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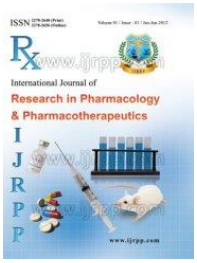

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An observational study on prescribing pattern of iscemic heart disease

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ABSTRACT

Background

Cardiovascular disease is the leading cause of death globally. India has become a country with more cardiac patients. India has become a country with more number of cardiovascular disease patients. Study of prescribing pattern can give trend in using the drugs in coronary artery disease in treating there comorbid conditions. The information of prescribing pattern can lead us toward the rational drug use helps to take measures to enhance prescribing habits. Multi morbidity is common in old age. Death's related with cardiovascular events remain in constant in many countries due to latest therapeutic approaches for prevention and treatment in cardiovascular disease .This condition is widely associated with risk factors such as Hypertension ,Diabetes mellitus, alcohol consumption and sedentary lifestyle which plays an important role in cardiovascular diseases.

Objectives

The objectives of this study was to evaluate coronary artery disease prevalence and drug utilization in pattern in the department of the secondary care hospital in Hyderabad, India.

Study Design

A cross sectional study was carried out in general medicine department, Thumbay New Life Hospital Chaderghat using a well designed patient collected well defined form.

Results

In this study among 250 case of coronary artery disease analysed, which consist of male n=156 (62%) and females where n=94(38%). The incidence of CAD was more common in males than in females. In this study two different types of coronary artery disease were identified which includes angina pectoris patients and myocardial infarction patients (MI). Most of the patients with coronary artery disease where of the age group of 41-60 the most common comorbid conditions were hypertension 75(30%), hypertension and diabetes 72(29%) , hypertension and others (CKD ,hypothyroidism, dyslipidemia) 52(20%). The prescribing pattern of various cardiovascular drugs were found to be –antiplatelet drugs 250(89.6%), anti hyperlipidemic drugs 167 (66%), antibiotic drugs 99(21.6%), anti angina drugs 320(130%), antihypertensive drugs 207(64.8%), anticoagulants 138(66.4%) , diuretics 142(53.6%), bronchodilators 19(14.8%)

Out of 250 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 250 in-patients (prescriptions) with the diagnosis of coronary artery disease included in the

study was 1235. The average number of drugs per prescription was determined and found to be 4.94% (Table 14). The number of drugs prescribed by generic name was only 431(34.8%). Aspirin 161, Atorvastatin 127, Amlodipine 8, Paracetamol 99, Pantoprazole 36 were the drugs prescribed by generic name.

Conclusion

Uncontrolled DM, hypertension, hyperlipidemia are risk factors for coronary artery disease. Anti-fibrinolytics followed by statins, anti-diabetics and anti hypertensives were most prescribed drugs. Combination drugs were prescribed patients were effective therapeutic. The present study will help health care professionals to modify the efficient and safe cardiovascular disease.

Keywords: Cardiovascular disease, Coronary artery disease, Dyslipidemia, Sedentary lifestyle, Multi morbidity, Prescribing patterns, Cardiovascular events.

INTRODUCTION

Ischemic heart disease also known as Coronary Artery Disease, Coronary Heart Disease, Coronary Microvascular Disease [1]. Ischemia is a condition that an insufficient supply of blood is reaching a part of the body. Ischemic heart disease is characterized by reduced blood supply to the heart muscle. Ischemia is associated not only with inadequate oxygen supply, but also with reduced availability of nutrients and inadequate removal of metabolic end products [3]. Atherosclerosis (sometimes called "hardening" or "clogging" of the arteries) is the build up of cholesterol and fatty deposits (called plaques) on the inner walls of the arteries. These plaques can stop blood flow to the heart muscle by apparently clogging the artery or by causing abnormal artery function [4].

Coronary artery disease is categorised into stable angina, unstable angina, myocardial infarction, and sudden cardiac death [5]. Stable angina is also called angina pectoris [6]. Stable angina: Stable angina is chest pain or discomfort that most occurs with activity or emotional stress. Angina is due to poor blood flow through the blood vessels in the heart [7].Unstable angina: The angina may occur more frequently, occur more easily at rest, feel more severe, or last longer. Although this can often be relieved with oral medications, it is unstable and may progress to a heart attack. Usually more intense medical treatment or a procedure are required to treat unstable angina [8].Myocardial infarction (MI), commonly known as a heart attack, occurs when blood flow decreases or stops to a part of the heart, causing damage to the heart muscle [9].

Coronary artery disease cause damage or injury to the inner wall coronary artery. The damage might be due to: Smoking, Sedentary lifestyle, High cholesterol, Diabetes or insulin resistance, High blood pressure. Once the inner wall of an artery is damaged, fatty deposits (plaque) made of cholesterol and other cellular waste products accumulate at the site of injury in a process called atherosclerosis. If the surface of the plaque ruptures, blood cells called platelets will clot at the site to try to repair the artery. This clot can block the artery, leading to a heart attack [10]. The fibrous plaque starts to develop itself. It supports its own small vessels to provide it with a supply of blood in a process called angiogenesis. The plaques starts to calcify as calcium starts to deposit. The final plaque is made up of a cap of fibrous tissue covering a core that is rich in lipids as well as necrotic or dead cells. The edge of this cap is key in acute coronary disease. This region ruptures, which exposes the primary core of lipids and necrotic material to thrombogenic factors in the blood. This can cause the aggregation of platelets that form a clot across the plaque and further narrow the artery. Arteries that have become narrowed due to the presence of plaques may lead to angina or chest pain as the muscles of the heart are deprived of oxygen. As the deposits on the plaques grow in size and dimension, the blood vessels become further narrowed and there may be obstruction leading to a heart attack or a myocardial infarction.

Risk factors

Risk factors often appear in clusters and may accumulate, such as obesity leading to type 2 diabetes and high blood pressure. When grouped together, certain risk factors put at an even greater risk of coronary artery disease. For example, metabolic syndrome a cluster of conditions that includes elevated blood pressure, high triglycerides, low HDL, or "good," cholesterol, elevated insulin levels and excess body fat around the waist increases the risk of coronary artery disease [12].

Age	Getting older increases risk of narrowing arteries
Sex	Men are generally at greater risk of coronary artery disease the risk for women increases after menopause.
Family history	A family history of heart disease is associated with a higher risk of coronary artery disease, especially if a close relative developed heart disease at an early age. Your risk is highest if your father or a brother was diagnosed with heart disease before age 55 or if your mother or a sister developed it before age 65.
Smoking	People who smoke have a increased risk of heart disease. Exposing others to smoke also increases their risk of coronary artery disease.
High blood pressure	Uncontrolled high blood pressure leads to hardening and thickening of arteries, narrowing the channel through which blood can flow
High cholesterol levels	High levels of cholesterol in your blood can increase the risk of formation of plaque and atherosclerosis. High cholesterol can be caused by a high level of low-density lipoprotein (LDL) cholesterol. A low level of high-density lipoprotein (HDL) cholesterol can also develops of atherosclerosis.
Diabetes	Diabetes is associated with an increased risk of coronary artery disease. Type 2 diabetes and coronary artery disease have similar risk factors, such as obesity and high blood pressure.
Over weight or obesity	Excess weight is the causes of this disease.
High sensitivity C-reactive protein	High sensitivity C-reactive protein (hs-CRP) is a normal protein that appears in higher amounts when there's inflammation in body. High hs-CRP levels causes heart disease as coronary arteries narrow, more hs-CRP in your blood.

Treatment involves lifestyle changes, and possibly some medical procedures and medications.

Statins	These are the only medications giving a positive impact on outcomes in CHD, but if a person has another underlying cholesterol disorder, they may not work.
Low dose aspirin	Reduces blood clotting, lowers the risk of angina or a heart attack.
Beta blockers	Reduce blood pressure and heart rate in a person who has already had a heart attack.
Nitroglycerin patches, sprays, tablets	Control chest pain by reducing the heart's demand for blood by widening the coronary arteries.
Angiotensin-converting enzyme (ACE) in	lower blood pressure and help to slow or stop the progression of coronary artery disease
Calcium channel blockers	Widen the coronary arteries, allowing greater blood flow to the heart, and reduce hypertension.

Electrocardiogram: An electrocardiogram records electrical signals as they move through heart. An ECG can often signify of a previous heart attack or one that's in progress [15]. Blood tests: Blood Tests inspect the levels of certain fats, cholesterol, sugar, and proteins in your blood. Abnormal levels may put you at risk for atherosclerosis. To scan the levels of cholesterol, triglycerides, sugar, lipoproteins, or proteins that are markers of inflammation .It can assess cardiac output and is a sensitive test for fluid across the heart (pericardial effusion). It can also be used to detect abnormal anatomy or infections of the heart valves. An angiogram is an X-ray image of blood vessels after they are filled with a contrast material. An angiogram of the heart, a coronary angiogram, is the "gold standard" for the evaluation of coronary artery disease (CAD). A coronary angiogram can be used to know the exact location and severity of CAD[18].More than a stress imaging study and cardiac computed tomography angiography at the same time, should not be used for risk evaluation in patients with stable IHD.

AIM

The ***objective*** of the study is to focus ***prescribing patterns*** and analysis of drugs used in the ***coronary artery disease*** (***CAD***) and to

identify, which drug is mostly prescribed at that hospital.

MATERIALS AND METHODS

Study site

The study conducted at Medicine ward of general, cubicals, sharing room and ICU of THUMBAY NEW LIFE HOSPITAL, CHADERGHAT.

Study Design

Hospital based prospective and observational study.

Study period

The study carried out for a period of six month from October 2018 to March 2019.

Sample size

250 patients.

Collection of data

Using a suitably designed data collection form, the following details will be collected:

- Patient demographics
- Prescription chart
- Lab data
- Medical record
- Doctor's note
- Investigations

Inclusion criteria

- Patient with ischemic heart disease.
- Patient with diabetes mellitus require treatment.
- Patient with symptomatic heart failure.
- Patients above 18 years of age.

Exclusion criteria

- Pregnant women and nursing mothers.
- Patients below 18 years of age.

Method and collection data

- Patient will be interviewed to determine the chief complaints, history of the present illness, past medical and medication history.
- Patient's prescriptions.
- Medical records of in patients.
- Interviews with patient and or care therapy.

RESULTS

A total no of 250 patients were enrolled in study of 156(62%) were males and 94(38%) were females (Figure No.1).The occurrence of CAD is more common in male compared to female. The patients were divided into 6 groups and kept at an interval of 10 years. Age wise distribution is shown in (Figure No.2, Table No.1)

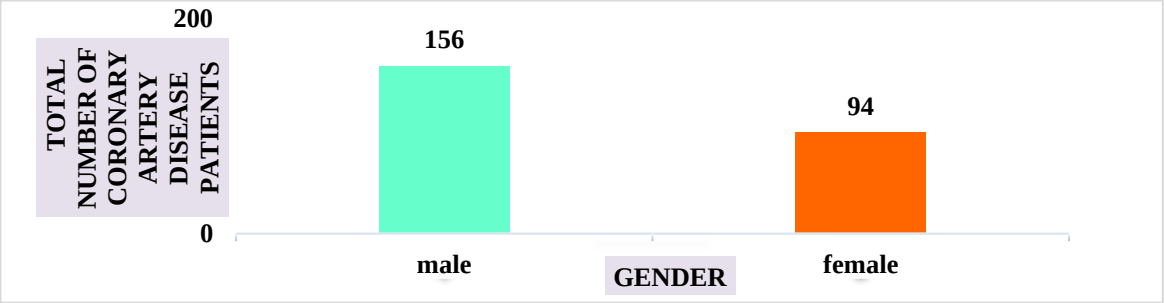

Figure.1: Sex wise distribution of Coronary Artery Patients

Table 1: Age and Gender wise distribution of coronary artery disease

Age group (years)	Males	Females
21-30	3	2
31-40	14	12
41-50	33	17
51-60	52	40
61-70	38	25
71 and above	8	6

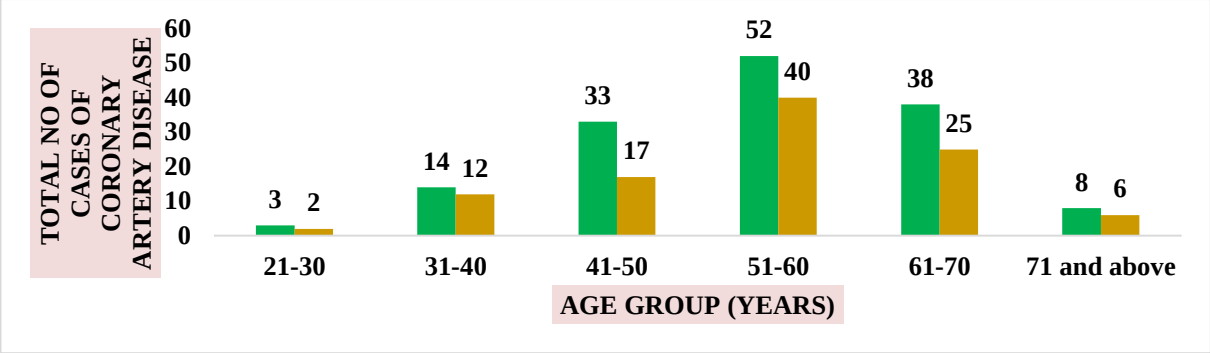

Figure. 2: Age and Gender wise distribution of coronary artery disease

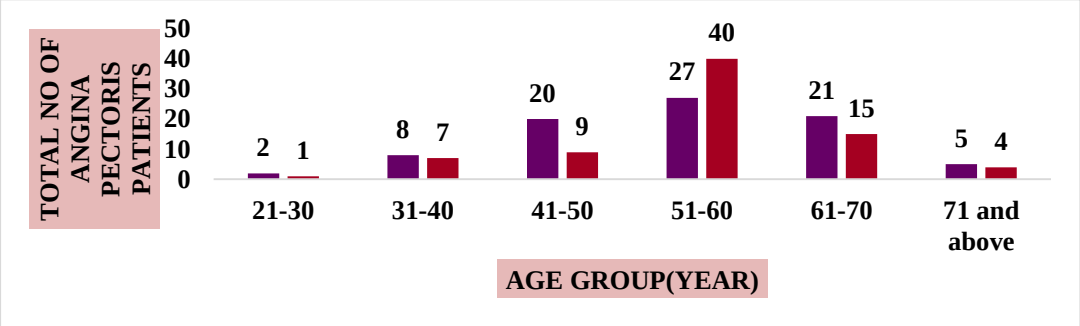

Figure. 3:Age and sex wise distribution of Angina Pectoris Patients

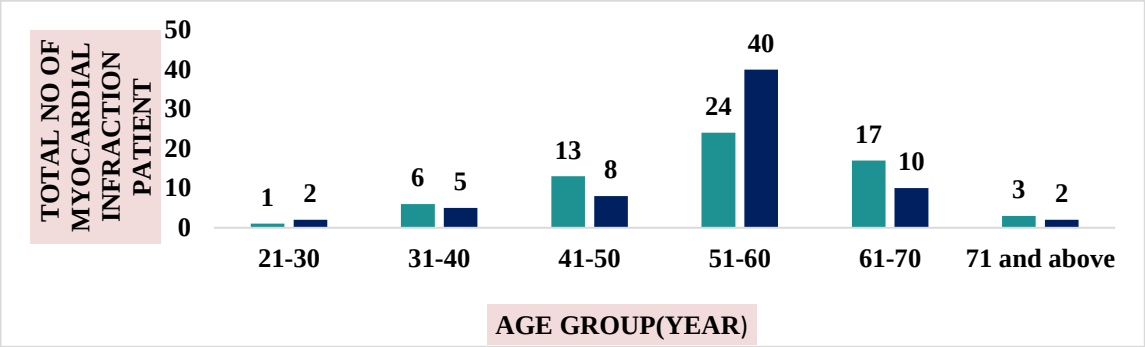

Figure. 4: Age and sex distribution of myocardial infraction patients

Table 2: Social history of coronary artery disease

Social history	No. of patients	Percentage
Smoker	69	56%
Ex-smokers	16	13%
Tobacco chewer	21	13%
Alcohol	15	12%
Pan chewer	6	5%

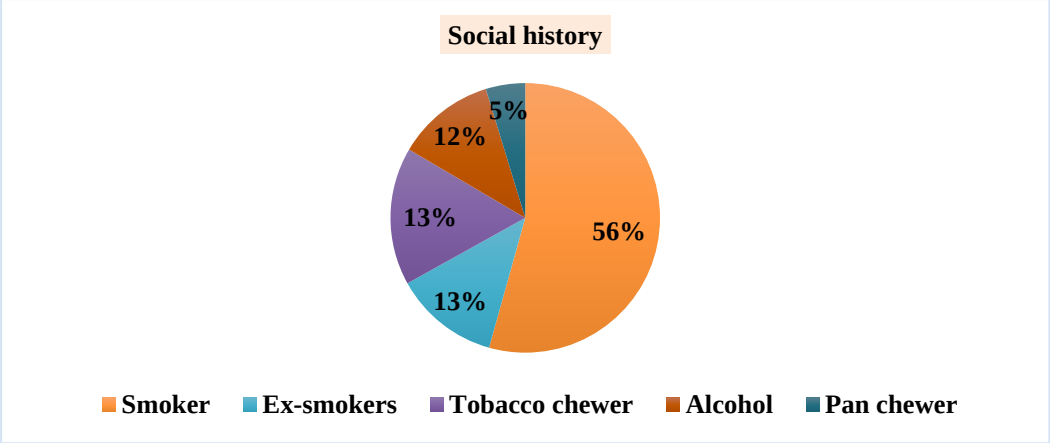

Figure 5: Social history of coronary artery disease

Table. 3: Comorbid conditions of coronary artery disease

Co- morbid condition	No of patients(n=250)	Percentage
Hypertension	75	30.00%
Hypertension+Diabetes	72	29%
Hypertension+Others(CKD,Hypothyroidism,Dyslipidemia)	52	20.80%
Hypertesion+Diabetes+Others(Dyslipidemia,Asthma)	38	15.20%
Diabetes+Others(Dyslipidemia, Hypothyriodism Asthma)	8	3.20%
No hypertension +Diabetes	5	2%

Table. 4: Categories of drugs prescribed to patient

Drug categories	No. of patients (n=250)	Percentage(%)
Antiplatlet	250	89.60%
Anticoagulant	138	66.40%
Antihypertensive	207	64.80%
Antidiabetic	93	37.20%
Antihyperlipidemic	167	66.80%
Antianginal	320	130%
Diuretics	142	53.60%
Bronchodilator	19	14.80%
Antibiotics	99	21.60%

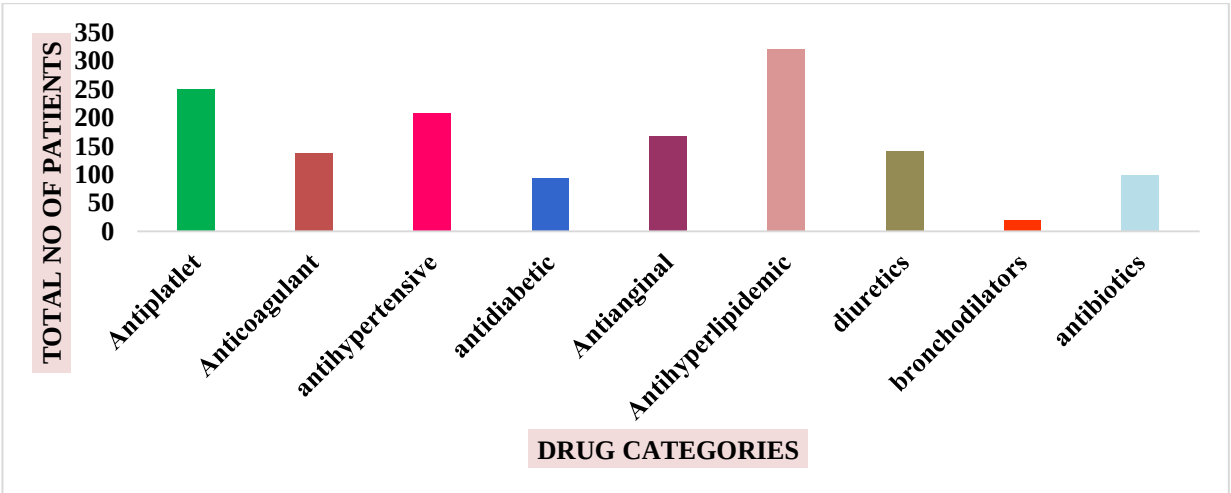

Figure 6: Categories of drugs prescribed to patient

Table: 5 Details of antiplatelet drugs prescribed to patients

Antiplatelets drugs	No of patients	Percentage
Clopidogrel	155	62%
Aspirin	**161**	**64.40%**

Table.6: Details of anticoagulant drugs prescribed to patients

Anticoagulant drugs	No of patients	Percentage
Heparin	127	50.80%
Dalteparin	8	3.20%
Enoxaparin	3	1.20%

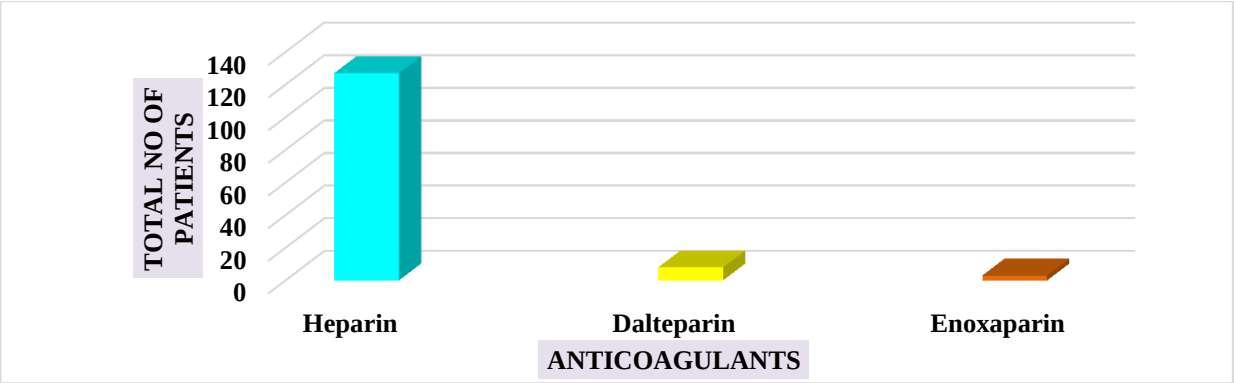

Figure.7: Anticoagulants prescribed to patients

Table 7: Details of anti fibrinolytics prescribed to patients

Antifibrinolytic drugs	No of patients	Percentage
Streptokinase	8	3.20%
Tranexamic acid	2	0.80%

Table: 8: Details of antianginal drugs prescribed to patients

Antianginal drugs	No of patients	Percentage
Trinitrate	89	35.60%
Ivabradine	38	15.20%
Trimetazidine	44	17.60%
Long acting nitrates	149	59.60%

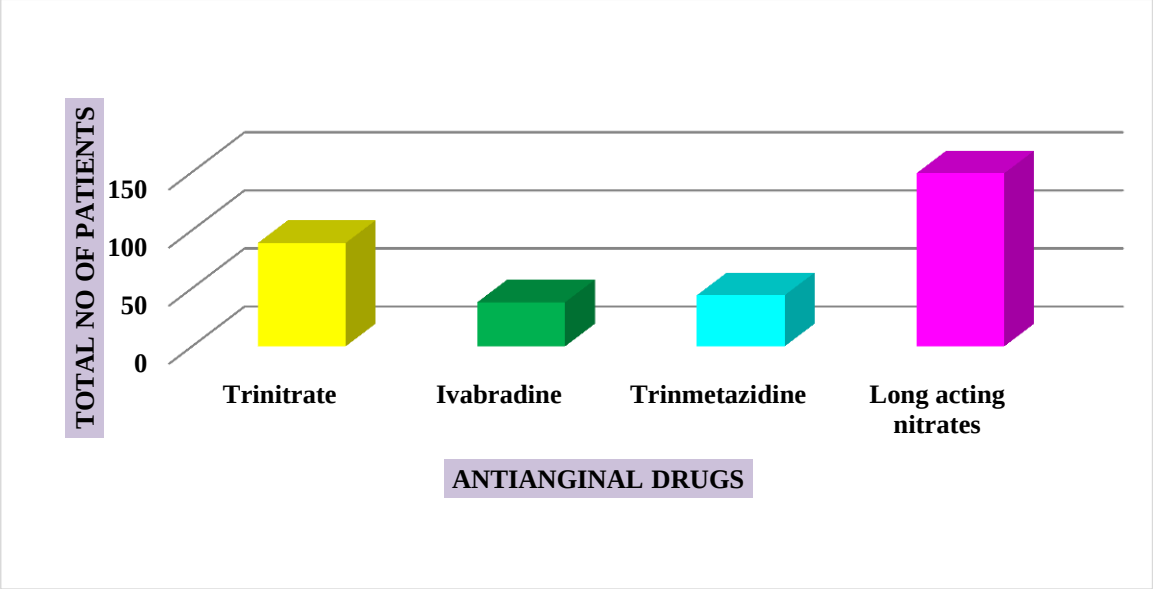

Figure .8: Anti anginal drugs prescribed to patient

Table.9: Details of antihyperlipidemic drugs prescribed to patients

Anti hyperlipidemic drugs	No of patients	Percentage
Ezetimibe	9	3.60%
Atorvastatin	127	50.80%
Rosuvastatin	31	12.40%
Fenofibrate	18	7.20%

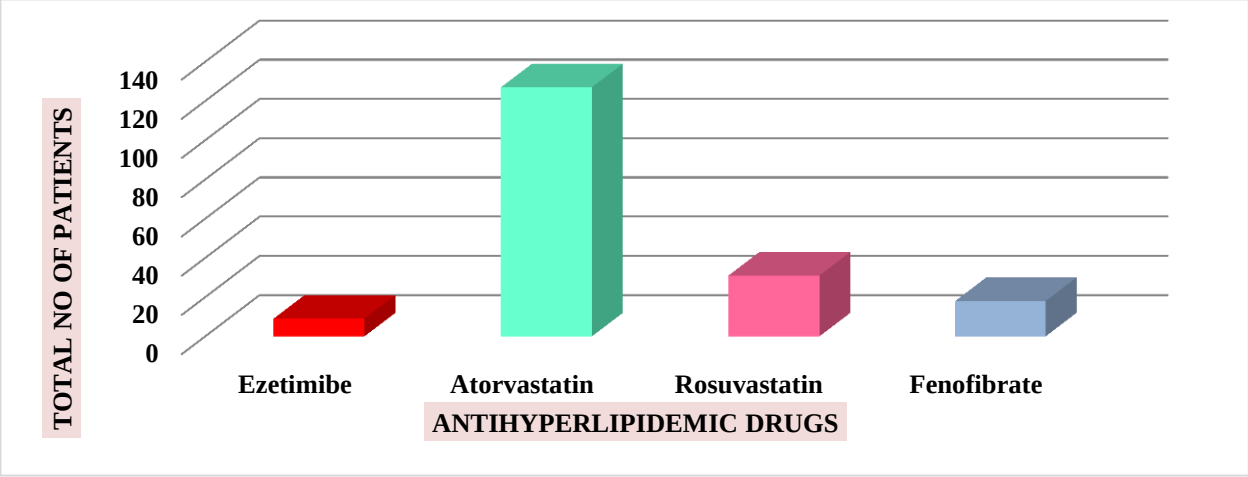

Figure.9: Antihyperlipidemic drugs prescribed to patient

Table.10: Details of diuretic drugs prescribed to patient

Diuretics drugs	No of patients	Percentage
Furosemide	72	28.80%
Torsemide	27	10.80%
Hydrochlorothiazide	16	6.40%
Spiranolactone	19	7.60%

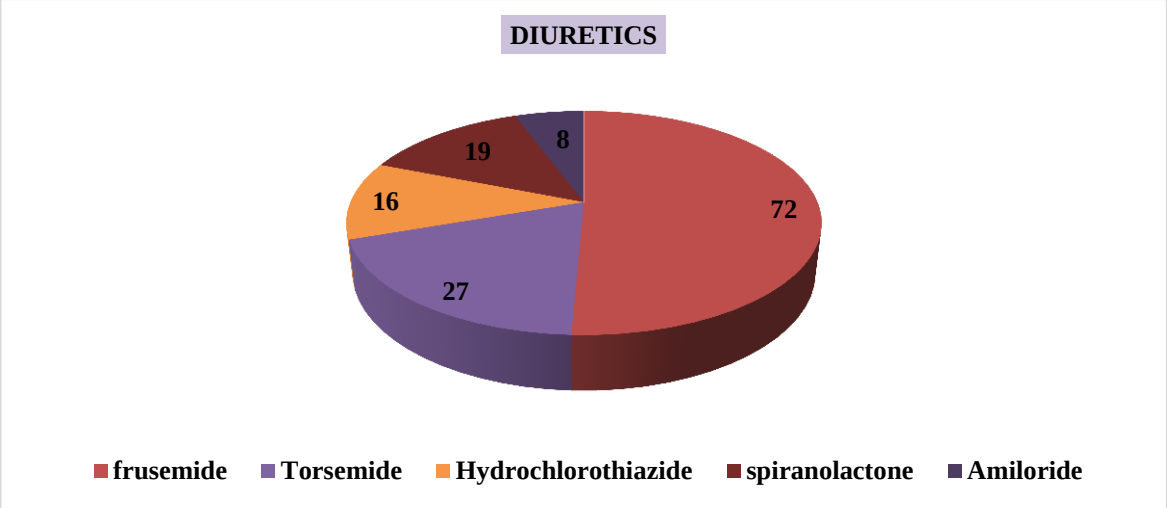

Figure.10: Diuretic drugs prescribed to patients

Table. 11: Details of bronchodilators prescribed to patients

Bronchodilators drugs	No of patients	Percentage
Budesonide	6	2.40%
Levosalbutamol	4	1.60%
Salmeterol	9	3.60%

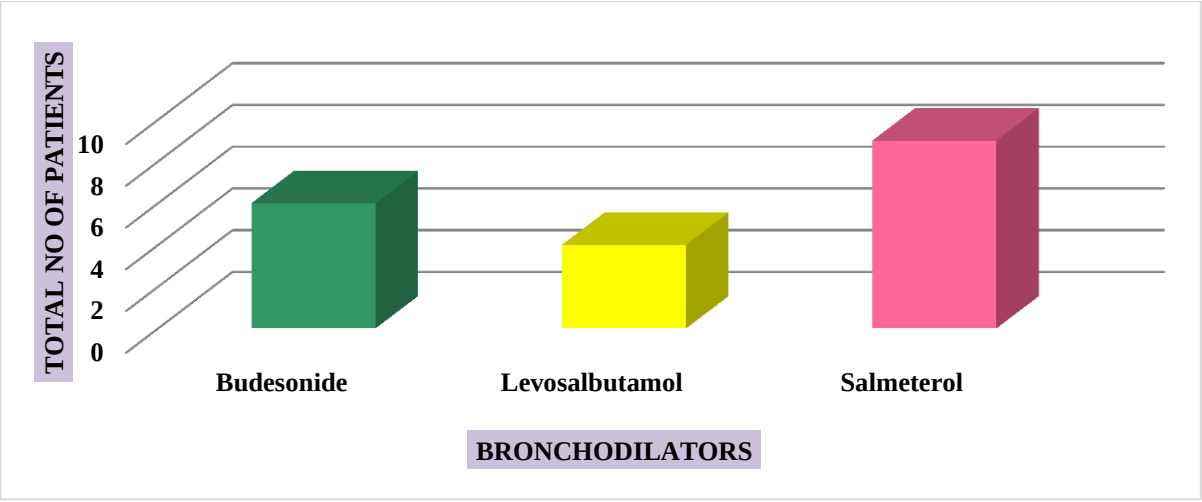

Figure. 11: Bronchodilators prescribed to patients.

Table.12: Details of antibiotics prescribed to patients

Antibiotic drugs	Number of Patients	Percentage
Cephalosporin	50	20%
Quinolones	4	1.60%
Penicillin	25	10.00%
Macrolide	4	2%
Sulfonamide	10	4.00%
Metronidazole	6	2.40%

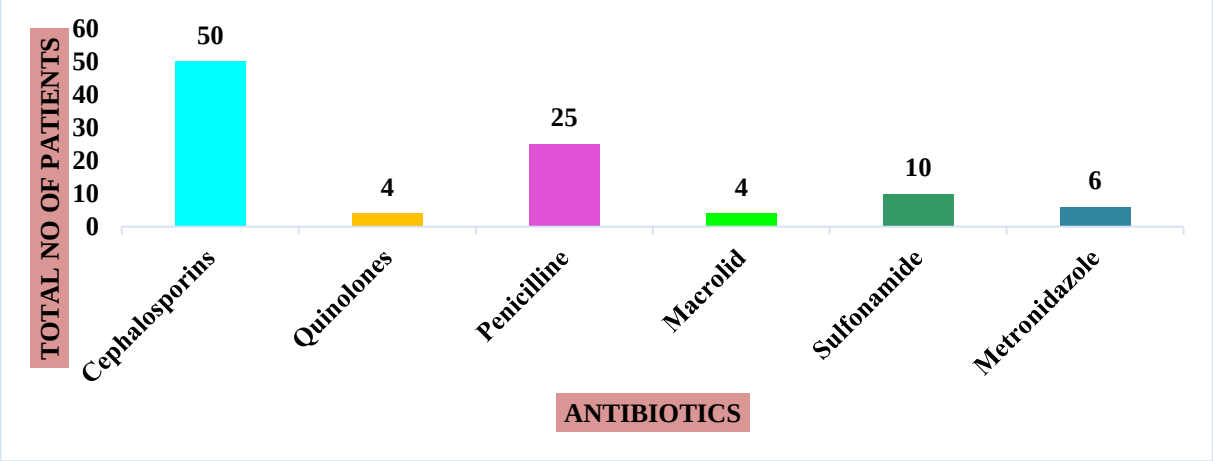

Figure. 12: Antibiotic drugs prescribed to patient

Table.13: Details of antihypertensive drug prescribed to patients

Antihypertensive drugs	No of patient	Percentage
Beta blockers		
Metoprolol	50	20%
Atenolol	20	8%
Carvedilol	13	5.20%
Propranolol	10	4%
Nebivolol	4	1.60%
Acebutolol	1	0.40%
ACEI		
Ramipril	9	3.60%
Captopril	4	1.60%
Enalapril	3	1.20%
Lisinopril	3	1.20%
Perindopril	2	0.80%
ARB's		
Losartan	6	2.40%
Telmisartan	16	6.40%
Valsartan	22	8.80%
CCB'S		
Amlodipine	14	5.60%
Diltiazem	16	6.40%
Nicardipine	11	4.40%
Verapamil	3	1.20%

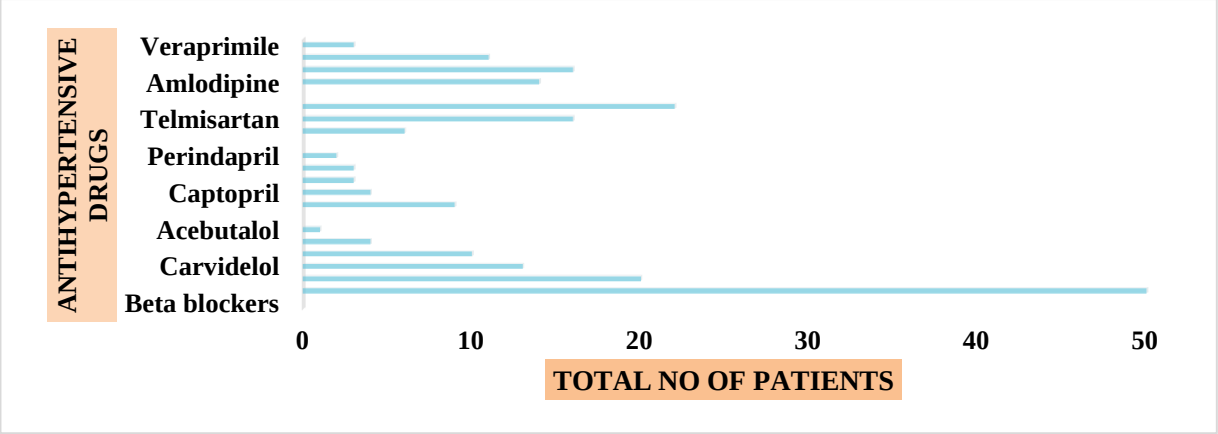

Figure.13: Details of antihypertensive drugs

Table.14: Details of Antacids, Antipyretics, Antiemetic prescribed to patients

Antacids	No of patients	Percentage
Pantoprazole	36	14.40%
Ranitidine	8	3.20%
Sodium bicarbonate	4	1.60%
Antipyretics		
Paracetamol	99	39.60%
Antiemetic		
Ondansetron	29	11.60%
Domperidone	5	2%
Metoclopramide	4	1.60%

Table.15: Details of risk factors in patients

Risk factors	No of patients	Percentage
Obesity	35	14%
Heart attack	18	7.20%
Stroke	3	1.20%
sedentary life style	14	5.60%

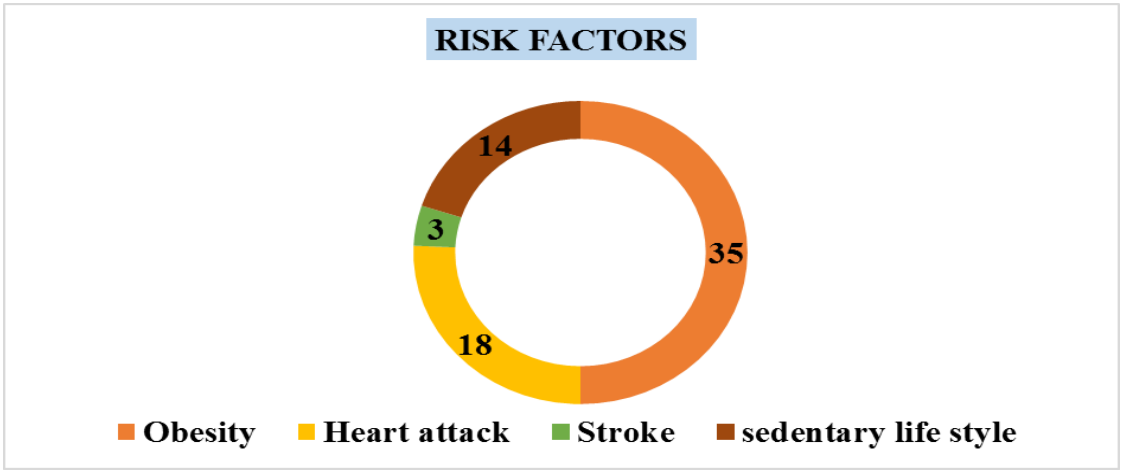

Figure.14: Details of risk factors

DRUG COMBINATIONS MONOTHERAPY

Mono drug therapy	No. of patients
NIKORAN	**1**
LASIX	**1**
TENORIM	**3**
CILAMET XL	**1**
MONIT GTN	**2**
LASILACTONE	**1**
MET XL	**4**

DUAL THERAPY

Dual therapy	No. of patients
METOPROLOL + GLYCERYL TRINITRATE	**2**
CAPTOPRIL + ISOSORBIDE MONONITRATE	**1**
TRIMETAZIDINE + NICORANDIL	**1**
AMLODIPINE + PERINODOPRIL	**4**
GLYCERYL TRINITRATE + FUROSEMIDE	**1**
GLYCERYL TRINITRATE + CARVEDILOL	**1**
TELMISARTAN + NITROGLYCERIN	**3**
PROPANOLOL + CAPTOPRIL	**4**
GLYCERYL TRINITRATE + METOPROLOL	**1**

MULTIPLE DRUG THERAPY

Mulitiple therapy	No of patients
FUROSEMIDE + EPLERENONE + TRIMETAZIDINE + IVABRADINE	**1**
TORSEMIDE + TRIMETAZIDINE + RAMIPRIL + IVABRADINE + METOLAZONE	**2**
TICAGRELOR + NICORANDIL + GLYCERYL TRI NITRATE + METOPROLOL + FUROSEMIDE	**1**
FUROSEMIDE + IVABRADINE + VALSARTAN + EPLERENONE	**1**
FUROSEMIDE + IVABRADINE + SPIRINOLACTONE + GLYCERYL TRINITR + TRIME	**2**
ETINOLOL + ISOSORBIDE DINITRATE + ELANAPRIL + LOSARTAN	**2**
ISOSORBIDE DINITRATE + DILTIAZEM + GLYCERYL TRINITRATE + AMLODIPINE + TRIMETAZI	**3**
DILTIAZEM + GLYCERYL TRINITRATE + METOPROLOL + TRIMETAZIDINE	**4**
ISOSORBIDE DINITRATE + GLYCERYL TRINITRATE + CILNIDIPINE + TORSEMIDE + NICORANDIL	**5**
GLYCERYL TRINITRATE + FUROSEMIDE + DILTIAZEM + RANOLAZINE + METOPROLOL	**2**
TELMISARTAN + TRIMETAZIDINE + GLYCERYL TRINITRATE + MOXONIDINE	**1**
DILTIAZEM + GLYCERYL TRINITRATE + METAPROLOL	**4**
FUROSEMIDE+ SPIRONOLACTONE + DIGOXIN + ISOSORBIDE HYDROLAZINE	**2**
TICAGRELOR + NICORANDIL + GLYCERYL TRINITRATE + METOPROLOL	**1**
GLYCERYL TRINITRATE + TICAGRELOR + NICORANDIL + DILTIAZEM	**2**
IVABRADINE + FUROSEMIDE + METOPROLOL + NICORANDIL	**1**

Table 13: Details of Prescriptions

Details of prescription	No. of patients
Total no. of patients prescriptions analysed	250
Total number of drugs prescribed	1235
Average number of drugs per prescription	4.94%
N.o of drugs prescribed by generic name out of total number of drugs prescribed	431

DISCUSSION

In the present study, the commonly prescribed drugs were long acting nitrates among the nitrates, aspirin among the antiplatelet agents, metoprolol among the beta blockers, diltiazem among the Calcium channel blockers, ramipril among the ACE inhibitors, atorvastatin among the hypolipidaemics and enoxaparin among the anticoagulants .In the present study, the average no. of drugs per patient is 4.94%. The percentage of drugs prescribed by generic name 431. 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 include Angina Pectoris. 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.

In a study conducted by Ford E S, et al., Approximately 47% of this decrease was attributed to treatments, including secondary preventive therapies after myocardial infarction or revascularization (11%), initial treatments for acute myocardial infarction or unstable angina (10%), treatments for heart failure (9%), revascularization for chronic angina (5%), and other therapies (12%). Approximately 44% was attributed to changes in risk factors, including reductions in total cholesterol (24%), systolic blood pressure (20%), smoking prevalence (12%), and physical inactivity (5%), although these reductions were partially offset by increases in the body-mass index and the prevalence of diabetes, which accounted for an increased number of deaths (8% and 10%, respectively. In present studies myocardial infraction has loss occurrence as compared to angina pectoris.

CONCLUSION

In this study, it is observed the occurrence 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 Angina Pectoris was high. Hypertension and diabetes were the most common co-morbid conditions associated with coronary artery disease. By controlling the co-morbid conditions there is a significant 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 followed by antihyperlipidemics, anti-anginal drugs. This was followed by antihypertensives and anticoagulants respectively. The use of anticoagulants and antiplatelet is value addition in the effective treatment as well as prevention of ischemic heart diseases. Extensive polypharmacy (4.94% drugs per prescription) was noticed in the prescriptions.

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