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Prescription Patterns of Drugs Used in Patients with Coronary Artery Disease at Tertiary Care Hospital

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ABSTRACT

Background: The Cardiovascular disease is emerging as one of the leading cause of morbidity and mortality worldwide. To determine the appropriateness of the prescriptions and various trends in treatment, so as to provide the basis for modification in the future drug usage in accordance with risk factors and clinical presentations and also assess the improvement of health-related quality of life of patients with coronary artery disease.

Methods: A prospective, observational and cross-sectional study was conducted in Department of Pharmacology in collaboration with Department of Medicine of tertiary healthcare hospital. As per inclusion criteria, patients visiting Medicine Outpatient department (OPD) from November 2021 to January 2022 were enrolled in the study.

Results: Total 360 prescriptions were analysed, most of them belonged to the age group of 61-75 years. The prevalence was higher in Females (54%) than males (46%). An average number of drugs per prescription was 4.5. All the drugs were prescribed by generic names. 90.63% drugs prescribed were included in World Health Organization (WHO) essential drugs list 2021. 98.40% drugs prescribed were included in National list of essential medicines (NLEM) 2015. Antiplatelets (99.44%) were the most commonly prescribed category of drugs, followed by hyperlipidaemic (96.67%).

Conclusion: The overall analysis of prescription pattern suggests that most of the drugs were prescribed rationally according to current American College of Cardiology Federation/American Heart Association (ACC/ AHA) guidelines. The incidence of polypharmacy was in the normal limits as per WHO recommendation. Generic drugs were prescribed majorly, which promotes awareness amongst prescribers, supporting WHO policies.

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Introduction

The term "cardiovascular disease" is a broad term which deals with disorders of heart or blood vessels. (1) The Cardiovascular disease is emerging as one of the leading cause of morbidity and mortality worldwide. The Cardiovascular disease involves coronary artery disease (CAD) such as Angina and Myocardial infarction (heart attack). Other CVDs include Stroke, Hypertensive heart disease, Rheumatic Heart Disease, Cardiomyopathy, Heart arrhythmias, Congenital Heart Disease, Aortic Aneurysms, Peripheral artery disease, Valvular Heart disease, and venous thrombosis (1,2). It is a condition in which vascular blood supply to the heart is hindered by Atheroma, Thrombosis or Spasm of coronary arteries. It is mainly due accumulation of atherosclerotic plaque (atherosclerosis) in the inner lining of the blood vessels, thereby occluding the lumen of the blood vessels i.e., Coronary arteries supplying the heart. This is due to imbalance in the myocardial oxygen supply-demand relationship. This imbalance may be caused by an increase in myocardial oxygen demand or by a decrease in myocardial oxygen supply or sometimes both which further leads to symptoms of angina (3).

An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths. Of these deaths, 85%

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were due to heart attack and stroke. Over 75% of CVD deaths take place in low- and middle-income countries where raised blood pressure happens to be amongst the most important risk factors for CVDs. In 2016, India reported 63% of total deaths due to Non-communicable Diseases, of which 27% were attributed to CVDs. CVDs also account for 45% of deaths in the 40-69 years age group (4).

The goals of treatment after occurrence of Acute Coronary Syndrome (ACS) are to bring the patient into the normal activities by decreasing myocardial oxygen demand (secondary to decrease in heart rate, blood pressure, preload or myocardial contractility) or to increase myocardial oxygen supply (by administration of oxygen or through coronary vasodilatation) and to re-evaluate the risk factors and lifestyle modification. The initial treatment of ACS is achieved by coronary reperfusion using fibrinolytics or revascularization using Percutaneous Coronary Intervention (PCI)/ Coronary Artery Bypass Graft (CABG), along with a Combination of Anti-ischaemic and Anti-thrombotic agents. Prescribing the medications based on practice guidelines from the American College of Cardiology Federation/American Heart Association (ACCF/ AHA) has improved in recent years to promote the proper therapeutic management for secondary prevention of coronary artery disease. The recommended medications for ACS patients include Statins, Antiplatelet agents, Angiotensin-Converting Enzyme Inhibitors (ACEIs) or Angiotensin Receptor Blockers (ARB), Beta-blockers, Nitroglycerin, Diuretics based on results of multiple controlled trials to improve survival benefits. Treatment administration according to the risk category of the patient is important. Moderate and high-risk patients are admitted to a coronary intensive care unit, depending upon the patients' symptoms and recognized level of risk. High-risk patients should undergo early coronary angiography (within 24-48 hr) and revascularization (with PCI/CABG) if significant coronary artery stenosis is established. Moderate risk patients with positive biochemical markers for infarction typically also undergo angiography and revascularization during hospital admission (5). However, despite of standard guidelines several studies worldwide have shown a wide variation in the prescription pattern for the management of CAD across different clinical settings (5).

Yusuf et al., in 'PURE' study, an epidemiological survey of 17 countries. The authors reported significant underutilization of Evidence Based Medications (EBM) therapies for the management of CAD in low-income countries in contrast to high income countries (6).

Prescription pattern analysis is a powerful exploratory tool to evaluate present trends of drug use and appropriateness of prescription. The study of prescribing patterns helps to monitor, evaluate and if necessary, suggest modifications in prescribing patterns so as to make medical care rational and cost effective (7).

The analysis of prescription pattern of drugs used in patients with CAD is important because Rational prescription pattern of these drugs can delay the risks associated with CAD and stabilize them for longer duration. By analysing the prescription and the medication history the risk factors and trends in prescription can be identified and thereby we can provide appropriate patient counselling and can improve the quality of life of patients with CAD. The physician should concentrate on prescribing drugs with their generic names to the maximum in order to minimize the cost-burden on the patients.

Therefore, this study is to scrutinize the prescriptions to determine the appropriateness of the prescriptions and various trends in treatment, so as to provide the basis for modification in the future drug usage in accordance with risk factors and clinical presentations and also assess the improvement of health-related quality of life of patients with CAD.

The aim of the present study was to assess the prescribing patterns of drugs used in patients with coronary artery disease in adherence to standard guidelines provided by ACCP/AHA in tertiary care hospital. The objective of this study was to assess drug utilization pattern & demographics, percentage of co-morbid conditions associated with coronary artery disease, adherence of prescription to WHO core prescribing indicators- Name, dose, dosage regimen of all drugs, Occurrence of Polypharmacy, percentage of drugs prescribed by generic names / brand names, percentage of drugs, present in the WHO essential drug list.

Methods

It was a hospital based Prospective, cross-sectional and observational study, carried out in Department of Pharmacology in collaboration with Department of Medicine of Tertiary health care hospital, Maharashtra. This study was conducted over a period of 3 months from November 2021 to January 2022 at Shri Chhatrapati Shivaji Maharaj Sarvopchar Rugnalay, Solapur, Maharashtra.

Total 360 prescriptions were selected as per inclusion and exclusion criteria. Patients with established diagnosis of coronary artery disease attending outpatient department of Medicine- age above 18 yrs. of age, both Male and Female, with or without co morbidities those willing to give written informed consent were included in the study. Pregnant and lactating women and who refuses to participate in the study were excluded.

Patients Visiting Medicine OPD with known case of coronary artery disease were included in the study. A pre-structured Performa was utilized to collect the required information. The following data was collected and analysed: Demographic information such as age and sex, co-morbidities associated with coronary artery disease, drugs

categorized into different classes, their doses, frequency and dosage form, percentage of Fixed-dose combination (FDC) and off-label, percentage of drugs following guidelines provided by American College of Cardiology Federation/ American Heart Association.

The protocol of the present study was approved by the Institutional Ethical Committee. Data was collected and entered into Microsoft Excel 2019. Descriptive statistics such as frequencies and percentage will be calculated for categorical variables.

Results

In this study, Prescription of 360 patients attending Medicine OPD over a period of 3 months with coronary artery disease with or without co-morbidities were assessed. It was observed that there was female predominance (54%) and male (46%) and the majority of patients belonged to the age group of 61-75 years (57.22%) (Table 1). The Non-ST segment elevation myocardial infarction (NSTEMI) (52.50%) was the most common followed by ST-elevated myocardial infarction (STEMI) (27.22%), Stable Angina (11.11%) and Unstable Angina (9.17%). Various co-morbid conditions were found to be associated with CAD patients like Hypertension, Diabetes, Chronic Obstructive Pulmonary Disease (COPD), Bronchial Asthma (BA), etc. Amongst them Hypertension (254 patients, 70.55%) and Diabetes Mellitus (130 patients, 36.11%) were found to be the most common. The patients with CAD were treated with the following categories of Drugs- Antiplatelets, Antihyperlipidemic, Antihypertensives, Diuretics, Anti-anginal, Hypoglycaemics, Bronchodilators and some miscellaneous drugs. Detailed records of the usage of these drugs were evaluated (Figure 1). Antiplatelets were the most commonly prescribed category of drugs. Prescribing patterns of Antiplatelets showed that majority of physicians prescribed Aspirin (75.14%) followed by Combination therapy (24.86%). The most commonly prescribed Antihypertensive was ACE Inhibitor (231, 69.79%), followed by CCB (207, 62.53%), Beta Blocker- (76, 22.96%) (Table 2).

Figure 1. Percentage distribution of different categories of a drug prescribed to Coronary artery disease patients.

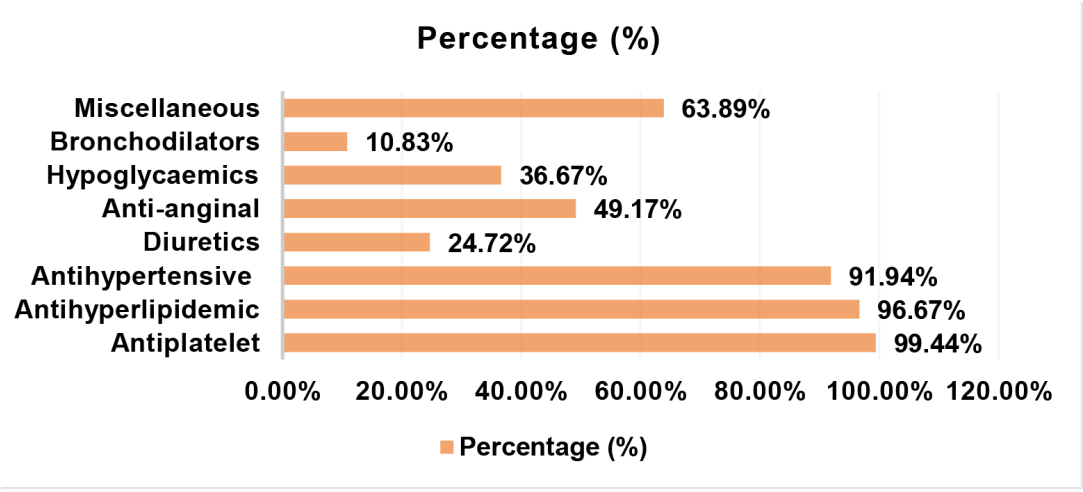

Table 1. Age-wise distribution of Coronary artery disease Patients

Age in years	No. of Patients (N=360)	Percentage (%)
18-30	1	0.28%
31-45	16	4.44%
46-60	82	22.78%
61-75	206	57.22%
76-90	54	15%
>90	1	0.28%

Furosemide monotherapy (94.38%) was most commonly prescribed diuretic followed by combination of furosemide and spironolactone (3.37%) and spironolactone alone (2.25%). Dinitrate (135, 76.27%) was the most commonly prescribed Anti-anginal drug in patients with CAD, followed by Isosorbide Mononitrate (42, 23.73%). Metformin monotherapy (80, 60.61%) was the most commonly preferred drug used in CAD patients with associated Diabetes Mellitus, followed by Metformin + Glimepiride combination (48, 36.36%) & Glimepiride (4, 3.03%). Table 3 showed that Lactulose (180, 78.26%) was preferred miscellaneous group of drug used in patients with CAD. Out of all the drugs prescribed in 360 prescriptions, 87.48% were tablets, 5.16% were capsules, 7.36% were syrup.

Table 2. Percentage distribution of Antihypertensives prescribed to Coronary artery disease patients (Monotherapy and combinations).

Drug	Generic name of drug	Number of patients prescribed Antihypertensives (n=331)	Percentage (%)
MONOTHERAPY		**172**	**51.96%**
ACE Inhibitors (ACEI)	Enalapril	97	29.30%
Beta-blocker (BB)	Atenolol, Metoprolol	5	1.51%
Calcium Channel blocker (CCB)	Amlodipine	70	21.15%
TWO DRUG REGIMEN		**135**	**40.79%**
ACEI + BB		22	6.65%
ACEI + CCB		88	26.59%
BB + CCB		25	7.55%
THREE DRUG REGIMEN		**24**	**7.25%**
ACEI + BB + CCB		24	7.25%

Table 3. Percentage distribution of Miscellaneous drugs prescribed to CAD Patients.

Drug	Number of patients prescribed Miscellaneous drugs (n=230)	Percentage (%)
Lactulose	180	78.26%
Proton Pump Inhibitor	150	65.22%
Multivitamin	126	54.78%
Iron and Folic Acid (FSFA)	87	37.83%
NSAIDs	96	41.74%
Phenytoin Sodium	10	4.35%

NSAIDs: Non-steroidal anti-inflammatory drugs

Total 2444 drugs were prescribed for 360 patients. Number of drugs per prescription varied from 3-11 with an average of 4.5 drugs per prescription. All the drugs were prescribed by generic names. The present study shows that the percentage of drugs prescribed as Fixed Dose Combinations were (10.31%). 90.63% drugs prescribed were included in WHO essential drugs list 2021. 98.40% drugs prescribed were included in National list of essential medicines (NLEM) 2015 (Table 4).

Table 4. Details of the prescription studied in CAD patients.

Details of the prescriptions	Number of drugs
Total number of patient's prescription analysed	360
Total number of drugs prescribed	2444
Average number of drugs per prescription	4.5
Number of drugs prescribed by generic name	2444 (100%)
Drugs prescribed by FDCs (%)	10.31%
Drugs included in WHO essential drugs list 2021 (%)	90.63%
Drugs included in National list of essential medicines 2015 (%)	98.40%

Discussion

The Coronary Artery disease has become a leading cause of mortality in the South Asian region globally and in India. Considering the uncertainty of CVD patients and the various classes of drugs to be used in the treatment, the physician has to weigh the pros and cons of each and every drug before using it. This study was planned to determine the various treatment strategies involved in the management of patients with CAD.

Monitoring of prescription pattern is an essential tool to promote rational use of drugs and minimise their abuse or misuse. It creates awareness among prescribers as well as general public about appropriate usage of drugs, their quality, prescription trends and ensures compliance with standard treatment guidelines (8).

In the present study, Prescription of 360 patients attending Medicine OPD over a period of 3 months with coronary artery disease with or without co-morbidities were assessed. Here, the prevalence of CVDs was higher in females (54%) than males (46%), which was similar to the study conducted by Rathod et al., where females (56.64%) are more than males (43.36%), but was different from previous studies where males had higher prevalence than females (9). This may be explained as CVD risk factors become more prevalent in post menopause women as the mean age of women in the study was found to be 60±12.47 years (10). The reason for increased incidence of Cardiovascular emergencies in female could be due to the loss of cardioprotective effect of oestrogen after menopause. Inflammation, obesity, Type 2 DM and metabolic syndrome appear to play more prominent roles in the development of CVDs in women than men (11).

In the present study it was found that cardiovascular disease was most common in the patients who belonged to the age group of 61-75 years (57.22%), which was similar to the study conducted by Xia et al, where maximum number of patients were in the range of 60 to 75 years of age (52.6%) (12). This correlates with many other studies which shows increased risk of CAD with increasing age. Similar study was conducted by Belhekar et al., where majority (62%) of patients belonged to age group of 41-60 years (13).

Hypertension (70.55%) and diabetes (36.11%) were the two most commonly associated co-morbidities in CAD patients found in the present study which is in concordance with the previous studies. Similar type of finding was observed in another study done by Swapna et al., wherein the most commonly associated co-morbidities was hypertension (68.09%) followed by diabetes mellitus (42.34%) (14). In addition to this HTN and DM both are risk factors to cardiovascular diseases. So apart from treating cardiovascular diseases patients may be educated about risk factors and life style modifications. Similar study was conducted among the Karnekanti et al., (15).

In the present study, on evaluating the data regarding the different class of drugs prescribed to CAD patients, Antiplatelet drugs were found to be the highly prescribed group (99.44%), followed by Anti-hyperlipidaemic group of drugs (96.67%), Antihypertensives (91.94%), Anti-anginal (49.17%). This finding was quite comparable with the findings observed in similar type of previous studies done Dawalji et al., (16).

In the present study, Atorvastatin was the most commonly prescribed hypolipidemic drug. The utilization rate of statin was high in our study (96.67%). This finding correlates with the standard guidelines mentioned for use of the drug in cardiovascular disease. Similar results were found in the study conducted by Battu et al., (17). It decreases blood LDL cholesterol level effectively with increasing the HDL level. It also reduces the risk of coronary heart diseases, myocardial infarction and stroke effectively with fewer side effects.

In the present study the most commonly prescribed Anti-hypertensive drug was found to be ACE Inhibitors (69.79%), followed by CCB (62.53%) and Beta Blocker- (22.96%). In the study done by Dawalji et al., it was also found that Beta blockers were the highest prescribed antihypertensive drugs (59.41%) followed by ACE inhibitors (27%) and CCB's (21.2%) (16). In the study conducted by Sreelekshmi et al., the use of Diuretics was (28.7%). which were similar to the present study (18).

In the present study, Isosorbide dinitrate (76.2%) was the most commonly prescribed antianginal agent (49.17%) for prophylaxis and relief of ischemia among CAD patients. The results are in concordance with a previous study conducted by Battu et al., & Dawalji et al., (17,16). As Nitrates dilate normal and atherosclerotic coronary arteries and increases coronary collateral flow.

In the present study the commonly prescribed drugs were Aspirin among Antiplatelet agents, Atorvastatin among Antihyperlipidemic agents, Enalapril Maleate among Antihypertensive, Furosemide among Diuretics, Isosorbide Dinitrate among Antianginal drugs, Metformin among Hypoglycaemics, Theophylline and Etophylline among Bronchodilators and Lactulose among Miscellaneous group of Drugs. The findings of this study are in accordance with the ACC/ AHA Guidelines (4). For patients with Acute Coronary Syndrome (ACS) recommend Dual Antiplatelet therapy, Beta-blockers, ACEI or ARBs and statins unless

any of these are Contraindicated (19). No serious side effects were noticed during the course of observation.

The results of this study cannot be extrapolated to the entire population of that region as it was conducted only in one tertiary care teaching hospital and did not include the patients visiting other tertiary care teaching hospitals of that region. Small sample size, single centred and short study duration are the main limitations of our study. A larger population size could give a better result if other tertiary care hospitals of the city were included and more reliable outcomes which could be generalize for the entire community.

This study provides an overview of utilization of drugs in patients with CAD in one of the tertiary care hospitals in Maharashtra. In this study, it is observed that the risk of CAD increases with increasing age. Hypertension and Diabetes were the most common co-morbid conditions associated with CAD. The most commonly prescribed drugs for the treatment of CAD were found to be Antiplatelets; followed by Antihyperlipidemic & Antihypertensives. In this study, the overall analysis of prescription pattern suggests that most of the drugs were prescribed rationally according to current ACC/ AHA guidelines. The incidence of polypharmacy was in the normal limits as per WHO recommendation. Since extensive polypharmacy was not seen & most of the prescribed drugs were available free of cost in the central pharmacy of the tertiary care hospital, which is favourable for reducing the cost of health care facilities. Generic drugs were prescribed majorly, which promotes awareness amongst prescribers, supporting WHO policies. Despite the limitations, it was our sincere efforts to provide insight into the prescription pattern of drugs used in CAD patients in a government tertiary care hospital. Studies on drug prescribing patterns will, definitely, help the physician to improve the prescribing patterns and efficient management will delay the progression of disease and improve the quality of life. Further studies from time to time are required in drug prescription pattern and standard treatment guidelines should be circulated amongst practicing physicians to encourage rational prescription.

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