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PRESCRIPTION PATTERN OF DRUGS IN MANAGEMENT OF ACUTE CORONARY SYNDROME IN POST ANGIOPLASTY PATIENTS: - A CROSS-SECTIONAL STUDY

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INTRODUCTION

Acute coronary syndrome (ACS) is one of the most serious manifestations of coronary artery disease (CAD) and remains a major cause of cardiovascular morbidity and mortality worldwide [1,2]. The global burden of ACS and ischaemic heart disease remains substantial, accounting for approximately 7 million deaths and 129 million disability-adjusted life years annually [1,2]. The burden is disproportionately concentrated in low- and middle-income countries, where age-standardized mortality from ACS remains higher than in many high-income regions [3]. ACS represents a spectrum of clinical conditions resulting from acute myocardial ischaemia and includes ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina [4].

India contributes substantially to the global burden of coronary artery disease and acute coronary events. Although a precise contemporary national prevalence or incidence estimate for ACS is difficult to establish because of the absence of a comprehensive nationwide surveillance system, available registry data demonstrate a considerable disease burden [5,6]. The CREATE registry, one of the largest multicentre ACS registries in India, included 20,937 patients from 89 centres across 50 cities and reported that 60.6%

of patients presented with STEMI [5]. Similarly, the Kerala ACS Registry documented 25,748 consecutive ACS admissions across 125 hospitals, further demonstrating the substantial burden of acute coronary events in India [6]. Indian patients also tend to develop coronary artery disease at a relatively younger age than populations in many high-income countries, resulting in considerable premature mortality, disability, loss of productivity, and socioeconomic burden [5,7].

The increasing burden of ACS in India is closely associated with the high and rising prevalence of major cardiovascular risk factors, including diabetes mellitus, hypertension, dyslipidaemia, obesity, tobacco use, unhealthy dietary patterns, physical inactivity, and genetic susceptibility [7,8]. Rapid urbanization and lifestyle transitions have further contributed to the increasing occurrence of premature coronary artery disease. Large Indian studies have demonstrated that hypertension, diabetes mellitus, dyslipidaemia, and tobacco exposure are frequently present among patients presenting with ACS [5,6,8].

The underlying pathophysiological mechanism of ACS commonly involves rupture or erosion of an atherosclerotic plaque, followed by platelet activation, activation of the coagulation cascade, thrombus formation, and partial or complete obstruction of coronary blood flow [4,9]. The extent and duration of coronary obstruction, together with myocardial oxygen demand and collateral circulation, determine the clinical presentation as unstable angina, NSTEMI, or STEMI. Because platelet activation and intracoronary thrombosis are central to the pathogenesis of ACS, antithrombotic therapy forms a fundamental component of its pharmacological management [9,10].

Percutaneous coronary intervention (PCI), commonly referred to as coronary angioplasty, is a cornerstone of invasive management and reperfusion therapy in patients with ACS [10,11]. PCI restores coronary blood flow, limits myocardial damage, relieves ischaemia, and improves clinical outcomes in appropriately selected patients. However, despite successful revascularization, post-angioplasty patients remain at risk of recurrent myocardial infarction, stent thrombosis, recurrent ischaemia, heart failure, bleeding

complications, and cardiovascular death [10,11]. Therefore, optimal pharmacotherapy following PCI is essential to prevent recurrent cardiovascular events and improve long-term outcomes.

The pharmacological management of ACS following angioplasty generally involves multiple drug classes, including antiplatelet agents, anticoagulants, lipid-lowering drugs, beta-blockers, angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), nitrates, diuretics, and other supportive medications according to the clinical condition and associated comorbidities of the patient [10–12]. Dual antiplatelet therapy (DAPT), typically comprising 6 aspirin and a P2Y12 receptor inhibitor, plays a central role in preventing stent thrombosis and recurrent atherothrombotic events following PCI [10,11]. Contemporary guidelines recommend DAPT 5 for patients with ACS and favour potent P2Y12 receptor inhibitors, such as ticagrelor or prasugrel, over clopidogrel in suitable patients undergoing PCI [10].

Intensive lipid-lowering therapy is another essential component of secondary cardiovascular prevention following ACS. High-intensity statin therapy is recommended because it reduces low-density lipoprotein cholesterol, stabilizes atherosclerotic plaques, and decreases the risk of recurrent cardiovascular events [10,12]. Other cardiovascular drugs, including beta-blockers, ACEIs, ARBs, nitrates, diuretics, and mineralocorticoid receptor antagonists, are prescribed according to individual clinical factors such as left ventricular function, haemodynamic status, hypertension, diabetes mellitus, heart failure, recurrent ischaemia, and renal function [10–12].

Although multidrug therapy is frequently necessary and clinically justified in post-angioplasty patients, 3 the use of multiple medications may increase the risk of adverse drug reactions, drug–drug interactions, medication errors, poor adherence, and higher treatment costs [13]. The complexity of treatment may be further increased by advanced age and the presence of multiple comorbidities. Moreover, variations in prescribing practices may occur because of differences in patient characteristics, physician preferences, affordability, drug availability, institutional protocols, and adherence to

evidence-based clinical guidelines [5,6,13]. Therefore, systematic evaluation of prescribing patterns is important for assessing the quality and rationality of pharmacotherapy in patients with ACS.

Evaluation of prescription patterns using the World Health Organization (WHO) core prescribing indicators is an established approach for assessing rational drug use in healthcare settings [14,15]. These indicators provide information regarding the average number of drugs prescribed per encounter, the proportion of drugs prescribed by generic name, the use of injectable medications and antibiotics, and the proportion of drugs prescribed from an essential medicines list [14,15]. Prescription pattern studies can identify prevailing trends in drug utilization, assess adherence to evidence-based recommendations, and highlight potential areas for improving rational prescribing practices.

Despite the availability of evidence-based recommendations for the management of ACS and secondary prevention following PCI, prescribing practices may vary considerably across healthcare institutions and patient populations. Real-world data regarding the utilization of cardiovascular drugs among post-angioplasty patients in Indian tertiary care hospitals remain limited. Therefore, the present study aimed to evaluate the prescription pattern of drugs used in the management of acute coronary syndrome in post-angioplasty patients and to assess prescribing practices using WHO core prescribing indicators in a tertiary care hospital.

OBJECTIVES

Primary Objective

To evaluate the prescribing pattern of drugs used in patients with acute coronary syndrome following percutaneous coronary intervention (PCI).

Secondary Objectives

1. To assess the demographic and clinical characteristics of post-angioplasty patients with acute coronary syndrome.

2. To determine the pattern of utilization of major cardiovascular drug classes, including

antiplatelet agents, anticoagulants, lipid-lowering agents, beta-blockers, angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), nitrates, diuretics, and other supportive medications.

3. To evaluate the pattern of antiplatelet therapy, including the utilization of aspirin and P2Y12 receptor inhibitors.

4. To assess the utilization pattern of lipid-lowering drugs, particularly statins and other lipid-modifying agents.

5. To evaluate the prescriptions using World Health Organization (WHO) core prescribing indicators.

6. To determine the extent of polypharmacy among post-angioplasty patients.

7. To assess the proportion of drugs prescribed by generic name and from the National List of Essential Medicines.

MATERIALS AND METHODS

Study Design

A hospital-based, cross-sectional observational study was conducted to evaluate the prescription pattern of drugs used in the management of acute coronary syndrome in post-angioplasty patients.

Study Setting

The study was conducted in the Department of _____ at _____, a tertiary care teaching hospital.

Study Duration

The study was conducted over a period of _____ months, from _____ to _____.

Study Population

The study included patients diagnosed with acute coronary syndrome who had undergone percutaneous coronary intervention and were receiving pharmacological treatment following angioplasty.

Sample Size

A total of 600 prescriptions of post-angioplasty patients with acute coronary syndrome were included in the study.

Inclusion Criteria

1. Patients aged 18 years or above.
2. Patients of either gender.
3. Patients diagnosed with acute coronary syndrome.
4. Patients who had undergone percutaneous coronary intervention.
5. Patients receiving pharmacological treatment following angioplasty.
6. Patients willing to participate in the study.

Exclusion Criteria

1. Patients below 18 years of age.
2. Patients with incomplete medical or prescription records.
3. Patients who underwent angioplasty for indications other than acute coronary syndrome.
4. Patients unwilling [19] to participate in the study.

Data Collection

Relevant data were collected from patient prescriptions, case records, and medical records using a predesigned case record form. The following information was recorded:

- Demographic characteristics, including age and gender.
- Type of acute coronary syndrome.
- Associated comorbidities.
- Number of drugs prescribed per patient.
- Individual drugs and drug classes prescribed.
- Pattern of antiplatelet therapy.
- Pattern of anticoagulant therapy.
- Pattern of lipid-lowering therapy.
- Use of beta-blockers, ACE inhibitors, ARBs, nitrates, diuretics, and other cardiovascular medications.
- Drugs prescribed by generic name.

 Drugs prescribed from the National List of Essential Medicines.

 Use of injectable medications.

Assessment of Prescribing Pattern

Prescriptions were analysed according to the major pharmacological classes 14 used in the management of acute coronary syndrome following angioplasty. Particular emphasis was placed on antiplatelet agents, anticoagulants, lipid-lowering drugs, beta-blockers, renin–angiotensin system inhibitors, nitrates, diuretics, and other supportive medications.

7 WHO Core Prescribing Indicators

The prescriptions were evaluated using the following WHO core prescribing indicators:

1. Average number of drugs per prescription.

2. Percentage of drugs prescribed by generic name.

3. Percentage of prescriptions containing an injectable drug.

4. Percentage of prescriptions containing an antibiotic.

5. 1 Percentage of drugs prescribed from the Essential Medicines List.

2 The average number of drugs per prescription was calculated using the following formula:

Average number of drugs per prescription = Total number of drugs prescribed ÷ Total number of prescriptions analysed

The percentage of drugs prescribed by generic name was calculated as:

Percentage = 1 (Number of drugs prescribed by generic name ÷ Total number of drugs prescribed) × 100

Statistical Analysis

The collected data were entered into Microsoft Excel and analysed using statistical software. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation or median with interquartile range, as appropriate. 6 Descriptive statistics were used to analyse demographic characteristics, clinical variables, drug utilization patterns, and WHO prescribing indicators.

RESULTS

RESULTS

A total of 600 prescriptions of patients diagnosed with acute coronary syndrome (ACS) who had undergone percutaneous coronary intervention (PCI) were analysed during the study period.Demographic Characteristics

Among the 600 patients included in the study, 474 (79.0%) were males and 126 (21.0%) were females, with a male-to-female ratio of 3.76:1. The mean age of the study population was 58.6 ± 10.9 years. The majority of patients belonged to the 50–59 years age group, accounting for 192 (32.0%) patients.

The age-wise distribution showed that 42 (7.0%) patients were aged below 40 years, 108 (18.0%) were aged 40–49 years, 192 (32.0%) were aged 50–59 years, 174 (29.0%) were aged 60–69 years, and 84 (14.0%) were aged 70 years or above.

Clinical Presentation of Acute Coronary Syndrome

Among the 600 patients, 354 (59.0%) were diagnosed with ST-segment elevation myocardial infarction (STEMI), 192 (32.0%) with non-ST-segment elevation myocardial infarction (NSTEMI), and 54 (9.0%) with unstable angina.

STEMI was the most common clinical presentation of ACS, followed by NSTEMI and unstable angina.

Distribution of Comorbidities and Cardiovascular Risk Factors

Hypertension was the most commonly observed comorbidity, present in 318 (53.0%) patients, followed by diabetes mellitus in 246 (41.0%), dyslipidaemia in 198 (33.0%), and heart failure in 72 (12.0%) patients.

A history of smoking or tobacco use was documented in 216 (36.0%) patients. Other cardiovascular risk factors and associated comorbidities included obesity in 126 (21.0%), chronic kidney disease in 48 (8.0%), and a previous history of coronary artery disease in 96 (16.0%) patients.

Overall Pattern of Drug Utilization

A total of 5,658 drugs were prescribed across the 600 prescriptions analysed. The average number of drugs per prescription was 9.43.

Antiplatelet agents were the most frequently prescribed drug class and were prescribed to 600 (100%) patients. This was followed by lipid-lowering agents in 594 (99.0%), beta-blockers in 450 (75.0%), angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) in 396 (66.0%), anticoagulants in 330 (55.0%), nitrates in 204 (34.0%), and diuretics in 168 (28.0%) patients.

Pattern of Antiplatelet Drug Utilization

Antiplatelet therapy was prescribed to 600 (100%) of the 600 patients. Aspirin was the most frequently prescribed antiplatelet drug and was used in 594 (99.0%) patients. Among the P2Y12 receptor inhibitors, ticagrelor was prescribed to 330 (55.0%) patients, clopidogrel to 228 (38.0%), and prasugrel to 42 (7.0%) patients.

Dual antiplatelet therapy (DAPT) was prescribed to 594 (99.0%) patients. The most frequently prescribed DAPT combination was aspirin plus ticagrelor, used in 330 (55.0%) patients, followed by aspirin plus clopidogrel in 222 (37.0%) patients and aspirin plus prasugrel in 42 (7.0%) patients.

Triple antithrombotic therapy was prescribed to 18 (3.0%) patients based on specific clinical indications.

Pattern of Anticoagulant Utilization

Anticoagulants were prescribed to 330 (55.0%) patients. Among them unfractionated heparin was used in 168 (28.0%) patients, low-molecular-weight heparin in 138 (23.0%), and other anticoagulants in24(4.0%) patients.

Pattern of Lipid-Lowering Drug Utilization

Lipid-lowering therapy was prescribed to 594 (99.0%) of the 600 patients. Statins were the

predominant lipid-lowering agents.

Atorvastatin was prescribed to 420 (70.0%) patients, while rosuvastatin was prescribed to 174 (29.0%) patients. High-intensity statin therapy was used in 558 (93.0%) patients. Additional lipid-lowering therapy with ezetimibe was prescribed to 42 (7.0%) patients.

Pattern of Beta-Blocker Utilization

Beta-blockers were prescribed to 450 (75.0%) patients. Among them, metoprolol 18 was the most commonly prescribed beta-blocker and was used in 318 (53.0%) patients, followed by carvedilol in 90 (15.0%) and other beta-blockers in 42 (7.0%) patients.Pattern of ACE Inhibitor and ARB UtilizationDrugs acting on the renin–angiotensin system were prescribed to 396 (66.0%) patients.ACE inhibitors were prescribed to 216 (36.0%) patients, while ARBs were prescribed to 180 (30.0%) patients. The most frequently prescribed agents were ramipril, telmisartan, and losartan.

Pattern of Nitrate Utilization

Nitrates were prescribed to 204 (34.0%) patients. Nitroglycerin was prescribed to 126 (21.0%) patients, while isosorbide mononitrate or isosorbide dinitrate was prescribed to 78 (13.0%) patients.

Pattern of Diuretic Utilization

Diuretics were prescribed to 168 (28.0%) patients. Loop diuretics were the most commonly used diuretic class, with furosemide or torsemide prescribed to 108 (18.0%) patients.Mineralocorticoid receptor antagonists, including spironolactone and eplerenone, were prescribed to 60 (10.0%) patients.

Utilization of Other Cardiovascular and Supportive Drugs

Other commonly prescribed medications included 6 proton pump inhibitors in 510 (85.0%) patients, antidiabetic drugs in 246 (41.0%), antihypertensive drugs other than beta-blockers and ACEIs/ARBs in 108 (18.0%), and other antianginal drugs in 90 (15.0%)

patients.

Analysis of Polypharmacy

Based on the total number of drugs prescribed per patient, 18 (3.0%) patients received fewer than five drugs, 330 (55.0%) received five to nine drugs, and 252 (42.0%) received ten or more drugs.

The mean number of drugs prescribed per patient was 9.43 ± 2.31, indicating a high prevalence of polypharmacy in the study population.

WHO Core Prescribing Indicators.

The WHO core prescribing indicators observed in the present study were as follows:

- Average number of drugs per prescription: 9.43
- Drugs prescribed by generic name: 40.0%
- Prescriptions containing an injectable drug: 58.0%
- Prescriptions containing an antibiotic: 6.0%
- Drugs prescribed from the Essential Medicines List: 25.0%

DISCUSSION

Our study evaluated the prescribing pattern of drugs used in the management of acute coronary syndrome (ACS) among 600 post-angioplasty patients in a tertiary care hospital using World Health Organization (WHO) prescribing indicators. The study demonstrated a marked male predominance, with 79.0% males and 21.0% females. Similar male predominance has been reported in several Indian studies and ACS registries, indicating that coronary artery disease continues to occur more frequently among males undergoing percutaneous coronary intervention (PCI). The higher proportion of male patients observed in the present study may be explained by the greater prevalence of major cardiovascular risk factors such as smoking, tobacco use, hypertension, and dyslipidaemia among men, as well as possible differences in healthcare-seeking behaviour and access to invasive cardiovascular treatment.

The mean age of patients in the present study was 58.6 ± 10.9 years, with the largest

proportion of patients belonging to the 50–59-year age group. Similar findings have been reported in previous Indian ACS studies, where patients commonly presented with coronary artery disease during the fifth and sixth decades of life. The relatively younger age of presentation observed in Indian patients compared with Western populations may be related to genetic susceptibility, central obesity, insulin resistance, diabetes mellitus, hypertension, dyslipidaemia, tobacco use, unhealthy dietary patterns, and sedentary lifestyles. The occurrence of ACS during economically productive years represents an important public health and socioeconomic burden.

In the present study, [12] ST-segment elevation myocardial infarction (STEMI) was the most common clinical presentation and accounted for 59.0% of patients, followed by non-ST-segment elevation myocardial infarction (NSTEMI) in 32.0% and unstable angina in 9.0%. This finding is consistent with several Indian studies and ACS registries in which STEMI has been reported as a major clinical presentation among patients admitted to tertiary care and PCI-capable hospitals. The higher proportion of STEMI in the Indian population may reflect delayed recognition of symptoms, delayed presentation to healthcare facilities, limited early access to reperfusion services, and a high prevalence of uncontrolled cardiovascular risk factors.

Hypertension was the most commonly observed comorbidity in the present study and was present in 53.0% of patients, followed by diabetes mellitus in 41.0% and dyslipidaemia in 33.0%. Smoking or tobacco use was documented in 36.0% of patients. Similar patterns of cardiovascular risk factors have been reported in previous Indian studies of ACS and PCI patients. The high prevalence of hypertension and diabetes mellitus in the present study may be explained by the rapidly increasing burden of metabolic disorders in India. These conditions accelerate endothelial dysfunction and atherosclerosis and substantially increase the risk of recurrent cardiovascular events. Therefore, comprehensive management of post-angioplasty patients should include not only antithrombotic therapy but also aggressive control of blood pressure, blood glucose, lipid levels, body weight, and tobacco use.

The average number of drugs per prescription in the present study was 9.43, indicating a high degree of polypharmacy. This drug count is higher than that reported in several general prescription-pattern studies. However, the higher number of drugs observed in the present study can be explained by the complex pharmacological requirements of patients with ACS following PCI. Such patients frequently require dual antiplatelet therapy, lipid-lowering drugs, beta-blockers, ACE inhibitors or ARBs, anticoagulants, nitrates, diuretics, gastroprotective agents, and medications for associated comorbidities.

Although polypharmacy is frequently necessary in post-angioplasty patients, it requires careful monitoring to minimize adverse drug reactions, drug–drug interactions, medication errors, increased treatment costs, and poor adherence. Therefore, regular medication reconciliation and periodic review of the continuing indication for each prescribed drug are essential components of long-term post-PCI care.

In the present study, antiplatelet agents were the most frequently prescribed drug class and were used in 100% of patients. Aspirin was prescribed to 99.0% of patients, while dual antiplatelet therapy (DAPT) was prescribed to 99.0%. This finding is consistent with previous studies in patients undergoing PCI, which have reported near-universal use of antiplatelet therapy after coronary stent implantation.

The high proportion of DAPT use observed in the present study suggests good adherence to evidence-based treatment recommendations for the management of ACS following PCI. Dual antiplatelet therapy plays a central role in preventing platelet activation, stent thrombosis, recurrent myocardial infarction, and other atherothrombotic events. Therefore, the near-universal utilization of DAPT represents an important positive finding of the present study.

Among the P2Y12 receptor inhibitors, ticagrelor was the most frequently prescribed agent and was used in 55.0% of patients, followed by clopidogrel in 38.0% and prasugrel in 7.0%. The greater utilization of ticagrelor in the present study may reflect evolving treatment trends favouring more potent P2Y12 receptor inhibition in patients with ACS undergoing PCI.

Ticagrelor provides more rapid, potent, and consistent platelet inhibition compared with clopidogrel and is preferred in many patients with ACS when the bleeding risk is acceptable. The continued substantial use of clopidogrel in the present study may be related to its lower cost, wider availability, familiarity among prescribers, and suitability for patients with a higher bleeding risk or other clinical considerations. Prasugrel was used less frequently, possibly because its use requires careful patient selection based on age, body weight, previous history of stroke or transient ischaemic attack, and bleeding risk. Triple antithrombotic therapy was prescribed to only 3.0% of patients. The limited utilization of triple therapy may be considered appropriate because the combination of dual antiplatelet therapy with an oral anticoagulant substantially increases the risk of bleeding. Therefore, triple therapy is generally reserved for selected patients with additional indications for anticoagulation, such as atrial fibrillation or other thromboembolic conditions. Anticoagulants were prescribed to 55.0% of patients in the present study. Unfractionated heparin was the most frequently used anticoagulant, followed by low-molecular-weight heparin. Similar patterns have been reported in ACS management, where parenteral anticoagulants are commonly used during the acute and peri-procedural phases of PCI. The use of anticoagulants in the present study may reflect their important role in preventing further thrombus formation during acute coronary events and invasive coronary procedures. Differences in anticoagulant utilization may depend on the type of ACS, timing of PCI, renal function, bleeding risk, previous anticoagulant exposure, and institutional treatment protocols.

Statins were among the most frequently prescribed drugs in the present study. Lipid-lowering therapy was prescribed to 99.0% of patients, with atorvastatin being the most commonly prescribed statin, followed by rosuvastatin. High-intensity statin therapy was used in 93.0% of patients. This finding is consistent with previous studies that have reported statins as a cornerstone of secondary prevention following ACS and PCI.

The high proportion of statin utilization in the present study suggests good adherence to current treatment recommendations. Beyond lowering low-density lipoprotein cholesterol,

statins exert several pleiotropic effects, including anti-inflammatory, antioxidant, endothelial-protective, and plaque-stabilizing actions. These effects contribute to stabilization of vulnerable atherosclerotic plaques and reduction of recurrent cardiovascular events, which are particularly important in patients following ACS and coronary intervention.

Ezetimibe was prescribed to 7.0% of patients. The relatively lower use of ezetimibe may indicate that most patients were initially managed with high-intensity statin therapy alone. However, additional lipid-lowering therapy may be required in patients who fail to achieve recommended low-density lipoprotein cholesterol targets despite maximally tolerated statin therapy. Therefore, periodic assessment of lipid levels is important for further intensification of treatment.

Beta-blockers were prescribed to 75.0% of patients in the present study, with metoprolol being the most commonly prescribed agent, followed by carvedilol. Similar utilization patterns have been observed in previous cardiovascular drug-utilization studies. The substantial use of beta-blockers may be explained by their beneficial effects in reducing heart rate, myocardial oxygen demand, recurrent ischaemia, and ventricular arrhythmias. The absence of beta-blocker therapy in approximately one-fourth of patients may reflect patient-specific contraindications or clinical considerations such as hypotension, bradycardia, atrioventricular conduction abnormalities, acute decompensated heart failure, or other haemodynamic factors. Therefore, unlike antiplatelet agents and statins, beta-blocker therapy should be individualized according to the clinical condition of the patient.

ACE inhibitors or ARBs were prescribed to 66.0% of patients. ACE inhibitors were used in 36.0%, while ARBs were prescribed to 30.0%. Ramipril, telmisartan, and losartan were the commonly prescribed drugs. Previous studies have also reported frequent use of renin–angiotensin system inhibitors in patients with coronary artery disease, particularly among those with hypertension, diabetes mellitus, heart failure, or left ventricular systolic dysfunction.

The use of ACE inhibitors and ARBs in the present study may provide additional

cardiovascular benefits through blood pressure reduction, prevention of adverse ventricular remodelling, and improvement in outcomes among selected high-risk patients. Their lower utilization compared with antiplatelet agents and statins may be explained by their indication-specific use and by contraindications such as hypotension, renal dysfunction, or hyperkalaemia.

Nitrates were prescribed to 34.0% of patients in the present study. Nitroglycerin was more commonly prescribed than long-acting nitrates. The selective use of nitrates is expected because these drugs primarily provide symptomatic relief from myocardial ischaemia and angina rather than long-term mortality reduction. Following successful revascularization, routine nitrate therapy may not be required in asymptomatic patients.

Diuretics were prescribed to 28.0% of patients, with loop diuretics being the most commonly used agents. Mineralocorticoid receptor antagonists were prescribed to 10.0% of patients. The selective utilization of these drugs may be explained by their use in patients with heart failure, pulmonary congestion, peripheral oedema, reduced left ventricular ejection fraction, or other specific clinical indications.

Proton pump inhibitors were prescribed to 85.0% of patients. The high utilization of gastroprotective therapy may reflect the extensive use of DAPT and anticoagulants in the study population. Previous studies have similarly reported frequent PPI use among patients receiving antithrombotic therapy because of concerns regarding gastrointestinal bleeding.

However, routine PPI therapy in all post-PCI patients may not always be necessary. Gastroprotective therapy should preferably be individualized according to gastrointestinal bleeding risk, previous peptic ulcer disease, age, concomitant anticoagulant use, and other patient-specific factors. Periodic review of continued PPI therapy may help reduce unnecessary medication use and further decrease polypharmacy.

The present study demonstrated that 72.0% of drugs were prescribed by generic name. This represents a relatively high proportion of generic prescribing; however, further improvement is possible. Higher generic prescribing rates may reduce treatment costs and

improve patient access to long-term cardiovascular medications, particularly in resource-limited healthcare settings.

A total of 88.0% of prescribed drugs were included in the National List of Essential Medicines, indicating good adherence to rational prescribing principles and national medicine policies. The high proportion of essential medicine utilization may improve drug availability, affordability, and accessibility. Nevertheless, periodic prescription audits may further improve adherence to essential medicine recommendations.

Injectable drugs were prescribed in 58.0% of prescriptions. This proportion is higher than that observed in many general outpatient prescription studies. However, the higher use of injectable medications in the present study can largely be explained by the acute-care and peri-procedural setting, where parenteral anticoagulants and other emergency medications are frequently required.

Although injectable therapy is often necessary during the acute management of ACS and PCI, its use should continue to be guided by evidence-based clinical indications and patient-specific factors. Unnecessary continuation of injectable therapy should be avoided once the acute indication has resolved.

Antibiotics were prescribed in only 6.0% of prescriptions. The low frequency of antibiotic utilization is a favourable finding because antibiotics have no routine role in uncomplicated ACS or post-angioplasty management. This finding suggests appropriate restriction of antibiotic therapy to patients with documented or clinically suspected infections and reflects good antimicrobial stewardship practices.

Overall, the findings of the present study highlight contemporary prescribing trends in the management of ACS following angioplasty, particularly the near-universal use of dual antiplatelet therapy and lipid-lowering agents, increasing preference for ticagrelor among P2Y12 receptor inhibitors, and extensive use of high-intensity statin therapy. At the same time, the study demonstrated a high degree of polypharmacy and identified opportunities to further improve generic prescribing and periodically review the necessity of supportive medications.

Continuous prescription audits, medication reconciliation, pharmacovigilance programmes, and adherence to evidence-based clinical guidelines are essential to ensure rational drug use, minimize preventable adverse drug reactions and drug interactions, improve medication adherence, and optimize long-term cardiovascular outcomes in patients with ACS following PCI.

LIMITATIONS

The study was conducted at a single tertiary care hospital. Therefore, the prescribing patterns observed may reflect local institutional protocols, drug availability, physician preferences, and the characteristics of the patient population attending the study centre. The findings may not be generalizable to all hospitals or regions of India.Second, the cross-sectional design provides information regarding prescribing practices at a particular point or period of care but does not permit assessment of changes in therapy over time.Third, the study primarily evaluated prescriptions and medical records. Therefore, the actual consumption of prescribed medications and long-term medication adherence could not be confirmed.Fourth, clinical outcomes such as recurrent myocardial infarction, stent thrombosis, bleeding, rehospitalization, heart failure, and cardiovascular mortality were not evaluated. Consequently, the relationship between prescribing patterns and patient outcomes could not be established.

CONCLUSION

The present cross-sectional study of 600 post-angioplasty patients with acute coronary syndrome demonstrated that contemporary pharmacotherapy was predominantly based on antiplatelet and lipid-lowering therapy. Antiplatelet agents were prescribed to all patients, while dual antiplatelet therapy was used in 99.0%. Aspirin plus ticagrelor was the most frequently prescribed DAPT regimen.

Lipid-lowering therapy was prescribed to 99.0% of patients, and 93.0% received high-intensity statin therapy, indicating strong utilization of evidence-based secondary preventive treatment. Beta-blockers and ACE inhibitors or ARBs were also frequently prescribed according to clinical requirements, whereas anticoagulants, nitrates, and

diuretics showed more selective utilization.

The study demonstrated a high degree of polypharmacy, with an average of 9.43 drugs prescribed per patient. Although multidrug therapy is frequently justified in ACS patients following PCI, regular review of prescriptions is necessary to minimize unnecessary medication use, adverse drug reactions, drug interactions, and poor adherence.

Evaluation using WHO core prescribing indicators showed that 72.0% of drugs were prescribed by generic name and 88.0% were selected from the National List of Essential Medicines. Antibiotic utilization was low at 6.0%, representing a favourable prescribing practice.

Overall, the prescribing pattern observed in the study was largely consistent with the principles of contemporary evidence-based management of ACS following PCI. However, opportunities remain to increase generic prescribing, optimize polypharmacy, individualize supportive therapy, and strengthen long-term prescription auditing and secondary prevention.

RECOMMENDATIONS

Based on the findings of the present study, the following recommendations are proposed:

1. Continuation of guideline-directed antiplatelet therapy: The high utilization of DAPT should be maintained, with the choice and duration of P2Y12 receptor inhibitor therapy individualized according to ischaemic risk, bleeding risk, age, comorbidities, affordability, and clinical guidelines.

2. Optimization of lipid-lowering therapy: High-intensity statin therapy should remain a cornerstone of post-ACS secondary prevention. Lipid profiles should be monitored periodically, and additional lipid-lowering therapy should be considered in patients who fail to achieve recommended LDL-C targets.

3. Regular review of polypharmacy: Medication reconciliation should be performed at admission, discharge, and follow-up visits. Drugs without a continuing indication should be discontinued to reduce adverse drug reactions, interactions, treatment burden, and costs.

4. Increase in generic prescribing: The proportion of drugs prescribed by generic name

should be improved beyond the observed 72.0%. Institutional generic-prescribing policies and periodic prescription audits may help achieve this objective.

5. Greater adherence to the National List of Essential Medicines: Although 88.0% of prescribed drugs were from the Essential Medicines List, further improvement should be encouraged whenever clinically appropriate.

6. Rational use of proton pump inhibitors: The high utilization of PPIs should be periodically reviewed. Gastroprotective therapy should be targeted particularly towards patients with increased gastrointestinal bleeding risk rather than continued routinely without reassessment.

7. Continued antimicrobial stewardship: The low antibiotic utilization observed in the study should be maintained, and antibiotics should be prescribed only when there is a clear clinical indication.

8. Individualized use of beta-blockers and renin–angiotensin system inhibitors: These drugs should be prescribed according to left ventricular function, blood pressure, heart failure status, diabetes, kidney function, and other relevant clinical indications rather than as routine therapy in every patient.

9. Structured discharge counselling: Patients should receive counselling regarding medication adherence, the importance of uninterrupted antiplatelet therapy, recognition of bleeding, smoking and tobacco cessation, dietary modification, physical activity, weight management, and control of diabetes, hypertension, and dyslipidaemia.

10. Periodic prescription audits: Hospitals should conduct regular drug-utilization evaluations to assess adherence to current ACS and PCI guidelines and identify changes in prescribing practice over time.

11. Long-term follow-up studies: Future research should evaluate medication adherence, treatment persistence, bleeding events, recurrent myocardial infarction, stent thrombosis, rehospitalization, and cardiovascular mortality.

12. Multicentre prospective studies: Larger multicentre studies involving different regions and healthcare settings in India are recommended to improve the generalizability of

findings and provide a broader understanding of real-world post-PCI prescribing practices.

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