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Assessment of prescribing pattern in coronary artery disease

Battu Rakesh^{*1}, Dr. B.S. Suresha¹, Jaladi Himaja², Emilda.T.Joy³, Angitha Rose Varghese⁴.

^{*12,3,4} Pharm.D Intern, Department of Pharmacy Practice, Bharathi College of Pharmacy, Bharathinagara, K.M.Doddi, Mandya, Karnataka, India-571422.

¹Professor and HOD, Department of Pharmacy Practice, Bharathi College of Pharmacy, Bharathinagara, K.M.Doddi, Mandya, Karnataka, India-571422.

*Corresponding Author: Battu Rakesh

Email id: rakeshjaanu143@gmail.com

ABSTRACT

Background

Cardiovascular disease is the leading cause of death and disease burden globally. In recent years, India has become a country with the largest number of cardiovascular disease patients. Dyslipidaemia in the patients with diabetes has been shown to increase the risk of coronary heart disease. There is a much larger burden and overall medical costs on coronary artery disease itself. Study of drug-prescribing pattern can give insight into the trends in using the drugs in coronary artery disease in treating their co-morbid conditions. The knowledge of prescription pattern can lead us toward the rational drug use and help to take measures to improve prescribing habits. Multimorbidity is common in old age. Deaths associated with cardiovascular events remains constant in many countries due to new therapeutic approaches for prevention and treatment of cardiovascular diseases. This condition is widely attributable to unhealthy outcomes in its association with risk factors such as Hypertension, Diabetes mellitus, smoking, alcohol consumption and sedentary lifestyle which play a significant role in the progression of cardiovascular diseases.

Objectives

The objective of this study was to evaluate the coronary artery disease prevalence and drug utilization pattern in the department of general medicine in a tertiary care hospital in Karnataka, India.

Study design

A Cross Sectional study was carried out in the General Medicine Department, MIMS Teaching Hospital, Mandya, Karnataka, using a well-designed patient data collection form.

Results

In this study, among 99 cases of coronary artery diseases analysed, which consists of male n=60 (60.6%) and n=39 (39.4%) were females. The incidence of CAD was more common in male compared to female. In this study two different type of coronary artery disease were identified which includes 33 Angina Pectoris patients and 66 Myocardial infarction (MI) patients. Most of the patients diagnosed with coronary artery disease were of the age group of 41-60 (55.55%). The most common co-morbid conditions were hypertension in 10 (10.10%) and a combination of hypertension, diabetes, dyslipidaemia 42 (42.42%) patients. The prescription pattern of various cardiovascular drugs were found to be as – antiplatelet drugs 99 (100%), anti-hyperlipidemic drugs 81 (81.81%),

antibiotics 87 (87.87%), anti-anginal drugs 33 (33.33%), antihypertensives 42 (42.42%), anticoagulants 35 (35.35%), diuretics 65 (65.65%) and bronchodilators 57 (57.57%).

The average number of drugs per prescription was found to be 7.34 and the percentage of drugs prescribed by generic name was found as 24.20%. The most commonly prescribed drug classes in coronary artery disease were antiplatelet drugs followed by antihyperlipidemics and antibiotics. This was followed by anti-anginal drugs, antihypertensives and anticoagulants. The prescribing pattern could be improved by reducing the number of drugs per prescription and by prescribing generic drugs to reduce the economic burden of the patients.

Conclusion

Uncontrolled DM, Hypertension, Hyperlipidaemia risk factors for developing coronary artery disease. Anti-thrombotic followed by Statins, antidiabetics and antihypertensive were most prescribed drugs. Combinations of drugs were prescribed to the patients for effective therapy. The present study will help the healthcare professionals to optimize the efficient and safe use of cardiovascular drugs.

Keywords: Cardiovascular diseases, Dyslipidaemia, Coronary artery disease, Prescribing pattern, Multimorbidity, Cardiovascular Events, Sedentary lifestyle.

INTRODUCTION

Cardiovascular disorders (CVDs) are the group of disorders that involves the heart and blood vessels. Cardiovascular diseases are the leading cause of death globally. Deaths from CVD are more common and largely the product of interactions among modifiable risk factors that are increasing in much of the developing world while rates have declined in most of the developed countries. Most of the CVDs affect older adults. The increase in CVDs could be attributable to (i) increase in the population size due to natural growth, (ii) ageing of the population which makes people more vulnerable to chronic diseases at older ages, and (iii) increased vulnerability due to lifestyle changes [1]. An estimated 17.3 million people died from CVDs in 2008, representing 30% of all global deaths. Of these deaths, an estimated 7.3 million were due to coronary heart disease. By 2030, almost 23.6 million people will die from CVDs, mainly from heart disease and stroke. These are projected to remain the single leading causes of death [2].

Coronary artery disease has emerged as an epidemic in India. According to the projections of National Commission and Macroeconomics and Health, Government of India, the total no. of coronary artery disease (CAD) patients in India at the turn of the century was 30 million (5.3% of adult population) which could increase to more than 62 million (8.1%) by the year 2016 [3].

Coronary artery disease (CAD) is mainly due to atherosclerosis (plaque in artery walls) of the inner lining of the blood vessels that supply blood to the

heart. CAD begins when hard cholesterol substances (plaques) are deposited within a coronary artery. The plaques narrow the internal diameter of the arteries which may cause a tiny clot to form, which can obstruct the flow of blood to the heart muscle. This reduces the supply of oxygen and nutrients to the heart muscles, which is essential for proper functioning of heart. This may eventually result in a portion of heart being suddenly deprived of its blood leading to death of that area of heart tissue resulting in a chest pain or heart attack. The treatment for CAD involves the use of various categories of drugs namely antiplatelet drugs, anticoagulants, antianginal drugs, beta-blockers, angiotensin converting enzyme inhibitors (ACEI)/angiotensin II receptor blockers (ARBs), Calcium channel blockers, diuretics, etc. Effective screening, evaluation, and management strategies for CAD are well established in high-income countries, but these strategies have not been fully implemented in India [4].

Guidelines based on evidence from randomized controlled trials recommend that aspirin, beta adrenergic blockers, ACEI, and hydroxyl methylglutarate coenzyme A reductase inhibitors (statins) be used in all patients with symptomatic chronic stable angina or asymptomatic survivors of acute myocardial infarction and following percutaneous coronary intervention or coronary bypass surgery for secondary prevention of myocardial infarction, stroke and death [5,6,7,8]. It has been hypothesized that if used collectively these agents could reduce long term risk of cardiovascular events and mortality by as much as

75%. However the actual impact depends on extent to which they are used in practice [9, 10, 11].

The quality of medical care requires prescribing to be judicious, appropriate, safe, effective and economic. 'Good' prescribing is a complex balance between various conflicting factors. The aim is to achieve clinical benefit with minimum risk at cost-effective price while respecting the patient's choice [12]. The study of prescribing pattern is a component of medical audit that does monitoring and evaluation of the prescribers as well as recommends necessary modifications to achieve rational and cost-effective medical care [13].

Cardiovascular diseases (CVD) have been leading cause of morbidity and mortality in India. In more than 90% of cases, the risk of a first heart attack is related to nine potentially modifiable risk factors such as high blood pressure, Smoking/tobacco use, Poor diet, High blood cholesterol, Insufficient physical activity, Obesity, Diabetes, Psychosocial stress (linked to people's ability to influence the potentially stressful environments in which they live), Excess alcohol consumption [25,26, 27].

Irrational prescribing of drugs is of common occurrence in clinical practice [14], important reasons being lack of knowledge about drugs, unethical drug promotions and irrational prescribing habits of clinicians. Inappropriate prescribing habits lead to ineffective and unsafe treatment, prolongation of illness, distress and unnecessary economic burden to the patient [15]. Studies of prescribing patterns and drug utilization are useful to identify the problems and provide feedback to prescribers so as to create awareness about rational use of drugs [16].

Drug utilization pattern study is a powerful exploratory tool to evaluate present trends of drug use and appropriateness of prescriptions. It is a descriptive and analytical method of collection, quantification, understanding and evaluation of the prescribing pattern, as well as dispensing and consumption for the advancement of existing therapy and enhancement of patient safety. Nowadays inappropriate drug use is a common hurdle which receives the support of numerous worldwide research studies to determine the safe and effective drug utilization [17].

Drug utilization research helps in the management of drug-specific problems, and the evaluation of the appropriateness of drug therapy.

Identification and assessment of the prescribing pattern are one of the very first steps towards improving both medication quality and patient safety. Medication quality and patient, safety requires a rational prescription of medication and avoidance of inappropriate/ irrational prescribing patterns. Rational prescription of drugs means an efficient and safe drug according to clinical needs for an adequate period and at the minimum available cost. Prescribing unnecessarily branded drugs, the cost issue, inadequate drugs supply, and lack of patient counselling regarding dosing schedules and possible side effects are the major causes of irrational use of drugs, which may lead to failure of therapy and undesirable side effects. Triad of right diagnosis, accurate prescription and excellent patient counselling leads to the effective and safe use of the drug [18].

Therefore, this study attempts to analyse the current prescription patterns in the treatment of coronary artery disease in order to ensure appropriate drug use to reduce the morbidity and mortality of the disease and reduce the unnecessary economic burden on the patient. The findings of this study are expected to provide relevant and useful feedback to physicians. Findings from this study provide a benchmark at local and national level.

MATERIALS AND METHODOLOGY

The Ethical clearance for the study was obtained from the Institutional Ethics committee, Mandya Institute of Medical Sciences and Teaching Hospital, Mandya, Karnataka, India.

Study site

The study was carried out in Department of General Medicine at Mandya Institute of Medical Sciences and Teaching hospital, Mandya, Karnataka, India. It is one of Karnataka's leading healthcare institutions offering multi-super specialty tertiary care of high standards. MIMS hospital situated in Mandya has earned the reputation for being one of the best tertiary care multi-super specialty hospitals in Karnataka. It is a 650-bedded hospital providing tertiary level multi-super specialty care services. It provides specialized services in General Medicine, Gastroenterology, Surgery, ENT, Ophthalmology, and Psychiatry, Paediatrics, Orthopaedics, OBG

(Obstetrics and gynaecology), Dermatology and Community Medicine.

Study design

A Cross Sectional study was carried out in various units such as Intensive Critical Care Unit (ICCU), Respiratory Intensive Care Unit (RICU), Medical Intensive Care Unit (MICU), Medical wards (Male and Female) of the department of general medicine, Mandya Institute of Medical Sciences and Teaching hospital, Mandya, Karnataka, India. The essential data for the Cross Sectional study was collected from patient case files using a well-designed patient data collection form.

Study criteria

The patients admitted in department of general medicine were enrolled in to the study after taking their consent and by considering following inclusion and exclusion criteria.

Inclusion criteria

- All adult male and female Coronary artery disease patients of age > 20 years.
- Individuals giving consent for study.

Exclusion criteria

- Individuals who are not willing to be a part of the study.
- All pregnant women and lactating mothers.
- All out patients in OPDs.
- Seriously and mentally ill patients.
- Paediatrics.

Source of data

The data was collected from the patients who met the inclusion criteria. To study the prescribing patterns, relevant details of every in-patient with coronary artery disease were collected in suitably designed proforma. The relevant data on drug prescription of each patient was collected from the in-patient record. The demographic data (age, sex), the diagnosis by the treating cardiologist was obtained from the in-patient case records of each patient. Also, associated co-morbid conditions, risk factors identified for developing coronary artery disease were noted from the medical records. The drug data - drugs, dosage form, dose, route of administration, frequency were noted. The laboratory parameters which were monitored

during the treatment such as blood pressure, blood glucose levels, lipid profile, serum creatinine levels, serum electrolytes, prothrombin time, international normalized ratio (INR) were also recorded. Any other relevant data required which could not be obtained from case records were obtained by interviewing the patients, their caretakers or health care providers.

Study procedure

The following data was collected and recorded in the data collection form- demographic details (name, age, sex), drugs (name of the drug, dosage form, dose, route of administration, frequency), principal diagnosis and co-morbid conditions. To study the drug prescribing patterns in coronary artery disease, all patients included in the study were considered for analysis. The trade names of drugs were deciphered and classified into pharmacological groups that included aspirin, clopidogrel-antiplatelet agents, beta-blockers, ACEI (Angiotensin Converting Enzyme Inhibitors) or ARBs (Angiotensin Receptor Blockers), Calcium Channel Blockers (CCBs), Statins, short and long-acting nitrates, anticoagulants such as enoxaparin sodium, diuretics, bronchodilators, antibiotics, multivitamins, diabetic medications, and other medications. Utilization of different classes of drugs as well as individual drugs was analysed and presented as percentage. The average number of drugs per prescription and the percentage of drugs prescribed by generic name were determined. The percentage encounters with an antibiotic prescribed were also determined.

Statistical analysis

Collected information was analysed using Microsoft Office (MS-Word and Excel) 2010. Descriptive data analysis has been performed in the form of percentage of demographic variables and drug therapy and related issues were shown as various tables and graphs for better understanding of data. For the analysis of the results, simple percentage calculations were used to arrive at a conclusion of our study.

RESULTS

A total number of 99 case sheets of coronary artery disease patients admitted to MIMS teaching hospital were analysed. It consists of male n=60

(60.6%) and n=39 (39.4%) were females (Figure No.1). The patients were divided into 8 groups based on their age and the age group being kept at

an interval of 10 years (Figure No.2, Table No.1). The incidence of CAD was more common in male compared to female.

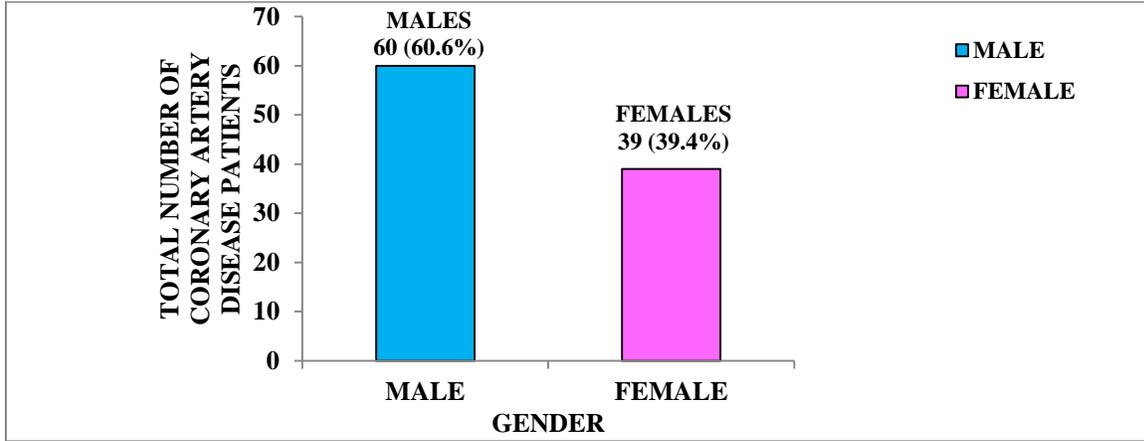


Fig.1: Sex Wise Distribution of Coronary Artery Disease Patients

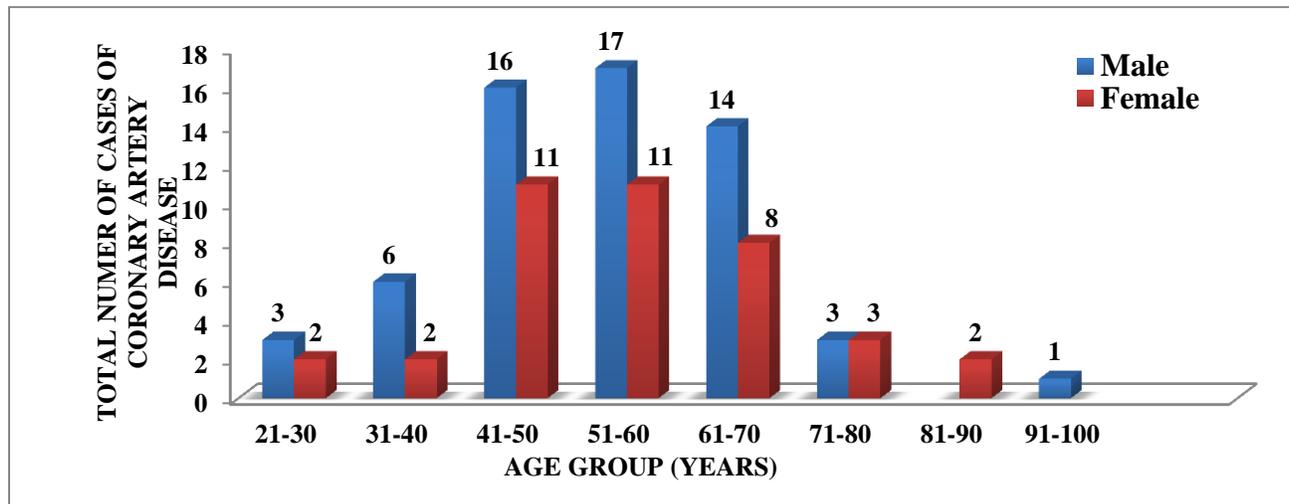


Fig.2: Age and Gender wise Distribution of Coronary artery disease patients

In this study two different type of coronary artery disease were identified which includes 33

Angina Pectoris patients and 66 Myocardial infarction (MI) patients. (Table 1, Figure 3).

Table 1: Age and Gender wise Distribution of Coronary Artery Disease

AGE GROUP (YEARS)	ANGINA PECTORIS		MYOCARDIAL INFARCTION	
	MALE	FEMALE	MALE	FEMALE
21-30	1	2	2	0
31-40	3	1	3	1
41-50	2	4	14	7
51-60	8	3	9	8
61-70	6	2	8	6
71-80	1	0	2	3

81-90	0	0	0	2
91-100	0	0	1	0
TOTAL	21	12	39	27

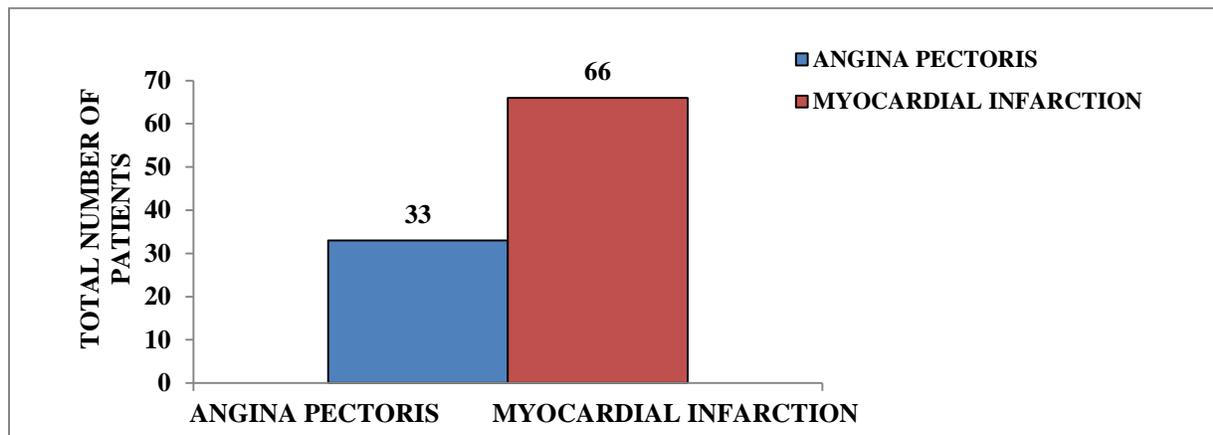


Fig.3: Classification of Coronary Artery Disease

The Angina Pectoris includes 1 (1.01%) male and 2 (2.02%) females within 21-30 years of age, 3 (3.03%) males and 1 (1.01%) females within 31-40 years of age, 2 (2.02%) males and 4 (4.04%) females within 41-50 years of age, 8 (8.08%) males

and 3 (3.03%) females within 51-60 years of age, 6 (6.06%) males and 2 (2.02%) females within 61-70 years of age and 1 (1.01%) males within 71-80 years of age which are represented (Figure No:4).

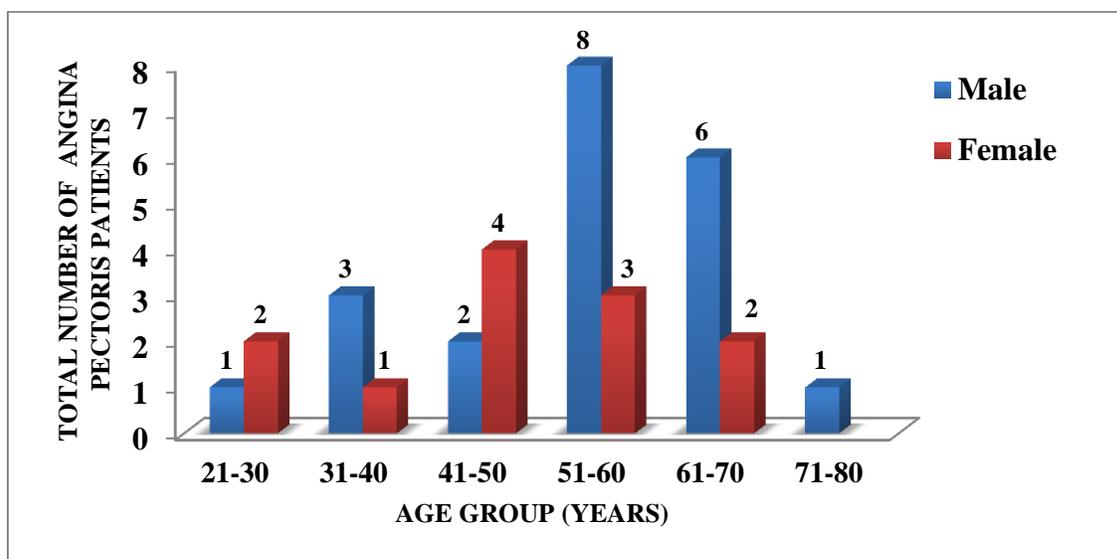


Fig.4: Age and Sex Wise Distribution of Angina Pectoris Patients

Myocardial Infarction includes 2(2.02%) male within 21-30 years of age, 3(3.03%) males and 1(1.01%) females within 31-40 years of age, 14(14.14%) males and 7(7.07%) females within 41-50 years of age, 9(9.09%) males and 8(8.08%) females within 51-60 years of age, 8(8.08%) males

and 6(6.06%) females within 61-70 years of age, 2(2.02%) males and 3 (3.03%) females within 71-80 years of age, 2(2.02%) females within 81-90 years of age and 1(1.01%) male within 91-100 years of age which are represented (Figure No:5).

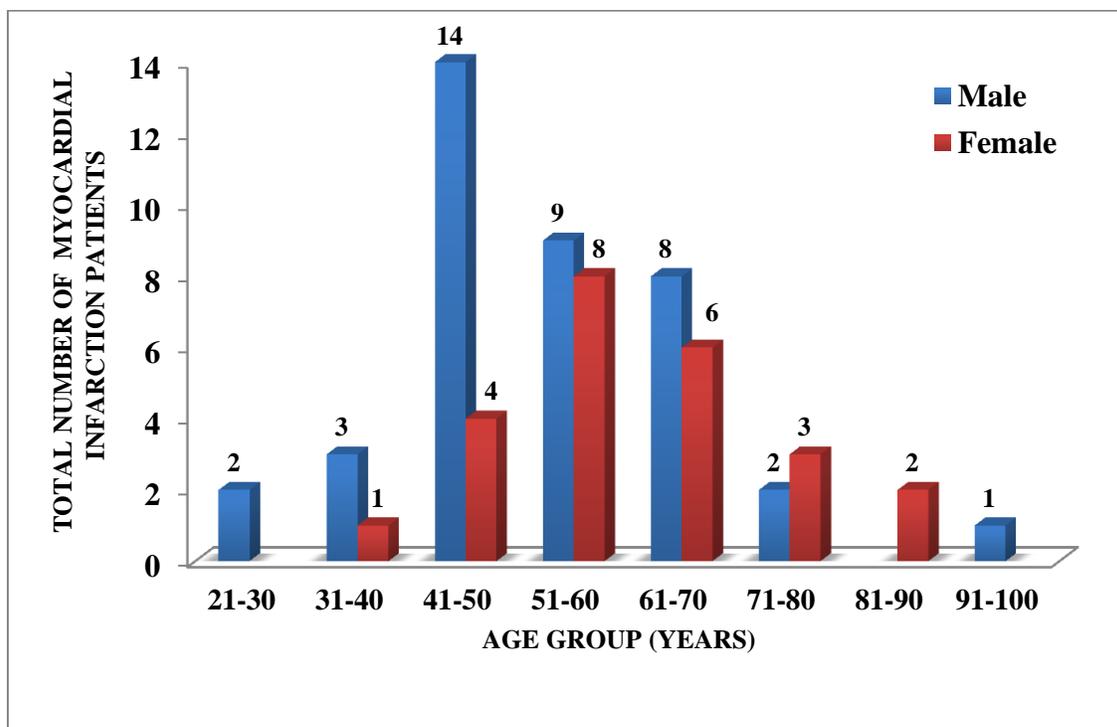


Fig.5 Age and Gender Wise Distribution of Myocardial Infarction Patients

Various co-morbid conditions like hypertension, diabetes mellitus, hypothyroidism, dyslipidaemia were seen among patients and many of these were found to be risk factors of coronary artery disease. Hypertension and diabetes were the two most common co-morbid conditions found in most of the patients which increase the risk of coronary artery

disease. Treatment of coronary artery disease involves various categories of drugs namely antiplatelet drugs, anticoagulants, fibrinolytics, anti-anginal drugs, anti-hypertensives, anti-hyperlipidemic agents, bronchodilators, antibiotics. The usages of these drugs were recorded and analysed.

Table 2: Details of the Patients based on Co-morbid Conditions

Co-morbid Condition	No. of Patients (n=99)	Percentage
Hypertension	10	10.10%
Hypertension+Diabetes Mellitus	29	29.29%
Hypertension+Dyslipidemia	11	11.11%
Hypertension+Diabetes+ Dyslipidaemia	42	42.42%
Hypertension+Diabetes+Others (Dyslipidemia+Hypothyroidism+ COPD+CKD)	7	7.07%

CKD = Chronic Kidney disease, COPD = Chronic obstructive Pulmonary Disorder

Table 3: Different Categories of Drugs Prescribed to the Patients

Drug Categories	No. of Patients (n=99)	Percentage
Antiplatelets	99	100%
Anti-anginals	33	33.33%
Antihyperlipidemic	81	81.81%
Antidiabetics	47	47.47%
Antihypertensives	42	42.42%
Anticoagulants	35	35.35%
Diuretics	65	65.65%
Bronchodilators	51	51.51%
Antibiotics	87	87.87%

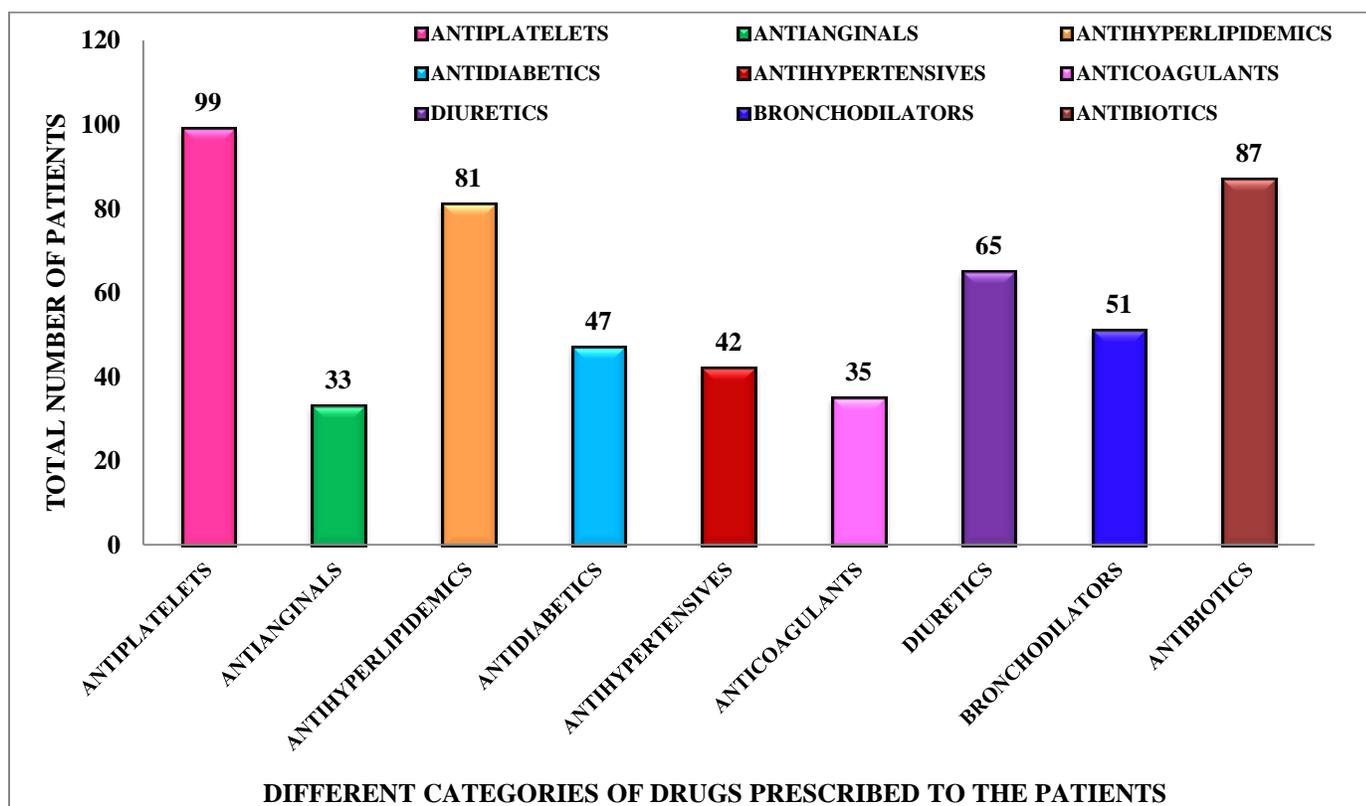


Fig.6: Different Categories of Drugs Prescribed to the Patients

Different combinations of anti-thrombotic drugs, which include the antiplatelet drugs (aspirin, clopidogrel), anticoagulants (heparin, enoxaparin sodium), fibrinolytics (streptokinase), were

prescribed. The percentage and no. of patients received anti-thrombotic drugs is shown in (Table 7).

Table 7: Combination of Anti-thrombotic Drugs Prescribed to the Patients

Drug Categories	No. of Patients	Percentage
Antiplatelets	99	100%
Antiplatelets +Anticoagulants	45	45.45%
Antiplatelets+Anticoagulants+Fibrinolytics	5	5.05%

The anti-platelet drugs aspirin and clopidogrel were used to reduce the cardiovascular mortality and non- fatal myocardial infarction in coronary artery disease. Among 99 prescriptions analysed anti-platelet drugs were prescribed in 99 (100%) patients. Details of anti-platelet drugs prescribed are shown in (Table 8, Figure No.7). Out of these (n=99), a fixed dose combination (75 mg) of

aspirin and clopidogrel was found to be used in 31 (31.31%) and aspirin (150 mg) and clopidogrel (75 mg) singly were used in 49 (54.54%) of the patients. Aspirin alone was used in very few patients 14 (14.14%) and in least no. of patients 4 (4.04%) clopidogrel alone was used. All these drugs were prescribed in oral dosage form.

Table 8: Details of Anti-platelet Drugs Prescribed to the Patients

Drug Categories	No. of Patients	Percentage
Clopidogrel	4	4.04%
Aspirin	14	14.14%
Aspirin + Clopidogrel	81	81.81%

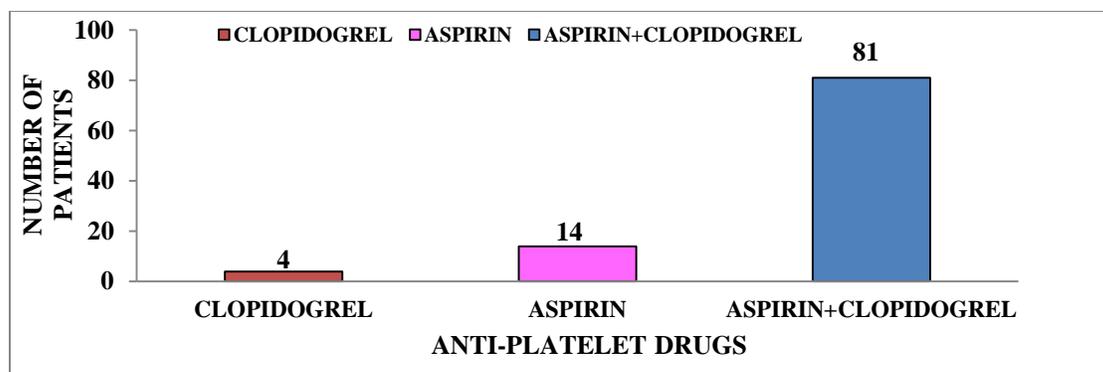


Fig.7: Total number of patients received anti-platelet drugs

Anticoagulant drugs prescribed include heparin and low molecular weight heparins- enoxaparin sodium. Details of anticoagulants prescribed are

shown in (Table 9). These were prescribed in the form of injections through SC route of administration.

Table 9: Details of Anticoagulant Drugs Prescribed to the Patients

Drug Category	No. of Patients	Percentage
Enoxaparin sodium	35	35.35%

Details of prescribed anti-anginals (Table 10), anti-hyperlipidemics (Table 11), antihypertensives (Table 12, Figure 8), diuretics (Table 13, Figure 9), bronchodilators (Table 14, Figure 10), antibiotics (Table 15, Figure 11) and miscellaneous drugs (Table 16, Figure 12) are shown below.

Table 10: Details of Anti-anginal Drugs Prescribed to the Patients

Drug Category	No. of Patients	Percentage
Nitrates	33	33.33%

Table 11: Details of Anti-hyperlipidemic Drugs Prescribed to the Patients

Drug Category	No. of Patients	Percentage
Atorvastatin	81	81.81%

Table 12: Details of Anti-hypertensive Drugs Prescribed to the Patients

Drug Categories	No. of Patients (n=99)	Percentage
Beta-Blockers		55.55%
Atenolol	36	36.36%
Metoprolol	19	19.19%
Alpha+Beta Blockers		12.12%
Carvedilol	12	12.12%
ACEI		18.18%
Enalapril	18	18.18%
ARBs		7.07%
Losartan	3	3.03%
Telmisartan	2	2.02%
Olmесartan	2	2.02%
CCB		4.04%
Amlodipine	4	4.04%

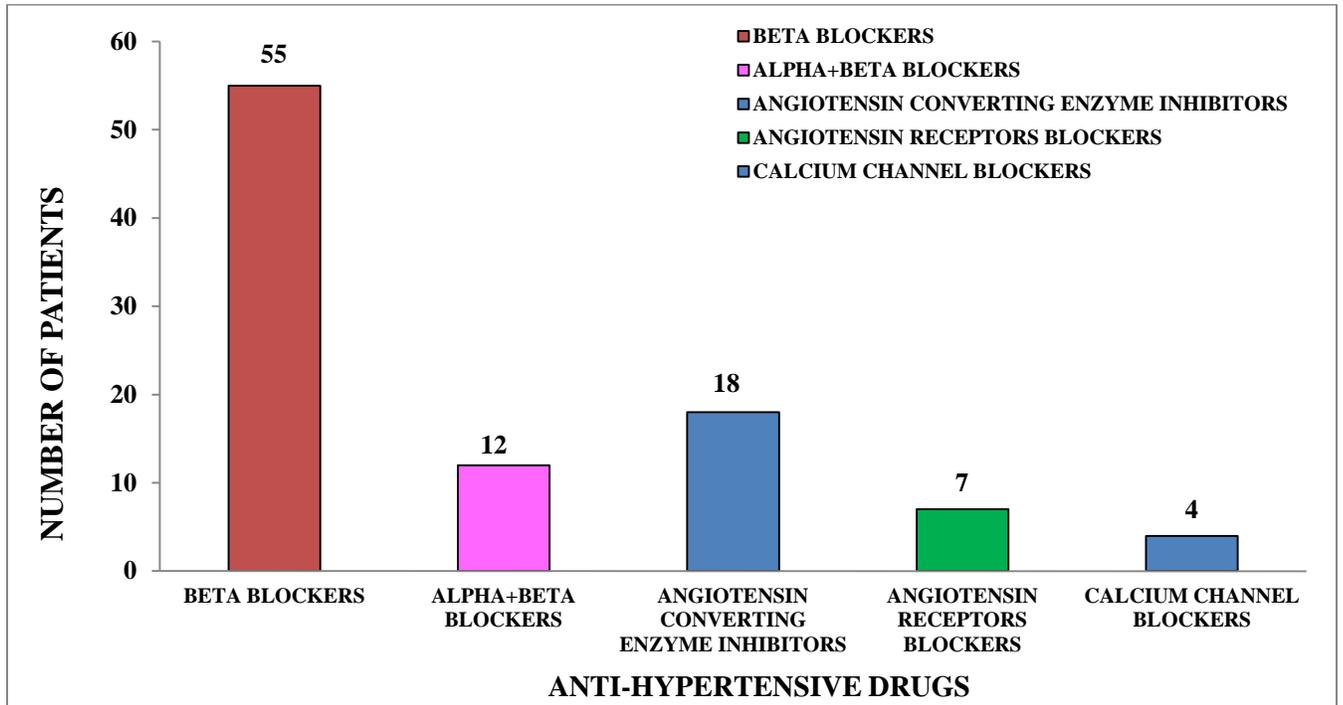


Fig.8: Total number of patients received Anti-Hypertensive drugs

Table 13: Details of Diuretics Prescribed to the Patients

Drug Categories	No. of Patients (n=99)	Percentage
Furosemide	45	45.45%
Spironolactone	8	8.08%
Furosemide+ Spironolactone	12	12.12%

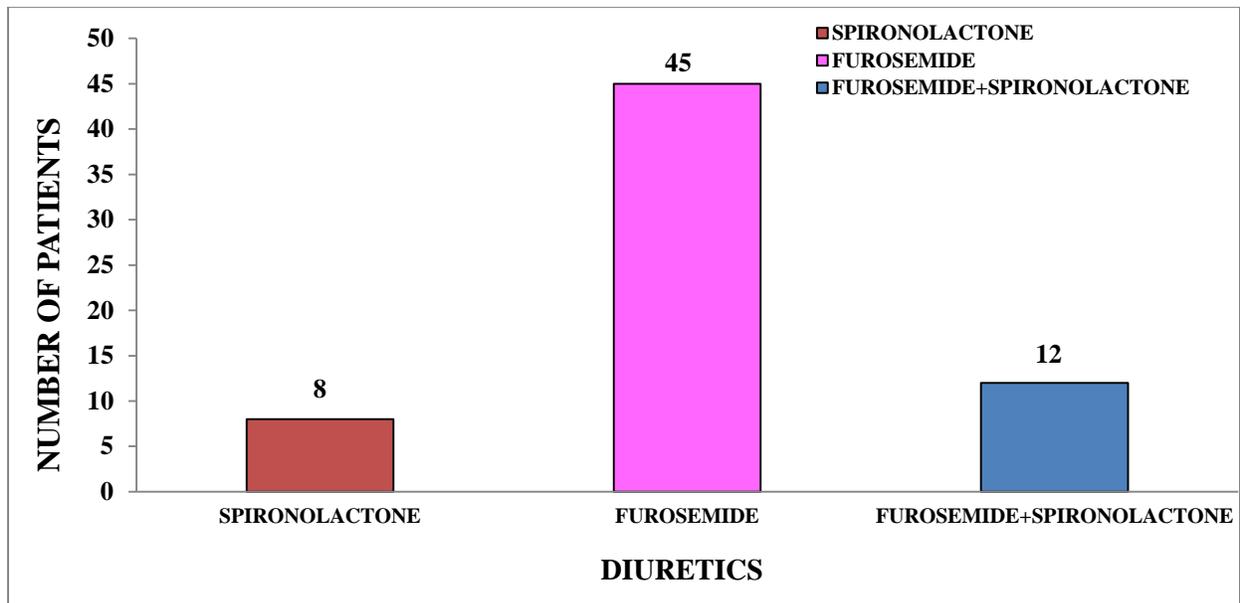


Fig.9: Total number of patients received Diuretics

Table 14: Details of Bronchodilators Prescribed to the Patients

Drug Categories	No. of Patients (n=99)	Percentage
Theophylline + Etophylline	21	21.21%
Salbutamol + Ipratropium bromide	23	23.23%
Budesonide	19	19.19%

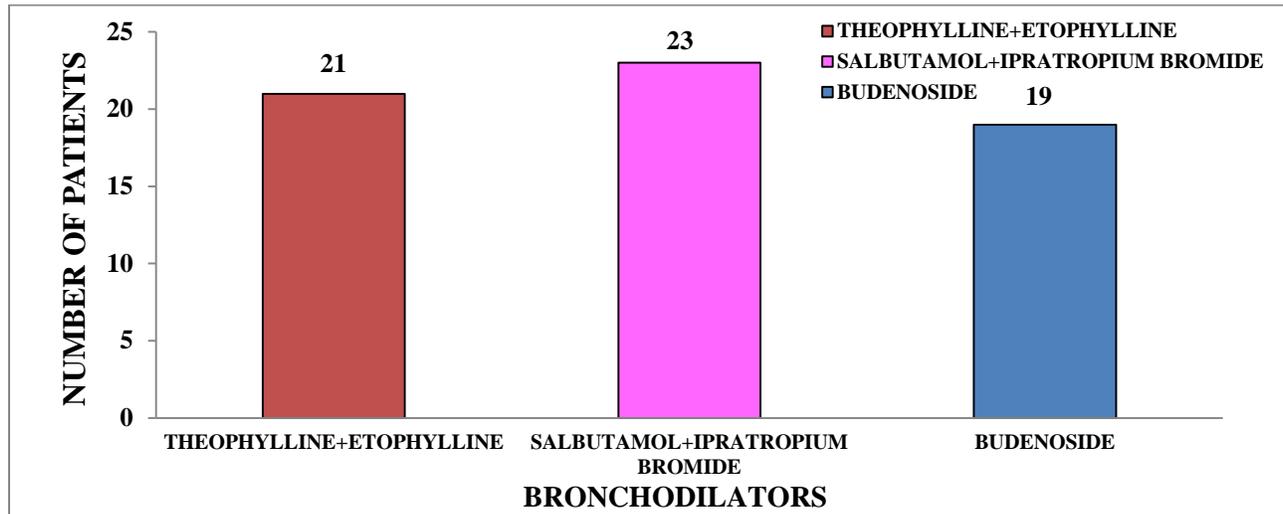


Fig.10: Total number of patients received Bronchodilators

Table 15: Details of antibiotics Prescribed to the Patients

Drug Categories	No. of Patients (n=99)	Percentage
Cephalosporin's	69	69.69%
Antiprotozoal	12	12.12%
Penicillin's	5	5.05%
Quinolones	3	3.03%

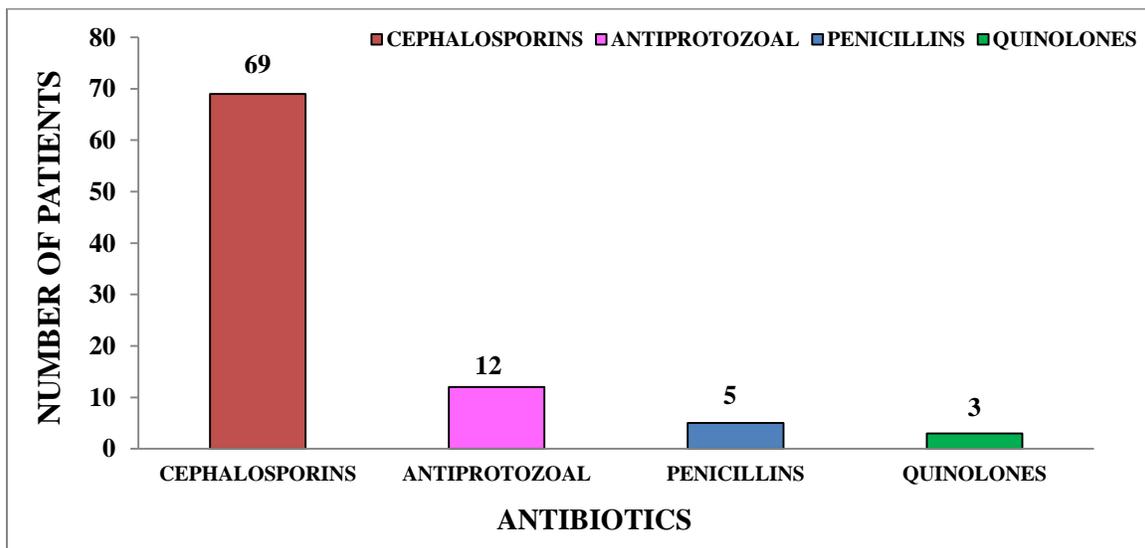


Fig.11: Total number of patients received Antibiotics

Table 13: Miscellaneous Drugs Prescribed

Drug Categories	No. of Patients (n=99)	Percentage
Pantoprazole	78	78.78%
Lactulose	17	17.17%
NSAIDS	23	23.23%
Paracetamol	29	29.29%

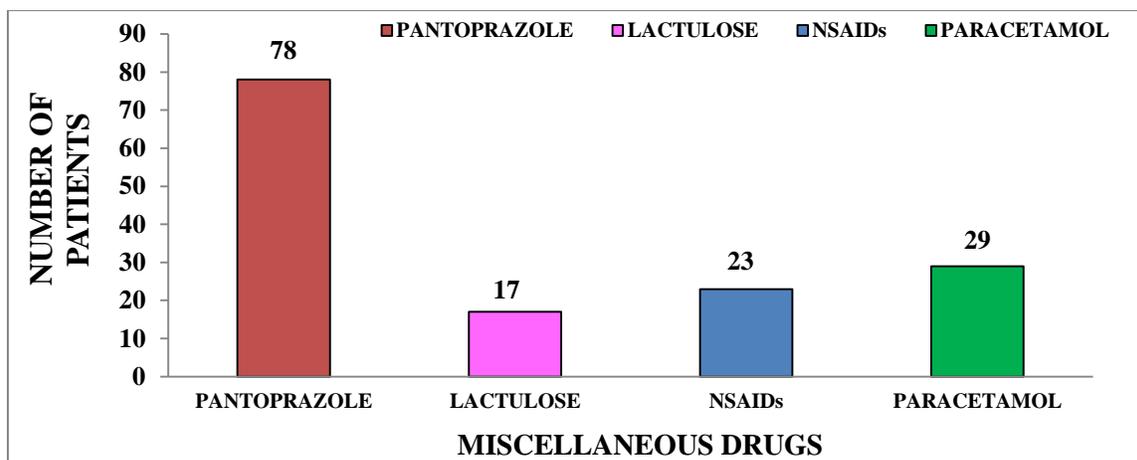


Fig.12: Total number of patients received miscellaneous drugs

Out of 99 patients, 47(47.47%) patients had diabetes mellitus. Most of the patients were prescribed with human Actrapid insulin and Human Mixtard Insulin during hospital stay. The doses of insulin were given based on the blood glucose levels. Very few patients were prescribed with oral hypoglycaemic agents. The total no: of drugs prescribed among 99 in-patients (prescriptions)

with the diagnosis of coronary artery disease included in the study was 727. The average number of drugs per prescription was determined and found to be 7.34 (Table 14). The number of drugs prescribed by generic name was only 176 (24.20%). Aspirin, Atorvastatin, Amlodipine, Paracetamol, Pantoprazole and ceftriaxone were the drugs prescribed by generic name.

Table 13: Details of Prescriptions

Details of prescriptions	Number
Total no. of patients prescriptions analysed	99
Total number of drugs prescribed	727
Average number of drugs per prescription	7.34
Number of drugs prescribed by generic name out of total number of drugs prescribed	176

DISCUSSION

In a study conducted by Kamath A et al., of the 349 patients, 81% were males and 19% females and 40% were more than 65 years of age [28]. In a retrospective study conducted by Tasneem Sandozi and Fouzia Nausheen, of the 140 patients was

studied, 96 of these patients were men and 44 of them were women. Average age of men was 62 years (Range 36-83 years) and of women was 61 years (Range 30- 80 years) [29]. In the present study, out of 99 patients, 60.6% were male and 39.4% were females and 31.31% were more than 60 years of age. The results of this study were found to

be in consistence with previous studies and indicated that male were more prone to coronary artery disease compared to female and the risk increased with increasing age. In a study conducted by Jorg Muntwyler, et al., the drug prescription rates for antithrombotic agents, beta-blockers, ACE inhibitors/angiotensin receptor blockers and lipid lowering drugs were 91%, 58%, 50% and 63% respectively [30]. In the present study, the drug prescription rates of anti-thrombotic agents were 100 %, beta-blockers 55.55%, ACE inhibitors/angiotensin receptor blockers and lipid lowering drugs were 25.25% and 81.81% respectively. The prescription rate of lipid lowering drugs in this study were comparatively very high than the previous study.

In a study conducted by Tasneem Sandozi and Fouzia Nausheen the drug utilization of various antiplatelet drugs were as aspirin alone (25.71%), aspirin and clopidogrel (60.00%), whereas in the present study, the prescription rate of Aspirin alone was 14.14% and combination of aspirin & clopidogrel (81.81%). In the present study the combination of aspirin and clopidogrel were prescribed in more number of patients compared to previous study. In a study conducted by Tasneem Sandozi and Fouzia Nausheen drug prescription rates for Low molecular weight heparin was 20% [29]. In another study by Banerjee S., et al., low molecular weight heparin was used in 25.2% [31]. In the present study, the prescription rate of low molecular weight heparin (35.35%). The results of this study were in not in consistence with previous studies. A greater variation in the use of anticoagulant was observed.

In a study conducted by Supratim Datta the overall use of antihypertensives in coronary artery disease was follows, Calcium channel blockers (73%), Beta blockers (37.2%), ACEIs (42.3%) [32]. A study conducted by Jorg Muntwyler, et al., observed the drug prescription rates for beta-blockers, ACE-inhibitors/angiotensin receptor blockers as 58% and 50% respectively [30]. In the present study, the use of antihypertensives were as follows Beta blockers (55.55%), ACEIs (18.18%), calcium channel blockers (4.04%). The previous study indicated high use of calcium channel blockers, whereas in the present study beta-blockers were found to be the preferable choice of antihypertensive prescribed more frequently. Beta blockers are a class of drugs, which are used

primarily in hypertension. Antihypertensive and cardioprotective effects β - blockers support more frequently use as found in our study. In a previous study by Heaton et al. [34] reported that beta blockers decrease the mortality rate in myocardial infarction patient. Cardioselective β blockers, metoprolol and carvedilol, were the most prescribed drugs in the present study which was a rational approach to the therapy.

In a study conducted by Sreedevi K et al., the different statins prescribed were Atorvastatin (261 prescriptions), Rosuvastatin (26 prescriptions) in 1000 prescriptions [32]. A study conducted by Tasneem Sandozi and Fouzia Nausheen indicated prescription of lipid lowering drugs to be 68.57% [29]. In the present study, Atorvastatin is prescribed in 81 prescriptions out of 99 prescriptions. This study recorded the use of lipid lowering drugs as 81.85%. From the previous and present study, it can be concluded that atorvastatin remains the most commonly prescribed drug among the various statins available to reduce cholesterol levels. The prescription of lipid lowering drugs was found to be very high in this study compared to earlier studies. Our study showed that most of the hyperlipidemic patients were prescribed atorvastatin which decreases blood LDL cholesterol level while increasing the HDL level. In addition, it also reduces the risk of CHD, MI and stroke, etc. [35].

In a study conducted by Supratim Datta, et al., the use of diuretics was (41%) [33], whereas in the present study the prescription of diuretics was recorded as 65.65%. The results of this study varied slightly from the previous studies. In a study conducted by Banerjee S., et al., the commonly prescribed drugs were as follows – isosorbide mononitrate among the nitrates, clopidogrel among the antiplatelet agents, metoprolol among the beta blockers, amlodipine among the Calcium channel blockers, ramipril among the ACE inhibitors, atorvastatin among the hypolipidaemics and Low Molecular Weight Heparin (LMWH) among the anticoagulants [31].

In the present study, the commonly prescribed drugs were isosorbide dinitrate among the nitrates, aspirin among the antiplatelet agents, metoprolol among the beta blockers, amlodipine among the Calcium channel blockers, Enalapril among the ACE inhibitors, atorvastatin among the hypolipidaemics and enoxaparin among the

anticoagulants. A variation in prescribing of antiplatelet drugs, anticoagulants was observed, aspirin and enoxaparin sodium were prescribed in more number of patients as compared to earlier studies. In a study conducted by Tasneem sandozi et al., the average number of drugs used per patient was 9.93 which are high. Percentage of drugs prescribed by generic names was 6.00% [29]. In a study conducted by Sreedevi, et al., the average number of drugs per prescription was found to be 5.5. Rare prescriptions were observed with generic names of the drugs, many prescriptions especially of CVD were containing fixed dose combinations (FDC) [32]. In the present study, the average no. of drugs per patient is 7.34 which were higher compared to previous study. The percentage of drugs prescribed by generic name is 24.20%. The present and previous studies have shown much variation in the average number of drugs per prescription and the percentage of drugs used by generic name.

Better health care services will have a positive impact on health care system. Many studies were conducted to evaluate the value addition of drug therapy management into the patient care in critical care setting but cardiovascular disease patient were rarely focused as the chances of readmission in hospitals and number of days of hospitalisation is found more in cardiac ill patient, so this study aimed to focus on analysis of prevalence and prescription pattern of drugs in coronary artery disease patients in tertiary care hospital. A drug therapy plan may require discontinuation or addition of a drug as well dosage adjustments and thus requires more complex decision making skills. Determining whether a patient actually requires drug therapy is probably the most intricate problem to identify because the outcomes of the patient's drug therapy depends upon the patient's social history as well pathophysiology and pharmacotherapeutics, which is altered due to disease conditions.

Study result shows that male patients admitted were more compared to female and may infer that male are more prone to cardiac diseases compared to female gender. Average age of patients found was between 41-60 years, which indicates that the cardiac conditions found may be chronic in this age group. Majority of the cases in this age group includes Myocardial Infarction. This increased prevalence is mainly due to the sedentary lifestyle

and co-morbidities, which decreases the blood supply to the heart and due to deposition of cholesterol in the arteries supplying blood to the heart leading to cardiac arrest.

Among all admitted patients in ICCU, RICU, MICU and medical wards (male and female) for cardiac problems, patients were suffering mostly from co-morbid conditions and commonly found co-morbid condition was hypertension, diabetes mellitus, dyslipidaemia and a combination hypertension, diabetes mellitus, dyslipidaemia which supports the study that these are more prone to high risk of cardiac complications.

CONCLUSION

In this study, it was observed the incidence of CAD was more common in male compared to female and the risk for coronary artery disease increased with increasing age. In the present study, the prevalence of Myocardial Infarction was high. Hypertension and diabetes were the most common co-morbid conditions associated with coronary artery disease. From the study it is concluded that co-morbidities were the main cause for cardiovascular diseases and their complications. By controlling the co-morbid conditions there is a substantial decline in the cardiovascular diseases and their complications.

The most commonly prescribed drug classes for main indications in coronary artery disease were anti-platelet drugs 99 (100%) followed by antihyperlipidemics 81 (81.81%), anti-anginal drugs 33 (33.33%). This was followed by anti-hypertensives and anticoagulants 35 (35.35%) respectively. The use of anticoagulants and anti-platelet is value addition in the effective treatment as well as prevention of ischemic heart diseases. Extensive polypharmacy (7.34 drugs per prescription) was noticed in the prescriptions. The prescribing pattern can be improved by reducing the number of drugs per prescription. Very few drugs were prescribed by generic name. The economic burden of the patients can be reduced by prescribing generic drugs.

The study of prescribing pattern is a component of medical audit that does monitoring and evaluation of the prescribers as well as recommends necessary modifications to achieve rational and cost-effective medical care. The results of this study on drug prescribing pattern can

provide a framework for continuous prescription audit in a hospital in-patient setting. This will help prescribers improve patient management by rationalizing prescribing practices. Moreover, time to time studies is required to assess drug utilization pattern for improving disease management strategy and quality of life of patients. In order to achieve optimal therapeutic outcomes unnecessary multifaceted prescription must be avoided. In addition from regular workshops or seminars for the health care professionals and dissemination of treatment guidelines could facilitate rational use of the drug.

Limitations of the study

- The external validity of the study may have also been limited by the small sample size, short study duration and follow-up.
- This is the first type of attempt to provide prescription pattern assessment in coronary artery disease in our setting. Monitoring patients for longer period would reflect more accurate profile of the natural time frame of the medication views.
- Establishing the interventions in the form of educational programs can improve the healthy well-being of the patient and decreases the risk of cardiovascular complications and also improves the overall drug therapy of the patient.

Future scope of the study

- This study may be helpful in identifying the new concept of prescription pattern assessment of

patients in different disease conditions in critical care and also introduce the new concept of drug therapy management in Karnataka state, India.

- Pharmacoeconomic evaluation studies of medication therapy can be done to assess the burden of coronary artery disease in the population to avoid unnecessary costs of medication.
- Pharmacoepidemiological studies can be done to study the uses and effects of drugs in well-defined populations.

Conflict of interest

All the authors declare that there is no potential conflict of interest in the study.

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