particularly among older adults; 11 individuals have both conditions. The most prescribed antiplatelet therapy is Aspirin and Ticagrelor (79.03%), followed by Aspirin and Clopidogrel (19.35%), with Clopidogrel and Aspirin Av being the least common (1.66%). A significant overlap of comorbidities (65%) is noted due to shared risk factors, and 78% of patients have a history of cardiovascular or cerebrovascular events. Patients with diabetes, CKD, and AKI are at higher risk for thrombotic and bleeding complications, requiring careful monitoring of antiplatelet therapy. In cases of hypothyroidism and pulmonary oedema, Aspirin is the most frequently used antiplatelet (49%), followed by Clopidogrel (20%), Ticagrelor (17%), and Prasugrel (12.4%).

Conclusion: The study provides valuable understanding of these disease, effectiveness of multiple antiplatelet therapies, & impact of comorbidities on the treatment option.

Keywords: Cardiovascular disease, Cerebrovascular disease, Prescription pattern, Antiplatelet drugs, Aspirin, Clopidogrel, Ticagrelor

Received: 27-06-2025; **Accepted:** 06-09-2025; **Available Online:** 25-09-2025

1. Introduction

Antiplatelet treatment relies on aspirin, which was shown in trials conducted in the 1960s and 1970s to inhibit platelet aggregation and decrease the risk of thrombosis (Knowles, R.B.et al., 2019).[1] In the 1990s and early 2000s, Discoverer discovered the role of adenosine diphosphate (ADP) in platelet activation. This encouraged research on the use of other ADP receptor antagonists, such as clopidogrel, in conjunction with aspirin to prevent cardiovascular disease (Fitzgerald, D. J et al., 2013).[2] Glycoprotein IIb/IIIa inhibitors are a type of antiplatelet medication that was introduced in the 1990s.Examples of drugs that inhibit the last common pathway of platelet aggregation, utilised in ACS and PCI, include tirofiban, eptifibatide, and abciximab (Sharifi-Rad, J. et al., 2023).[3]

Approximately 35 million people experience an acute coronary or cerebrovascular event annually, with about half occurring in individuals with pre-existing vascular disease (Sanchis-Gomar, F. et al., 2016).[4] There are probably more than 100 million people with recognised cardiovascular

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https://doi.org/10.18231/j.ijpp.13260.1758801291

disease worldwide. Antiplatelet drugs, along with β blockers, ACE inhibitors, and statins, significantly reduce death, reinfarction, or stroke in patients with coronary heart disease and are beneficial in patients with stroke (Chong, B. et al., 2024).[5] Antiplatelet medications such as cilostazol, clopidogrel, dipyridamole + aspirin, ticagrelor, ticlopidine, and aspirin (≤150 mg/day) significantly decreased the incidence of all strokes when compared to placebo or no treatment, according to a systematic review and network meta-analysis. Mortality Reduction: High-dose aspirin (>150 mg/day) was the only antiplatelet drug that significantly reduced all-cause mortality (Del Giovane, C. et al., 2021).[6]

While there are notable differences in the risk factors for haemorrhagic and ischemic strokes, variations also exist within the risk factors for different types of ischemic stroke (Price, A. J. et al, 2018).[7] Hypertension is a critical risk factor for haemorrhagic stroke, although it also plays a role in atherosclerosis, which can lead to ischemic stroke. Hyperlipidaemia, on the other hand, is a particularly significant risk factor for strokes due to its contribution to atherosclerosis in both extracranial and cerebral blood vessels (Tirschwell et al., 2004).[8]

The ultimate goal of our program is to provide patients with evidence-based care in a tertiary care hospital. Internshelp the healthcare provider focus on interventions and enhance patient treatment outcomes.

1.1. Aim and Objectives

The primary aim of this research topic is to comprehensively analyse and understand the prescribing patterns of antiplatelet drugs in patients diagnosed with cardiovascular and cerebrovascular diseases.

2. Materials and Methods

A cross-sectional prospective Observational Research was conducted by the Department of Pharmacy Practice, CT Group of Institutions at Tertiary Care Hospital (Shreeman Superspeciality Hospital, Jalandhar, Punjab 144012), for a Duration of 6months (January 2024 to June 2024). The Institutional Ethics Committee approved the research protocol. The Research was conducted under the permission of the Institutional Ethics Committee of Punjab Institute of Medical Sciences (Ref.No.:IEC/PIMS/24/10).

We analysed the Prescription pattern of the patient attending the inpatient Department of cardiology and neurology within the research Period. Drug analysed according to the WHO Prescribing guidelines. A 145-patient prescription was analyzed with the patient's written consent and enrolled under the Inclusion and exclusion criteria of the research protocol.

2.1. Inclusion criteria

Patients aged>18 years of both genders with Cardiovascular and cerebrovascular disease with or without Comorbid disease, and patients on antiplatelet therapy.

2.2. Exclusion criteria

Patients with highly vulnerable situations, like Pregnant Women and psychiatric patients and not on Antiplatelet therapy, and not diagnosed with CVD and CeVD.

145 inpatient prescriptionswere studied their demographic data was collected, like age, sex, etc. & their comorbid disease, like DM, COPD, Asthma, etc. also studied. All the data was grouped and compared in the form of Graphical and statistical data.

2.3. Statistical analysis

Data were collected in digital format from the original patient data collection form, approved by the IEC committee, using Microsoft Forms. The data were then entered into Microsoft Excel, and statistical descriptive analysis was performed using both Microsoft Excel and SPSS software.

3. Result

3.1. To assess the current prescribing practices of antiplatelet drugs for patients with cardiovascular and cerebrovascular diseases

3.1.1. Demographic analysis

3.1.1.1. Based on the analysis of the data in **(Table 1)**

It indicates that compared to women, men are more likely to suffer from cardiovascular and cerebrovascular illnesses. Here's a summary of the findings:

1. Male patients: 62.1%
2. Female patients: 37.9%

This indicates that out of the total cases, a larger percentage of males are affected by these diseases.

Table 1: Gender Distribution of the Study Population (N=145)

	Frequency	Percent
Female	55	37.9
Male	90	62.1
Total	145	100

3.1.1.2. Based on the analysis of data provided in **(Figure 1)***, which categorizes patients by risk related to gender and the type of disease they have, either cardiovascular, cerebrovascular, or both*

The dataset contains 90 males and 55 females overall. The data suggest that males have a higher incidence of cardiovascular disease, while the incidence of cerebrovascular disease is more balanced between genders. Additionally, more males than females have both conditions concurrently.

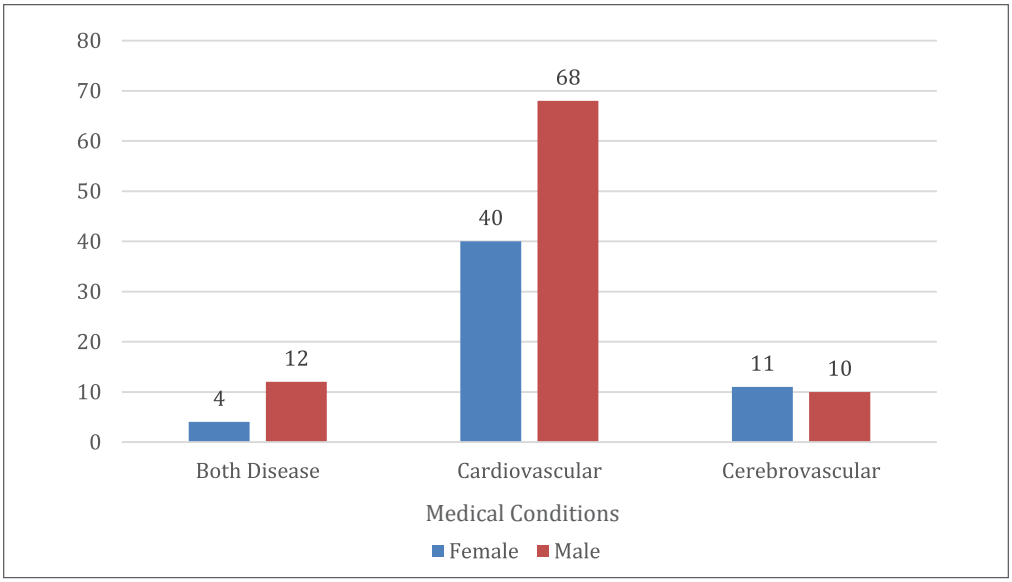

Figure 1: Comparison of cardiovascular and cerebrovascular disease cases among males and females

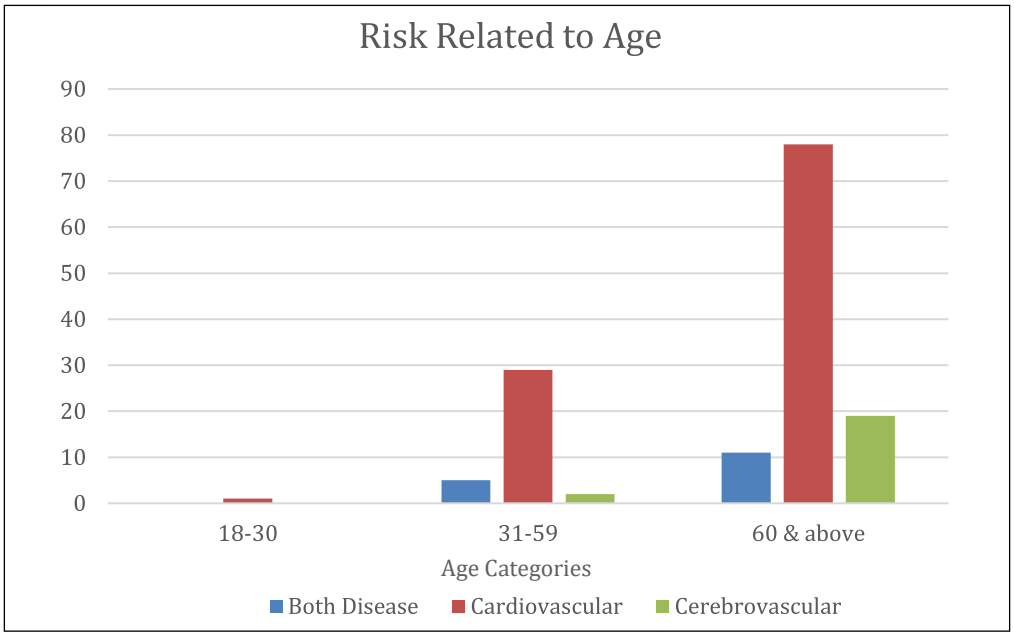

Figure 2: Prevalence of cardiovascular, cerebrovascular, and co-existing diseases in different age categories

Table 2: Gender-based distribution of disease types in the study population (N=145)

Disease	Female	Male	Total no. patients
Cardiovascular	40	68	108
Cerebrovascular	11	10	21
Both	4	12	16
Total	55	90	145

3.1.1.3. Based on the analysis of data, indicates an age-related risk factor for cardiovascular and cerebrovascular diseases

1. **Young Adults (18–30):** This group shows the lowest risk, with only one individual affected by cardiovascular disease and none by cerebrovascular disease or both.
2. **Middle-aged Adults (31–59)**
   i. There's an identifiable rise in hazard for this group. Five individuals have both diseases, which suggests that the prevalence of having multiple health issues starts to increase in this age bracket.
   ii. A pair of individuals has cerebrovascular illness, which is still extremely rare.

Table 3: Age-based distribution of disease types in the study population (N=145)

Disease	Age (18–30)	Age (31–59)	Age (60+)	Total no. of patients
Cardiovascular	1	29	78	108
Cerebrovascular	0	2	19	21
Both	0	5	11	16
Total	01	36	108	145

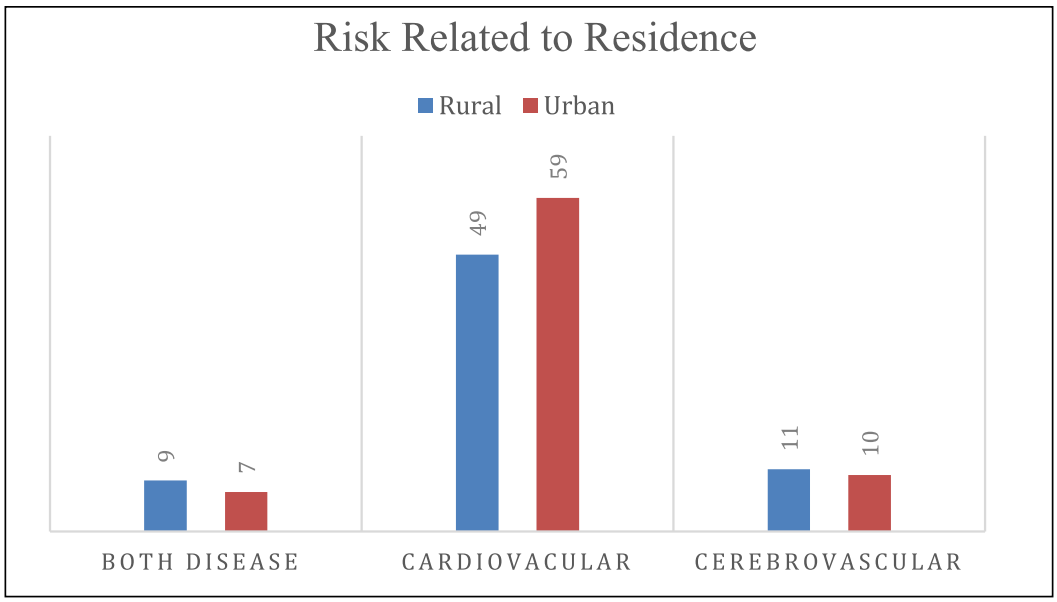

Figure 3: Rural–Urban distribution of patients with cardiovascular, cerebrovascular, and co-existing diseases

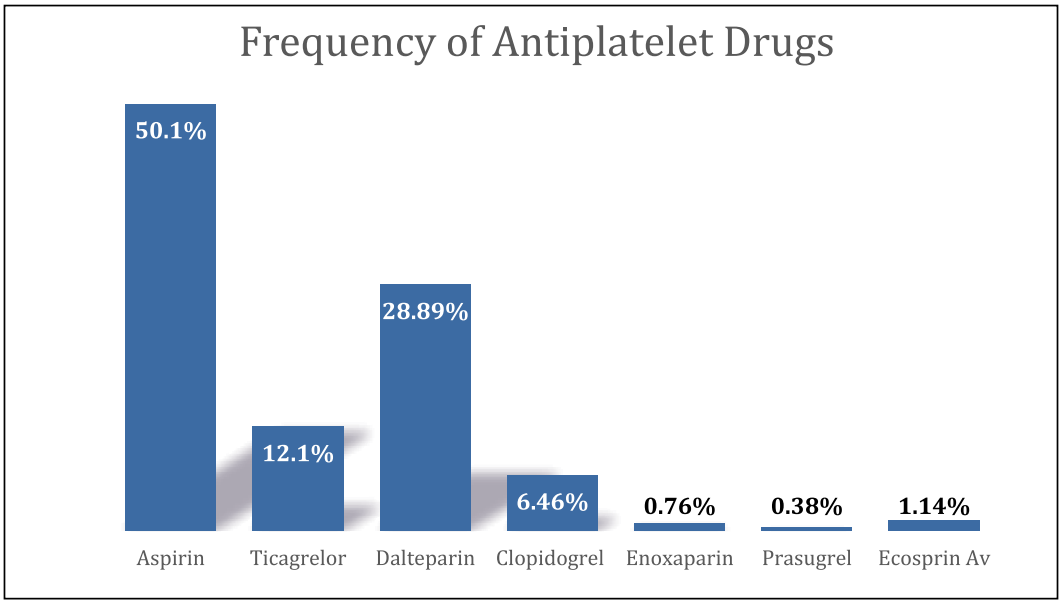

Figure 4: Prescription frequency of antiplatelet medications

3. **Seniors (60 and Above)**
   i. This group has the highest risk. Eleven individuals have both diseases, which is more than double the number in the previous age group, highlighting the increased vulnerability with age.
   ii. Nineteen individuals have cerebrovascular disease, whic is a substantial increase compared to the younger age groups.

3.1.1.4. Based on the analysis of data provided in **(Figure 3)** *statistical representation of the prevalence of cardiovascular and cerebrovascular diseases among people living in rural and urban areas*

The data suggest that cardiovascular diseases are more prevalent than cerebrovascular diseases in both rural and urban populations. Additionally, the urban population has a slightly higher total number of individuals with these diseases compared to the rural population.

Table 4: Rural–Urban distribution of patients with cardiovascular, cerebrovascular, and co-existing diseases

Disease	Rural	Urban	Total No. patients
Cardiovascular	49	59	108
Cerebrovascular	11	10	21
Both	9	7	16
Total	69	76	145

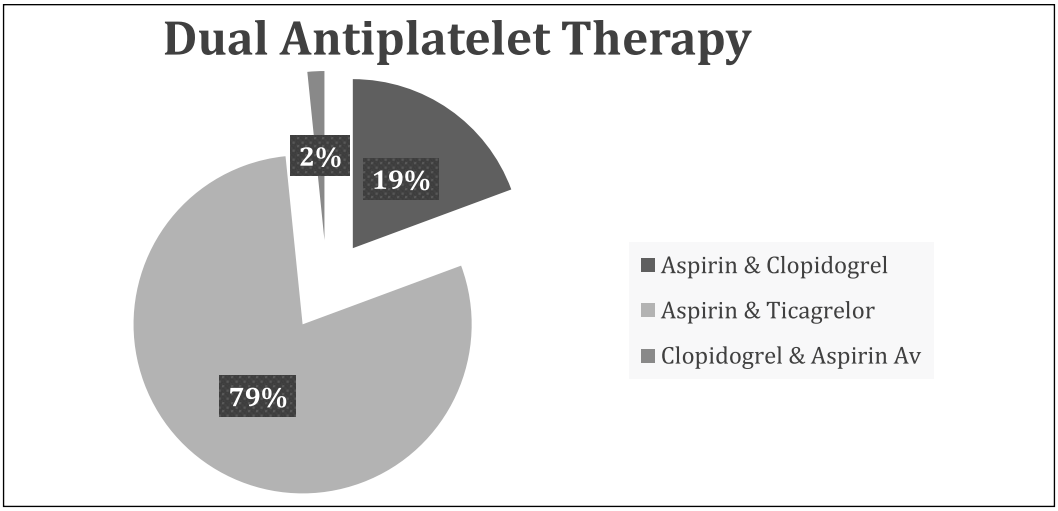

Figure 5: Dual antiplatelet therapy

3.1.2 Prescription rates

3.1.2.1 Percentage of patients with cardiovascular diseases (CVD) and cerebrovascular diseases (CeVD) receiving antiplatelet therapy

This table that lists various antiplatelet drugs, their frequency of use, and the corresponding percentage as shown in **(Table 5) and (Figure 4)**:

1. **Aspirin** is among the most commonly used, with 132 occurrences, accounting for 50.1% of the total.
2. **Ticagrelor** has been used 32 times and makes up 12.16%.
3. **Dalteparin**, which is underlined, shows a frequency of 76 and a percentage of 28.89%.
4. **Clopidogrel** has been used 17 times with a percentage of 6.46%.
5. **Enoxaparin** and **Prasugrel** have the lowest usage with 2 and 1 occurrences, respectively, contributing 0.76% and 0.38% to the total.
6. **Ecosprin Av(Atorvastatin)** was used 3 times, making up 1.14%.

Table 5: Distribution of antiplatelet drug use

Antiplatelet drugs	Frequency	Percentage (%)
Aspirin	132	50.1
Ticagrelor	32	12.16
Dalteparin	76	28.89
Clopidogrel	17	6.46
Enoxaparin	2	0.76
Prasugrel	1	0.38
Ecosprin Av	3	1.14

3.1.2.2 Percentage of patients with cardiovascular diseases (CVD) and cerebrovascular diseases (CeVD) receiving dual antiplatelet therapy in **(Figure 5)**

1. The data indicates that **Aspirin and Ticagrelor** is the most commonly used combination, accounting for 79.03% of the cases.
2. **Aspirin & clopidogrel** used as therapy, accounting for 19.35% of the cases.
3. In contrast**, Clopidogrel & Aspirin Av** is the least common, with only 1.66% usage.
4. This kind of data can be crucial for medical professionals to understand prescribing patterns and for researchers studying the efficacy of different therapy combinations.

Table 6: Distribution of Patients Receiving Dual Antiplatelet Therapy (DAPT)

Dual antiplatelet therapy	Frequency	Percentage (%)
Aspirin and Clopidogrel	12	19.35
Aspirin and Ticagrelor	49	79.03
Clopidogrel and Aspirin Av	1	1.66
Total	62	100

3.1.2.3. Antiplatelet medication prescribed particularly in cardiovascular, cerebrovascular and patients with both diseases explained in **(Table 7)** *and* **(Figure 6)**

Table 7: Antiplatelet medication is prescribed particularly in both diseases

	Both of the above	Cardio vascular	Cerebro vascular
Clavix AS 150 mg OD ecosprin AV 75/20 mg OD	0	1	0
Ecosprin 75 mg OD	9	44	17
Ecosprin75 mg and Clavix 75 mg	4	5	2
Ecosprin 75 mg OD ,Brilinta 90 mg BD	1	48	0
Tab brilinta 90 mg OD	0	1	0
Tab Clavix 75 OD	1	4	0
Tab Ecosprin AV 75mg/20 OD	0	2	0
Tab prax 10 mg	0	1	0

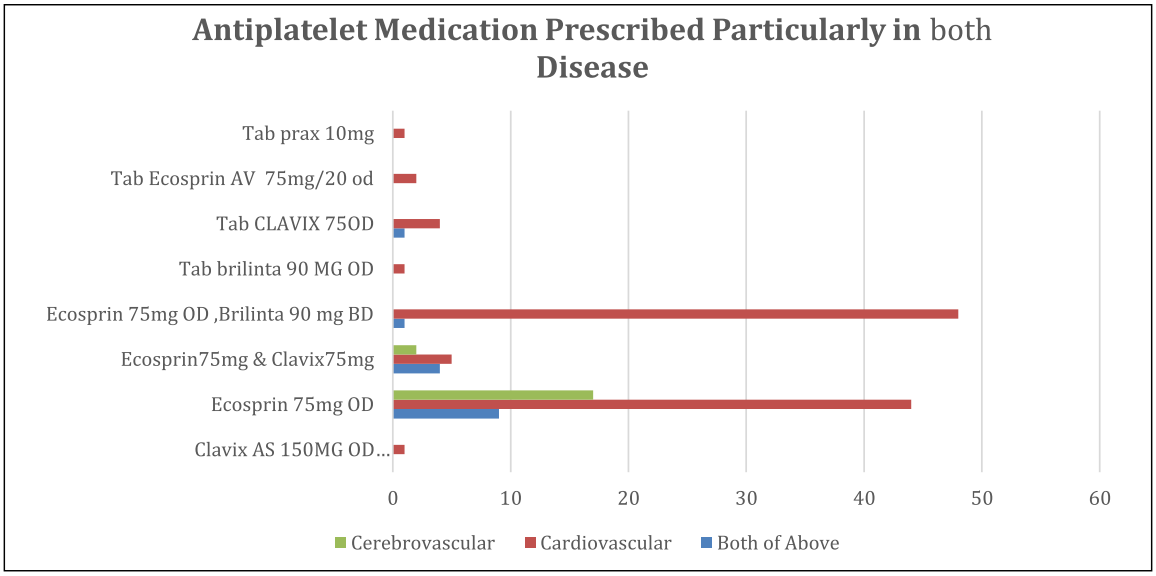

Figure 6: Antiplatelet medications prescribed among patients with cardiovascular, cerebrovascular, and both diseases

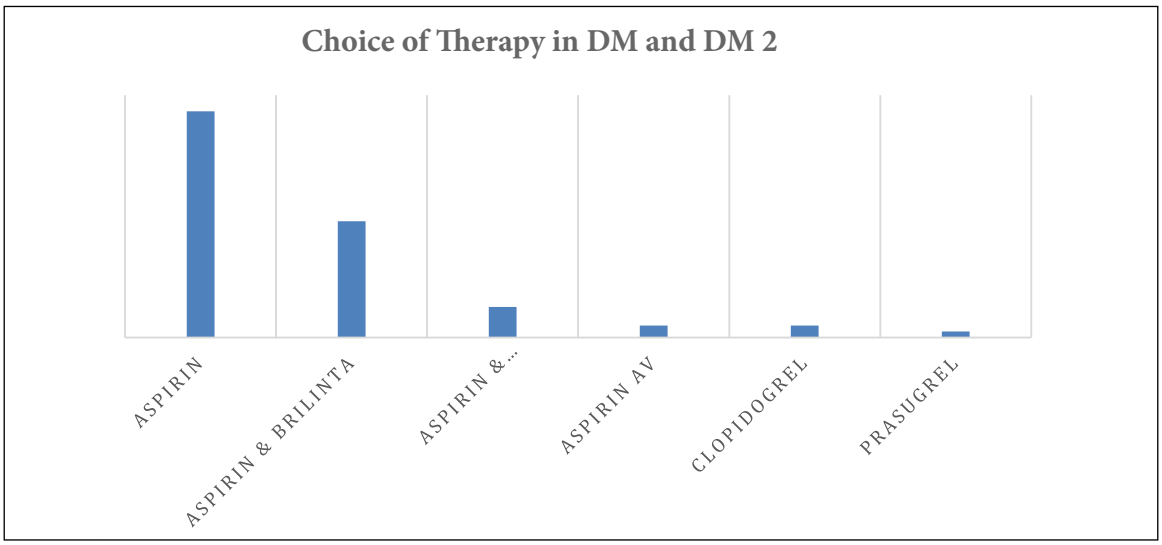

Figure 7: Prescription pattern of antiplatelet drugs in DM and type 2 DM

3.2. To identify potential factors influencing prescribing patternsin patients with comorbidities

3.2.1. Risk assessment

Analysing comorbidities helps to recognize the interconnected nature of these conditions.

3.2.1.1. Patient with comorbidities

1. 65% of the patients have comorbidities, which could include cardiovascular and cerebrovascular diseases. This high percentage suggests a significant overlap between these conditions, likely due to shared risk factors such as age, hypertension, diabetes, and hyperlipidemia.
2. 35% comorbidities, suggesting a decreased incidence of coexisting cardiovascular and cerebrovascular illnesses.

3.1.1.2. Medical history

1. 78% of the patients have a noted medical history, which may include previous instances of cardiovascular or cerebrovascular events. This is critical for healthcare providers toconsider, as a history of such events can increase the risk of future occurrences.
2. 22% of the patients do not have a noted medical history, suggesting they may be at a lower risk for these comorbid conditions.

3.2.2. Impact of comorbidities

3.2.2.1 Analysis of how specific comorbidities influence the choice of antiplatelet therapy

3.2.2.1.1 Diabetes mellitus (DM) & DM 2

1. **Comment:** In DM & DM 2,there is an increased risk of both thrombotic events and bleeding complications.

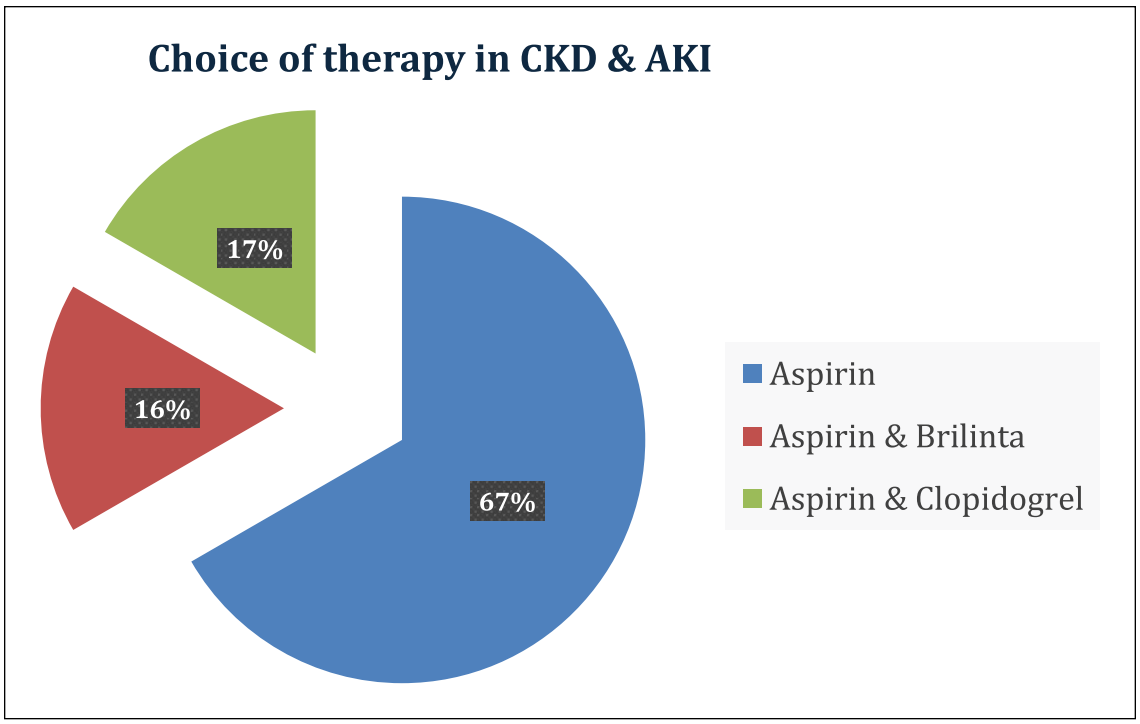

Figure 8: Distribution of antiplatelet therapy in patients with Chronic Kidney Disease (CKD) and Acute Kidney Injury (AKI)

2. **Finding:** There is a significant risk related to Antiplatelet therapy, but Aspirin as monotherapy or as DAPT with Ticagrelor can be prescribed, as shown by our Study, indicated in **(Figure 7)**

3.2.2.1.2. Chronic Kidney Disease (CKD) and Acute Kidney Disease (AKI)

1. **Comment:** CKD and AKI Patients have higher risks for both thrombotic events and bleeding due to altered platelet function and drug clearance.
2. **Finding:** Mainly Aspirin is used for management, but ticagrelor and clopidogrel are used at lower doses, and essential renal parameters are also monitored during Therapy, as indicated Aspirin 49%, Clopidogrel 20.9%, Ticagrelor 17.9%, Prasugrel 12.4%.

3.2.2.1.3. Analysis of COPD, Hypothyroidism, Pruritus, Pulmonary oedema, Pleural Effusion & LRTI has been performed collectively in **(Figure 8)**

During the study period, it was observed that the most prescribed antiplatelet drugs for these comorbidities, such as Hypothyroidism, Pruritus, pulmonary edema, pleural effusion, and LRTI, were aspirin (49%), Ticagrelor (17%), clopidogrel (20%), and prasugrel (12.4%).

4. Cost-Effective Treatment Strategy

4.1. Cost-Effective antiplatelet therapy recommendations

4.1.2. Monotherapy

1. Aspirin (49%) is the most frequently prescribed and is widely considered cost-effective.
   i. **Cost:** Low
   ii. **Efficacy:** Strong evidence for reducing thrombotic events.
   iii. **Recommendation:** Remains the primary option for most patients unless contraindicated (e.g., history of GI bleeding or aspirin intolerance).
2. Clopidogrel (20%) is an alternative for thoseintolerant to aspirin.
   i. **Cost:** Moderate (slightly more expensive than aspirin, but generic versions are available).
   ii. **Efficacy:** Effective, especially in patients with aspirin resistance.
   iii. **Recommendation:** Use in patients at high risk of bleeding or those who cannot tolerate aspirin.

4.1.3. Dual Antiplatelet Therapy (DAPT)

1. Aspirin + Clopidogrel (19.35%)
   i. **Cost:** Lower than ticagrelor-based combinations.
   ii. **Efficacy:** Well-established in secondary prevention of cardiovascular and cerebrovascular diseases.
   iii. **Recommendation:** Ideal cost-effective choice for patients needing DAPT with moderate bleeding risk.
2. Aspirin + Ticagrelor (79.03%)
   i. **Cost:** Higher than aspirin-clopidogrel.
   ii. **Efficacy:** More potent but increases bleeding risk.
   iii. **Recommendation:** Best for high-risk cardiovascular patients, but due to cost concerns, clopidogrel may be preferred in resource-limited settings.

Table 8: Recommended cost-effective antiplatelet therapy and alternatives in patients with comorbidities

Comorbidity	Recommended cost-effective option	Alternative (if risk of bleeding)
Diabetes Mellitus	Aspirin alone or Aspirin + Clopidogrel	Clopidogrel alone if aspirin-intolerant
Chronic kidney disease	Aspirin alone (monotherapy)	Clopidogrel with renal monitoring
COPD, Hypothyroidism, Pruritus, Pulmonary edema, Pleural effusion, LRTI	Aspirin or Clopidogrel (monotherapy)	DAPT (Aspirin + Clopidogrel) only if needed

3. Prasugrel (12.4%)
    i. **Cost:** Higher than both clopidogrel and ticagrelor.
    ii. **Efficacy:** More effective but associated with higher bleeding risk.
    iii. **Recommendation:** Avoid unless there is a specific indication (e.g., prior stent placement or ACS in younger patients without bleeding risks).
4. For cost-effectiveness:
    i. **Aspirin remains the first-line option** for monotherapy.
    ii. **Aspirin + Clopidogrel is the most cost-effective DAPT choice** for most patients.
    iii. **Ticagrelor and Prasugrel should be reserved** for patients at high thrombotic risk despite increased cost and bleeding risk.

5. Discussion

The present study highlights several important aspects related to cardiovascular and cerebrovascular diseases. Gender differences remain notable, as the male population shows a higher prevalence of heart disease and stroke compared to females (62.1% vs. 37.9%). This finding aligns with other research, which indicates that men are at greater risk due to hormonal differences, higher rates of hypertension, and lifestyle behaviors such as smoking and alcohol consumption (Kundu et al., 2023).[9] While stroke incidence appears relatively balanced across genders, men still exhibit greater susceptibility to both conditions, underlining the need for gender-specific preventive strategies. Age-related variations further emphasize that younger adults (18–30 years) have the lowest risk, whereas vulnerability increases in middle-aged individuals (31–59 years), particularly among those with comorbidities. By retirement age (60 years and above), disease incidence escalates sharply, with 11 patients in this category affected by both cardiovascular and cerebrovascular conditions. This pattern underscores the cumulative effect of aging and physiological decline, which increases disease burden through complex interactions of risk factors (Rodgers et al., 2019).[10]

Urban–rural differences reveal only a marginal variation, with urban dwellers slightly more affected (52% vs. 48%), possibly due to stressful lifestyles, sedentary habits, and poor dietary practices, while rural populations face challenges such as limited healthcare access, which may offset differences in incidence rates (Samuel et al., 2012). [11] In terms of treatment, usage patterns of antiplatelet therapy demonstrate that aspirin remains the most widely prescribed option (50.1%), owing to its efficacy and affordability. Dalteparin accounts for 28.89% of prescriptions and ticagrelor for 12.16%, both being reserved for specific patient groups. Combination therapy, particularly aspirin with ticagrelor, is frequently employed (79.03%) in high-risk patients, reflecting clinical preference for its effectiveness in preventing thrombotic events. Conversely, clopidogrel and aspirin AV are the least used, likely due to limited efficacy or safety concerns in certain populations. The overlap of comorbidities adds another layer of complexity, as 65% of patients suffer from additional illnesses such as hypertension, diabetes, or hyperlipidemia, compared to only 35% without such conditions. This indicates the strong interconnection between cardiovascular and cerebrovascular diseases, emphasizing the importance of comprehensive management strategies addressing multiple risk factors simultaneously (Kendir et al., 2018).[12]

Special considerations are also necessary when dealing with comorbid conditions. Patients with diabetes mellitus face increased risks of both thrombotic and bleeding events, requiring tailored therapy and careful monitoring of drugs like ticagrelor and clopidogrel (Vazzana et al., 2012).[13] Similarly, those with chronic kidney disease or acute kidney injury need adjusted dosing and close renal monitoring to balance efficacy and safety (Saeed et al., 2024).[14] COPD patients are generally managed with aspirin, as ticagrelor may exacerbate dyspnea. In hypothyroidism, thrombosis and bleeding risks remain high, necessitating cautious antiplatelet use. In chronic liver disease with associated pruritus, aspirin is used with regular renal monitoring when CKD is also present. Infections further complicate management by inducing a hypercoagulable state, where aspirin is again preferred to avoid respiratory side effects of ticagrelor. Pulmonary edema and pleural effusion, both often linked to underlying cardiovascular pathology, are managed primarily with aspirin, though clopidogrel or prasugrel may be considered for pleural effusion.

Taken together, these findings highlight the importance of individualized treatment approaches. Clinical decisions regarding antiplatelet therapy must consider patient-specific factors such as sex, age, comorbidities, and geographical setting. The high prevalence of multimorbidity reinforces the need for comprehensive and integrated care models that go beyond single-disease management. Moreover, the results underscore the necessity of future longitudinal studies to evaluate the long-term safety and effectiveness of

various antiplatelet combinations in diverse patient groups, especially those at very high risk of both cardiovascular and cerebrovascular complications (Kassymova et al., 2025).[15]

6. Conclusion

This study shows how our tertiary care setting's antiplatelet prescribing practices relate to current evidence-based practice and suitable therapeutic individualisation. Clinical recommendations have been effectively implemented into regular practice, as seen by the common usage of aspirin, the strategic use of dual antiplatelet medication, and disease-specific prescribing techniques. These results support our overarching objective of offering patients evidence-based care that improves treatment results via focused treatments and effective therapyapproaches. The knowledge obtained through this research serves as a basis for ongoing quality improvement in the treatment of cardiovascular and cerebrovascular diseases, and, in addition, an increasing amount of data supports targeted antiplatelet medication strategies.

By understanding current prescribing patterns and their clinical rationale, healthcare providers can continue to refine their therapeutic approaches and ensure optimal patient outcomes in the evolving landscape of antiplatelet therapy.

7. Ethical No.

IEC/PIMS/24/10

8. Authors Contribution

1. **Dr. Sumit Choudhary:** Data Collection, Table and R.O.L.
2. **Dr. Anurag Kumar:** Data Collection, Manuscript writing, Data evaluation by SPSS.
3. **Dr. Ravi Shankar Dwivedi:** Evaluator, Data Correction.
4. **Dr. Tushar Arora:** Supervisior, Data Evaluator.

9. Source of Funding

None

10. Conflict of Interest

None

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Cite this article: Choudhary S, Kumar A, Dwivedi RS, Arora T. Prescribing patterns of antiplatelet drugs in patients with cardiovascular and cerebrovascular diseases. *Indian J Pharma Pharmacol.* 2025;12(3)*:*167–175