VOLUME - 13, ISSUE - 09, SEPTEMBER - 2024 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Cardiology

# PRESCRIPTION TRENDS IN ISCHEMIC HEART DISEASE – A PROSPECTIVE ANALYSIS

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**ABSTRACT**

**Background:** Ischemic heart disease is a critical global health issue characterized by inadequate blood supply to the myocardium, leading to an imbalance between oxygen supply and demand. This study aimed to analyze the prescription patterns of both cardiovascular and non-cardiovascular drugs among ischemic heart disease patients at a government medical college hospital in Tamil Nadu, India. **Methods and Materials:** This observational prospective study was conducted over six months, from April to September 2023, involving 100 patients aged 31 years and above. Data were collected during ward rounds and regular follow-ups and were analysed using Microsoft Excel 2021. **Results:** The study revealed that the majority of ischemic heart disease patients were aged 51 to 60 years and men had a higher predominance rate than women. The most frequently prescribed drug classes were antiplatelet agents (17.26%), antihypertensives (17%), antihyperlipidemic drugs (8.76%), anticoagulants (7.80%), and nitrates (7.18%). Additionally, non-cardiovascular drugs were widely prescribed, with antacids (8.93%) and benzodiazepines (7.27%) being the most common. The prescription patterns largely adhered to established management guidelines, with a focus on antiplatelets, antihypertensives, and statins. The frequent use of non-cardiovascular drugs indicated the presence of comorbid conditions, such as gastroesophageal reflux disease and anxiety. **Conclusion:** This study highlights the prescription patterns for ischemic heart disease and their adherence to standard management practices concluding that antiplatelets were the most commonly prescribed drugs. It also emphasizes the need for future research with larger populations and an assessment of clinical outcomes.

**KEYWORDS :** prescription pattern, ischemic heart disease, antiplatelets, coronary heart disease.

## INTRODUCTION

Ischemic heart disease (IHD) is a condition characterized by an inadequate supply of blood and oxygen to the myocardium, typically due to an imbalance between myocardial oxygen supply and demand. [1] Coronary heart disease and IHD represent significant global health concerns. In the U.S., NHANES data from 2003 to 2006 estimated that 17.6 million Americans aged 20 or older had CHD, with a prevalence of 7.9%, and 935,000 new or recurrent myocardial infarctions (MI) annually. CHD was the leading cause of death in 2006, contributing to one in six deaths. [2] Globally, in 2017, IHD affected 126 million people, with a prevalence of 1,655 per 100,000, causing around nine million deaths and remaining the leading cause of mortality for over two decades. The prevalence of IHD is projected to rise to over 1,845 per 100,000 by 2030, with higher rates in Central and Eastern Europe and a notable increase in disability and years of life lost worldwide. [3]

IHD arises from an imbalance between myocardial oxygen supply and demand. Normally, coronary arteries regulate blood flow based on heart rate, contractility, and wall tension. Atherosclerosis narrows these arteries, limiting blood flow and affecting the heart's ability to meet increased oxygen demands. Other factors contributing to IHD include coronary spasm, thrombi, congenital abnormalities, severe left ventricular hypertrophy, anemia, and microvascular angina, which involves abnormal constriction or dilation of small coronary vessels. [1] Diagnosis is based on elevated troponins, myocardial ischemia symptoms, ECG changes, and myocardial impairment. Highly sensitive troponin tests improve sensitivity but reduce specificity. Treatment includes early reperfusion: PCI within 12 hours for STEMI, fibrinolysis for other cases. PCI patients should get dual antiplatelet therapy and low-molecular-weight heparin. Early invasive strategies and antiplatelet therapy are key for non-ST segment elevation acute coronary syndrome. Stem cell therapy is under investigation. [4]

Prescription pattern monitoring studies (PPMS) are essential for evaluating and promoting the rational use of medicines (RUM). These studies help identify deviations from regulatory guidelines, contributing to issues like treatment failure, antimicrobial resistance, and increased healthcare costs. Despite the abundance of PPMS data in India, its effective utilization is crucial to enhance RUM, bridge gaps with pharmacovigilance, and improve overall healthcare outcomes. [5] This study aims to analyse the prescription patterns of both cardiovascular and non-cardiovascular drug classes in the treatment of ischemic heart disease patients at a government medical college hospital in Tamil Nadu.

## MATERIAL AND METHODS

### Study Design

This observational prospective study was conducted at the Government Medical College, Nagapattinam, over six months from April to September 2023. The study included a total of 100 subjects.

### Inclusion Criteria

The inclusion criteria for the study were patients aged 31 years and above, both male and female, including those in the intensive care unit, geriatric patients, adult patients, and those willing to participate in the study.

### Exclusion Criteria

Exclusion criteria included patients below 30 or above 90 years of age, those unwilling to participate, pregnant or lactating women, pediatric patients, and outpatients.

### Data Collection and Analysis

Data collection occurred during ward rounds and regular follow-ups, ensuring comprehensive coverage of patient information. Following collection, the data were cleaned and analysed according to the defined inclusion and exclusion criteria. Microsoft excel version 2021 was used throughout the study for data analysis and interpretation.

### Ethical Considerations

The study involved patients visiting the cardiac in-patient departments who were enrolled after obtaining their consent and was conducted in accordance with ethical standards, ensuring the rights and welfare of the participants were respected at all stages of the study.

## RESULTS

### Demographical distribution

Most patients diagnosed with ischemic heart disease were in the age group of 51 to 60 years. The risk of ischemic heart disease varies with age, increasing in certain age groups and decreasing in others. (Table.1)

**Table.1: Age distribution in IHD**

| Age | No. of patients | | Total (percentage) |
|---|---|---|---|
| | Male | Female | |
| 31-40 | 2 | 2 | 4% |
| 41-50 | 29 | 3 | 32% |
| 51-60 | 25 | 8 | 33% |
| 61-70 | 15 | 5 | 20% |
| 71-80 | 5 | 2 | 7% |
| 81-90 | 3 | 1 | 4% |

Similarly, from the population it is found that male (79%) had a higher prevalence rate of IHD than female population (21%). (Figure.1)

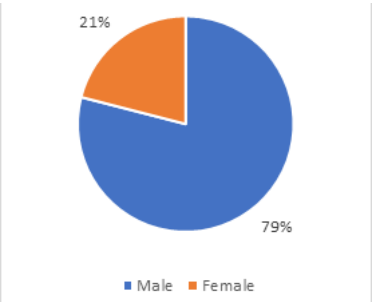


**Figure.1:** Gender distribution in IHD

### Prescription pattern of ischemic heart disease

Based on the study conducted on treatment strategies for ischemic heart disease, the most commonly prescribed medications were antiplatelet drugs (17.26%), followed by antihypertensive drugs (17%), antihyperlipidemic drugs (8.76%), anticoagulants (7.80%), nitrates (7.18%), inotropes (1.22%), and thrombolytic agents (1.13%). (Figure.2)

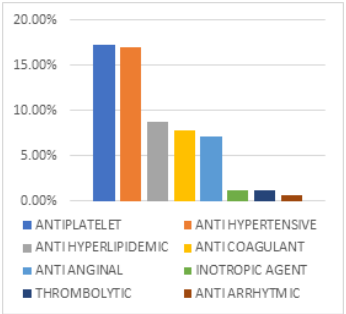


**Figure.2:** Prescription pattern of ischemic heart disease

### Other Drug Categories Used In Ischemic Heart Disease

The study revealed that among the medications prescribed, antacids (8.93%) were the most frequently used, followed by benzodiazepines (7.27%), laxatives (6.27%), antidiabetic drugs (5.10%), and vitamin supplements (3.50%). Other notable categories include antiemetics (2.45%), antibacterials (1.90%), and bronchodilators (1.22%). Less commonly prescribed were antipyretics (0.80%), antihistamines (0.43%), corticosteroids (0.35%), and analgesics (0.17%), with antifungals, antidepressants, antithyroid drugs, antivirals, and emollients each comprising less than 0.20%. (Table.2)

**Table.2: Other drug categories used in IHD**

| Other drug categories | Total (percentage) |
|---|---|
| Antacid | 8.93% |
| Benzodiazepine | 7.27% |
| Laxative | 6.27% |
| Anti-diabetic | 5.10% |
| Vitamin supplement | 3.50% |
| Anti-emetics | 2.45% |
| Anti-bacterial | 1.90% |
| Bronchodilators | 1.22% |
| Antipyretic | 0.80% |
| Antihistamine | 0.43% |
| Corticosteroids | 0.35% |
| Analgesics | 0.17% |
| Anti-fungal | 0.17% |
| Anti-depressants | 0.17% |
| Anti hypothyroidism | 0.17% |
| Anti hyperthyroidism | 0.08% |
| Anti-viral | 0.08% |
| Emollient | 0.08% |

### Details of drugs prescribed to ischemic heart disease patients

The study highlighted that aspirin and clopidogrel were almost equally prescribed as antiplatelet agents. Enalapril, metoprolol, and heparin were exclusively used in their categories, while atorvastatin was the dominant antihyperlipidemic drug. Adrenaline was the most common inotropic agent, and streptokinase was the sole thrombolytic agent prescribed. (Table.3)

**Table.3: Drugs prescribed to ischemic heart disease patients**

| Category | Drugs prescribed | N % |
|---|---|---|
| Antiplatelet | Aspirin (100) | 50.7% |
| | Clopidogrel (97) | 49.3% |
| ACE inhibitors | Enalapril (80) | 100% |
| Beta blockers | Metoprolol (68) | 100% |
| Diuretics | Furosemide (22) | 62.8% |
| | Spironolactone (13) | 37.2% |
| Calcium channel blocker | Amlodipine (8) | 88% |
| Alpha &beta blocker | Carvedilol (1) | 100% |
| Angiotensin receptor blocker | Telmisartan (1) | 100% |
| Anti hyperlipidaemic | Atorvastatin (96) | 96% |
| | Rosuvastatin (4) | 4% |
| Anti-coagulant | Heparin (89) | 100% |
| Anti anginal | Isosorbide dinitrate (82) | 100% |
| Inotropic agent | Adrenaline (7) | 50% |
| | Dopamine (5) | 35.7% |
| | Nor-adrenaline (2) | 14.3% |
| Thrombolytic agent | Streptokinase (13) | 100% |
| Anti arrhythmic agent | Digoxin (8) | 100% |

### Other prescribed drug categories

The study's drug prescription analysis highlighted key trends, with Ranitidine, Diazepam, and Bisacodyl being the most commonly prescribed within their respective categories. Insulin and Metformin were the primary antidiabetic agents, while Ondansetron was the sole antiemetic. Piperacillin, Salbutamol, and Paracetamol were frequently used in their groups. Exclusive prescriptions were noted for several drugs, including Morphine, Amitriptyline, and Oseltamivir. (Table.4)

**Table.4: Other prescribed drug categories to ischemic heart disease patients**

| Category | Drugs prescribed | N % |
|---|---|---|
| Antacid | Ranitidine (90) | 86.6% |
| | Omeprazole (9) | 8.7% |
| | Pantoprazole (2) | 1.9% |
| | Sodium bicarbonate (1) | 0.9% |
| | Pantoprazole (2) | 1.9% |
| Benzodiazepine | Diazepam (75) | 90.4% |
| | Alprazolam (8) | 9.6% |
| Laxative | Bisacodyl (70) | 100% |
| Anti diabetic | Insulin (26) | 44.1% |
| | Metformin (25) | 42.3% |
| | Glimepiride (8) | 13.6% |
| Vitamin supplement | BCT (30) | 73.2% |
| | Vitamin B-1 (7) | 17.1% |
| | Calcium (3) | 7.3% |
| | Ferrous sulphate (1) | 2.4% |
| Anti emetics | Ondansetron (28) | 100% |
| Anti-bacterial agent | Penicillin | |
| | Piperacillin (7) | 100% |
| | Cephalosporins | |
| | Cefotaxime (5) | 55% |
| | Ceftriaxone (4) | 44% |
| | Macrolide | |
| | Azithromycin (3) | 100% |
| | Oxolidone antibiotics | |
| | Linezolid (2) | 100% |
| | Quinolone | |
| | Ciprofloxacin (1) | 100% |
| Bronchodilators | Salbutamol (8) | 57.1% |
| | Orciprenaline (3) | 21.4% |
| | Theophylline (2) | 14.3% |
| | Ipratropium bromide (1) | 7.2% |
| Anti pyretic | Paracetamol (10) | 100% |
| Antihistamine | Betahistine (2) | 40% |
| | Cetirizine (2) | 40% |
| | Chlorpheniramine maleate (1) | 20% |
| Corticosteroids | Hydrocortisone (3) | 75% |
| | Dexamethasone (1) | 25% |
| Analgesics | Morphine (2) | 100% |
| Antifungal agent | Albendazole (2) | 100% |
| Antidepression agents | Amitriptyline (2) | 100% |
| Anti- hypothyroid agent | Thyroxine (2) | 100% |
| Anti- hyperthyroid agent | Carbimazole (1) | 100% |
| Anti-viral agent | Oseltamivir (1) | 100% |
| Emollient | Liquid paraffin (1) | 100% |

## DISCUSSION

This study revealed that IHD predominantly affected individuals in the 51-60 years age group, which aligns with existing literature suggesting that the risk of IHD increases with age, particularly in the fifth and sixth decades of life. This trend is reflective of the aging process and the cumulative effect of risk factors such as hypertension, diabetes, and hyperlipidemia, which are more prevalent in older populations. The male predominance observed (76.3% of the total cases) is consistent with global patterns, where men are generally at higher risk for IHD compared to women due to factors such as higher prevalence of smoking and other lifestyle-related risks. The results were concurrent with the study findings of Panday et al [6] and Rajesh et al [7] as they also found that men have a higher predominance to IHD than women.

The study's findings indicate that antiplatelet agents were the most frequently prescribed medications comparing with other class of drugs, highlighting the critical role of these agents in secondary prevention of cardiovascular events. These study finding were relevant to the results of Panchaksharimath et al [8] and Sawant et al [9] as their findings also states that antiplatelets were the most commonly prescribed agents. Antihypertensive medications, play a key role in IHD management, with the prevalent use of ACE inhibitors like enalapril and beta-blockers such as metoprolol aligning with guidelines for their cardioprotective benefits. The lower prescription rates of calcium channel blockers and angiotensin receptor blockers may be due to specific patient characteristics or prescriber preferences.

Additionally, the high prescription rate of antihyperlipidemic drugs, particularly atorvastatin, highlights the focus on lipid control, while the minimal use of rosuvastatin could be influenced by cost or prescriber choice, as atorvastatin is widely recognized for its efficacy in reducing cardiovascular events. [10]

The study also revealed substantial use of medications not directly related to IHD management, such as antacids and benzodiazepines. The frequent use of antacids may indicate a high prevalence of gastroesophageal reflux disease (GERD) among IHD patients, potentially exacerbated by lifestyle factors or polypharmacy. Similarly, the prescription of benzodiazepines could reflect an attempt to manage anxiety and improve patient compliance, though this raises concerns about the long-term use of such agents given their potential for dependence. Laxatives and antidiabetic drugs were also commonly prescribed, suggesting the presence of comorbid conditions such as constipation and diabetes mellitus, which are often associated with IHD. The diverse range of other prescribed medications, including antibiotics and bronchodilators, highlights the complexity of treating IHD patients. These results were concurrent with the findings of Roy et al study of utilization trends of drugs in patients admitted with ischemic heart disease in a tertiary care teaching hospital. [11]

The observed prescription patterns largely conform to established guidelines for the management of IHD, with a strong emphasis on the use of antiplatelets, antihypertensives, and statins. However, the notable use of non-cardiovascular medications points to the need for careful monitoring of drug-drug interactions and the overall burden of polypharmacy, particularly in elderly patients.

However this study provides valuable insights into the prescription patterns for IHD, it is limited by its sample size and single centre design. Additionally, the study did not assess clinical outcomes associated with the observed prescription patterns, which could be an area for future research. Longitudinal studies examining the impact of these prescribing practices on patient outcomes, including adherence and adverse events, would be beneficial.

## CONCLUSION

This study highlights the prescription patterns and their adherence to standard IHD management practices including widespread use of non-cardiovascular medications in the patient population. These findings underscore the importance of a holistic approach to IHD management, taking into account the broader health needs of patients. Optimizing prescription practices and ensuring comprehensive patient

care will be crucial in improving long-term outcomes for individuals with ischemic heart disease. In conclusion, the study offers valuable insights into IHD prescription patterns even though it is limited by its small sample size and single centre design. Future research should explore the prescription pattern in a wide range of population and their clinical outcomes.

**Acknowledgement**

Authors would like to thank all the physicians in the department of cardiology at Government medical college, Nagapattinam for their general support throughout the study.

**Author contribution**

All authors contributed equally to the outcome of the study.

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