International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

A Study on Prescription Analysis and Risk Factors Associated among Cardiovascular Diseased Patients in Tertiary Care Teaching Hospital

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Abstract: ***Aim: A Study on Prescription Analysis and Risk Factors Associated Among Cardiovascular Disease Patients in Tertiary Care Teaching Hospital. Objectives: To analyse prescribing pattern of cardiovascular drugs given to patients. To identify potential drug interaction among drugs prescribed to patients with CVDs on conservative treatment, and to identify various etiologies and risk factors in CVDs. Methodology: An Ambispective, observational and hospital-based study was conducted on patients admitted in a tertiary care teaching hospital for a period of 6 months. Data regarding patient's demographic details, the prescription of the patient who are treated during the course of the study are audited prospectively using a specifically predesigned pro forma. Results: The study reveals that females (63.3%) were more likely to have reported CVD which is largely due to comorbidities and risk factors. Majority of patients were in age group of 41-60 years. The study showed that highest number of patients was suffering from coronary artery disease (19.7%). Among all medications the major class of drugs prescribed were Antiplatelet agents, Anticoagulants, Lipid Lowering Agents and least were Alpha adrenergic blocker. Conclusion: The present study concluded that most of the patients included in the study were suffering from coronary artery disease, ischemic heart disease and hypertension. Multiple risk factors other than alcohol, high blood pressure, high blood sugar and abnormal cholesterol levels plays a major role in development of several cardiovascular diseases and the risk increases with increase in age. The maximum numbers of patients were female; which may be due to comorbidities and several underlying risk factors.***

Keywords: Prescription pattern, Cardiovascular Diseases, Risk factors

1. Introduction

Cardiovascular diseases (CVD's) is a term for a number of diseases that affect the heart itself and/or the blood vessel system, especially the veins and arteries leading to and from the heart. These include coronary artery disease, cerebrovascular disease, peripheral artery disease, congenital heart disease, rheumatic heart disease, deep vein thrombosis and pulmonary embolism. It is mainly caused by high blood pressure, smoking, diabetes, lack of exercise, obesity, poor diet, high blood cholesterol and excessive alcohol consumption. [1]

Types

There are numerous cardiovascular diseases involving the blood vessels. They are known as vascular diseases:

1. Coronary Artery Disease (also known as coronary heart disease and ischemic heart disease) is the most common type of heart disease. CAD is mainly due to atherosclerotic changes in the inner walls of the blood vessel that supply blood to the heart. Atherosclerotic process leads to the build-up of fatty deposits, plaque formation and thickening of vessel walls. These changes eventually lead to narrowing of the lumen, which restrict blood flow to the myocardium. Decreased blood flow to heart causes ischemia which leads to chest pain and cardiac dysfunction. Coronary artery disease is associated with increased risk of myocardial Infarction (MI) and stroke. [6]

2. Acute coronary syndrome (ACS) is a syndrome (a set of signs and symptoms) due to decreased blood flow in the coronary arteries such that part of the heart muscle is unable to function properly or dies. The most common symptom is centrally located chest pain, often radiating to the left shoulder or angle of the jaw, crushing, central and associated with nausea and sweating. Many people with acute coronary syndromes present with symptoms other than chest pain, particularly women, older patients, and patients with diabetes mellitus. ACS is subdivided in three scenarios depending on the duration of symptoms, the presence of ECG changes and blood test results: ST elevation myocardial infarction (STEMI, 30%), non-ST elevation myocardial infarction (NSTEMI, 25%), or unstable angina (38%). Generally, when the symptom is of less than 30 minutes, it is Unstable Angina (UA). When symptom is prolonged to more than 30 minutes the diagnosis is Acute myocardial infarction (AMI) classified under Acute Coronary Syndrome. [6]

3. Atherosclerosis refers to hardening of the arteries caused by accumulation of fatty deposits (plaques) and other substances. The heart is one of the organs commonly affected by atherosclerosis. When the arteries of the heart (coronary arteries) narrow may experience chest pain or a heart attack. [6]

4. Peripheral arterial disease – disease of blood vessels that provide blood to the legs and arms. [6]

5. Cerebrovascular disease – disease of blood vessels that provide blood to the brain (includes stroke caused by a lack of blood flow to the brain. This can happen because of a blood clot traveling to the blood vessels in the brain, or bleeding in the brain. [6]

6. Renal artery stenosis.-Aortic aneurysm. [6]

Drug Utilization

Drug utilization research is an important branch of pharmacoepidemiology as it elucidates the scope, character and determinants of drug exposure. the world health organization (WHO) in 1997 defined drug utilization as the prescribing, allotment, marketing and use of drugs in a civilization, among a particular focus on the medical, social, and economic consequence resulted.

Drug use is a complex process. In any country a large number of socio-cultural factors assign to the manner in which drugs are used. In India, these includes national drug policy, illiteracy, poverty, use of multiple health care systems, drug marketing and promotion, sale of prescription drugs without prescription, competition in the medical and pharmaceutical market place and limited availability of independent, unbiased drug information.

The complexity of use of drug means the optimal profits of drug therapy in patient care may not be attained because of underuse, overuse or abuse of drugs. Unfortunate drug use might also cause to elevate rate of medical concerns, antimicrobial resistance, adverse effects and patient mortality. Hence contemporary studies on drug utilization have developed into a probable mean to be used in the assessment of health systems.

Benefits of Drug Utilization:

The main principal of DU research is to promote the coherent use of drugs in individuals. For the individual patient, the coherent use of a drug indicates the prescription of a well-recognized drug at an ideal dose, along with the accurate information, at a standard price. Without knowledge of the manner of prescribing a drug and its use, it is stiff to initiate a discussion on rational drug use or to commend measures to promote prescribing habits. DU research affords to rational drug use in important ways as described below. [21]

Drug Use Pattern in Cardiovascular Disease (CVD's)

The goal of pharmacological anti-ischemic therapy is to decrease myocardial oxygen demand (secondary to a decrease in heart rate, blood pressure, preload or myocardial contractility) or to increase myocardial oxygen supply (by administration of oxygen or through coronary vasodilatation).

The American College of Cardiology Federation / American Heart Association have recommended antiplatelet drugs, anti-coagulants, anti-anginal drugs, beta blockers, angiotensin converting enzyme inhibitors (ACEI) / angiotensin II receptor blockers (ARBs), Calcium channel blockers, diuretics based on results of multiple controlled trials to improve the survival benefits.

In most of the studies the percentage of drug prescribed in generic name is very low. Thus, the physician should concentrate on prescribing drugs with their generic names to the maximum in order to minimize the cost-burden on the patients.
Aspirin and Clopidogrel were the most commonly prescribed anti-platelet drugs in all studies. The physician in India recommends that all patients with MI should receive dual anti-platelet therapy because combination therapy offers a better outcome than patients with single therapy of Aspirin or Clopidogrel.

2. Methods

Ambispective, Observational and Hospital based study was conducted in the inpatient ward of Cardiology and Medicine Department of Karnataka Institute of Medical Sciences, (KIMS) Hospital, Hubli. Data regarding patient's demographic details, diagnosis, complete prescription, and any other information will be collected in a predesigned pro forma. The collected data were assessed and thoroughly analysed.

3. Results

In this study it was observed that among the total 150 prescriptions maximum number of patients 79 (52%) were in the age group of 41-60 years, followed by 53 (35.3%) patients in the age group of >60 years, whereas 26-40 years age is 15 (10%) and 18-25 years age group contributes the least number of populations 3 (2%). Age related factor is more susceptible for CVD. Out of 150 patients having CVD in which 23 patients were having single disease of CVD, highest number of patient having Coronary Artery Disease were 58 (19.7%), whereas number of patients with IHD were 57 (19.3%), Hypertension 50 (17%), ST evolved myocardial infarction 45 (15.3%), Congestive cardiac failure (CCF) patients were 29 (9.8%), Dilated Cardiomyopathy (DCM) 23 (7.8%), Angina pectoris 36 (7.8%), Stroke 3 (1.02%), Rheumatic heart disease (RHD) were 2 (0.6%), Aortic valve stenosis 2 (0.6%), Least number of patients were having Arrythmia1 (0.3%) and Pericarditis 1 (0.3%).

Anti-hypertensive agents are predominantly used among the patients. The most prescribed class of drugs are Beta Blockers, ACE Inhibitors, ARBS and Diuretics. Metoprolol 75 (43%), Enalapril 69 (47%) Amlodipine 43 (9.1%), Diltiazem 4 (9%), Valsartan 1 (11%), Losartan 1 (11.1%), Telmisartan 6 (65%), Metosartan 1 (11.1%), Atenolol 1 (11.1%), Labetalol 1 (1%) Furosemide 79 (76%) Spironolactone 20 (%) Mannitol 4 (4%) Amiloride 1 (1%). Anti-Thrombotic agents prescribed were Streptokinase 22 (13%), Vasodilators given were Digoxin 16 (9%), and Inotropic agents were Amiodarone 6 (66.6%), Dobutamine 2 (22.1%), Dopamine1 (11.1%). Antiulcer and Anti-Diabetes Drugs given were Pantop 87 (21%) Metformin 7 (2%), Insulin 64 (16%) with Others Drugs 246 (61%). The study found that oral route [(669) 65%] of administration was mostly commonly used which

is followed by intravenous route [265 (26%)] and least used was subcutaneous [99 (9%)].

most of the CVD patients have been observed with multiple risk factors like High Blood Pressure 46 (17.1%) was the most leading factor among total CVD patients, smokers were 45 (16.7%) than alcoholics 44 (16.3%), out of this high blood sugar 37 (13.7%), Abnormal cholesterol 35 (13%), mental stress measured 19 (7.06%), Age and Obesity were 17 (6.3%), and family history of illness were 8 (2.9%).

4. Discussion

An Ambispective Observational Study was conducted in a tertiary care hospital for a period of 6 months. It was carried out by analysing prescription, method of treatment and to the access risk factors of 150 patients. Out of 150 patients, 55 (36.6%) patients were male and 95 (63.3%) were female, as per data shown CVD is more common in female compare to male, which get confirmed by demographic results and is largely due to comorbidities and risk factors.

In this study it was observed that among the total 150 prescriptions maximum number of patients 79 (52%) were in the age group of 41-60 years, were as patients having CVD in which 23 patients were having single disease of CVD, highest number of patient having Coronary Artery Disease were 58 (19.7%), And it also observed that out of 150 prescription, highest number of drugs given in CVD patients were Antiplatelet agents 238 (19.1%), followed by Lipid lowering agents 134 (10.7%), Anticoagulant Agents 99 (7.9%), Beta Adrenergic Blockers 91 (7.32%), Anti ulcers 87 (7%), Diuretics 79 (6.3%), Antidiabetic Agents 64 (5.1%), Calcium channel blocker 47 (3.78%), ACE inhibitors 69 (5.5%), Antianginal agent 31 (2.4%), Antithrombotic agent 22 (1.77%), Vasodilators 16 (1.28%), Inotropic agents 9 (0.72%), Antiarrhythmics 6 (0.5%), Angiotensin receptor blockers 9 (0.7%), others drugs 246 (19.8%) and least number of drugs given were Alpha adrenergic blocker 1 (0.08%).

The study found that oral route [(669) 65%] of administration was mostly commonly used which is followed by intravenous route [265 (26%)] and least used was subcutaneous [99 (9%)]. In this study out of 150 patients, numbers of drugs given per patient were individually categorized into 4 groups of intervals of 3 drugs. Majority of patients 131 (87.3%) were given >6 drugs, whereas 17 (11%) given 4-6 drugs, followed by patients 2 (1%) given 2-3 drugs.

Patients with maximum underwent procedure were percutaneous transluminal coronary angioplasty (PTCA) (14) patients, followed by Thrombolysis (11) patients, Coronary artery bypass grafting (CABG or CAG) (7) patients, Insertion of pacemaker or implantable cardioverter defibrillator (ICD) (2) patients, Ventricular assist device (2) patients and minimum number of procedures with Radiofrequency Ablation (1) patient and heart valve repair or replacement (1) patient.

In this study, various cardiac tests were performed in which maximum number of patients underwent Electrocardiogram (ECG) 145 (24%) followed by cholesterol test 124 (10%), Transthoracic Echocardiogram 121 (20%), Troponin 108 (17%), C-Reactive protein 99 (16%), D-Dimer 34 (5%), LDH 30 (5%) Cardiac CT scan 9 (1%), Cardiac stress test 7 (1%) patients, and minimum number of patients underwent cardiac Cauterization 4 (1%) patients.

5. Limitations of the Study

Random selection of patients was done in our study. So, the results cannot be generalized to all the patients admitted in the Hospital, as many cases might have been missed during night shifts and public holidays.

6. Conclusion

The present study concluded that most of the patients included in the study were suffering from coronary artery disease, ischemic heart disease and hypertension. Multiple risk factors other than alcohol, high blood pressure, high blood sugar and abnormal cholesterol levels play a major role in development of several cardiovascular diseases and the risk increases with increase in age.

Majority of prescription contain more than one CVD drugs indicating polypharmacy. Polytherapy was preferred over monotherapy as it reduces the clinical symptoms and helps in better control of disease. Henceforth the study says to reduce the occurrence of major cardiovascular events thereby reducing premature disability, economic burden and morbidity while prolonging survival and quality of life.

Acknowledgements

We are immensely thankful to KIMS (Karnataka institute of medical sciences-Hubballi) hospital and, RGUHS University, Management and Principal of SET's college of Pharmacy-Dharwad, for their constant encouragement and support provided during the study.

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Results

A Total of 150 case sheets were reviewed, analysed and categorized based on gender, age, length of hospital stay, number of drugs prescribed, past medical history, risk factors, comorbidities, distribution based on cardiovascular diseases, route of administration, drug Interactions.

Distribution Based On Gender:

In the study population of among 150 participants CVD is more common in female patients 95 (63.3%) than male patients 55 (36.6%) as per data shown in the Table no.1

Table 1: Gender Wise Distribution

Gender	Number of Patients (N=150)	Percentage (%)
MALE	55	36.6
FEMALE	95	63.3

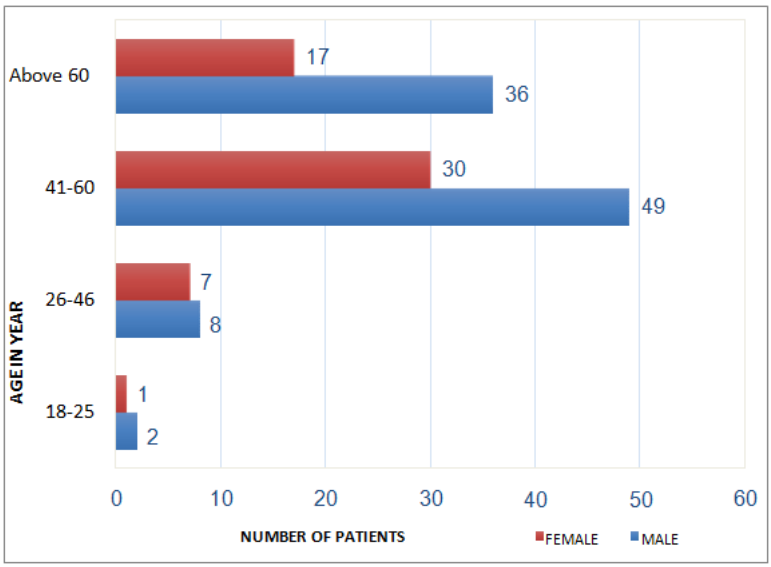

Figure 1: Distribution Based On Age

Table 2: Distribution Based On Length of Hospital Stay

Hospital Stay (Days)	Number of Patients (n=150)	Percentage (%)
0-2	1	0.7
3-5	29	19.3
>5	120	80

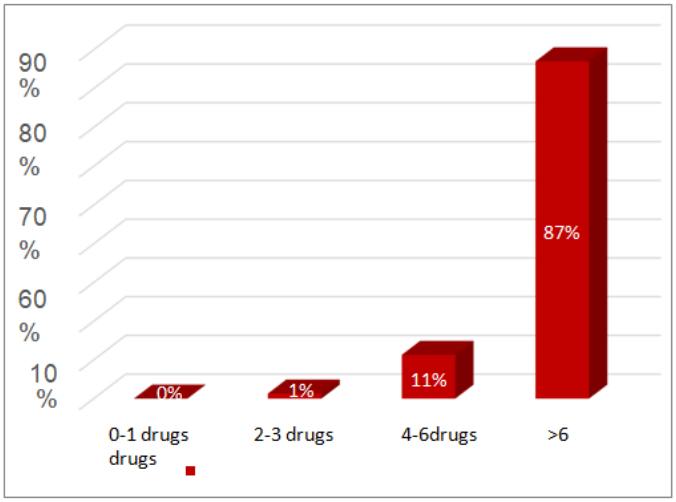

Figure 2: Distribution Based On Number of Drugs Given Per Patient

Table 3: Past Medical History

Medical Condition	Number of Patients (n=150)	Percentage (%)
Hypertension	62	36.9
Diabetes Mellitus	67	39.8
Bronchopneumonia	2	1.1
IHD	19	11.3
Seizure	1	0.6
TB	1	0.6
CVA	4	2.3
Asthma	3	1.8
COPD	4	2.3
Others	5	3

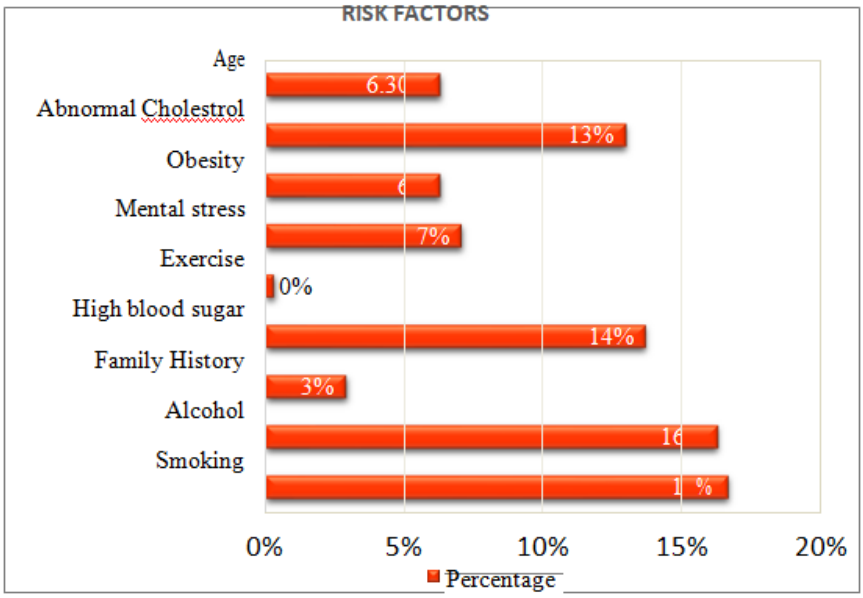

Figure 3: Distribution Based On Risk Factors

Risk Factors

Table 4: Comorbidities

Medical Condition	Number of Patients	Percentage (%)
Diabetes mellitus	61	44.2
Anemia	1	0.7
Pulmonary edema	12	8.6
COPD	11	7.9
Renal disorders	15	10.8
Thyroid disorders	4	2.8
GI disorders	1	0.7
Bronchopneumonia	21	15.2
None	12	8.6

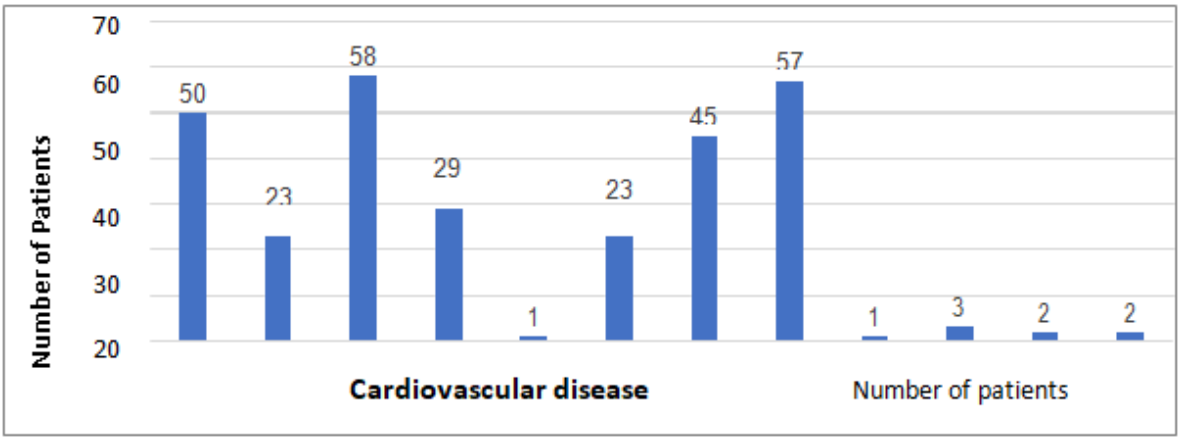

Figure 4: Distribution Based On Cardiovascular Diseases

Table 5: Route of Administration

R. O. A	Number of Drugs (n=1033)	Percentage (%)
Oral	669	65
Intravenous	265	26
Subcutaneous	99	9

Table 6: Distribution Based On Classification of Drugs

Class Of Drug	No. of Drugs (n=1242)	Percentage (%)
Lipid Lowering Agents	134	10.7
Antiplatelets	238	19.1
Anticoagulants	99	7.9
Antianginal	23	2.4
Ace Inhibitors	69	5.5
Angiotensin Receptor Blockers (Arb)	9	0.7
Alpha Adrenergic Blockers	1	0.08
Antithrombotic	22	1.77
Beta Adrenergic Blockers	91	7.32
Calcium Channel Blockers	47	3.78
Inotropic Agents	9	0.724
Vasodilators	16	1.288
Diuretics	79	6.3
Antidiabetic	64	5.15
Antiulcer	87	7
Others	246	19.8

Table 7: Anticoagulants

Anticoagulants	Number of Drugs (n=238)	Percentage (%)
Heparin/UFH	27	27.2
Low molecular weight heparin (LMWH)	71	71.7

Table 8: Inotropic Agents

Ionotropes	No. of Drugs (n=9)	Percentage (%)
DOPAMINE	1	11.1
DOBUTAMINE	2	22.2
AMIODARONE	6	66.6

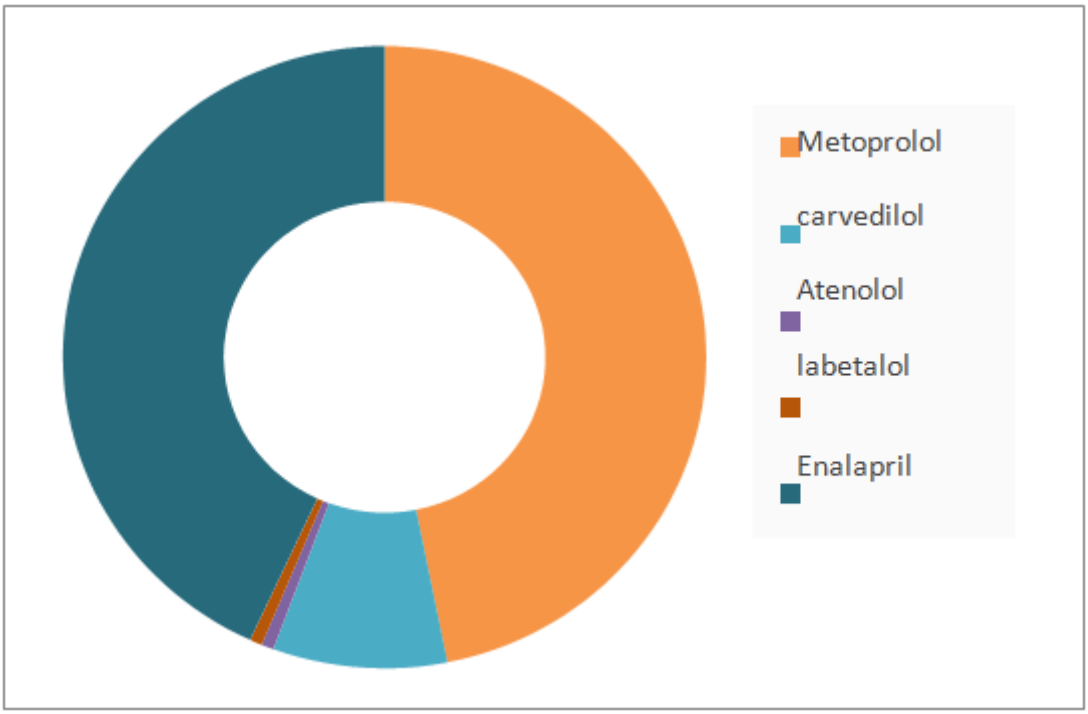

Figure 5: Distribution Based On Beta Adrenergic Blockers & Ace Inhibitors

Table 9: Calcium Channel Blockers

Calcium Channel Blockers	Number of Drugs (n=47)	Percentage (%)
Amlodipine	43	91
Diltiazem	4	9

Table 10: Diuretics

DIURETICS	NUMBER OF DRUGS	PERCENTAGE (%)
Furosemide	79	76
Spironolactone	20	19
Amiloride	1	1
Mannitol	4	4

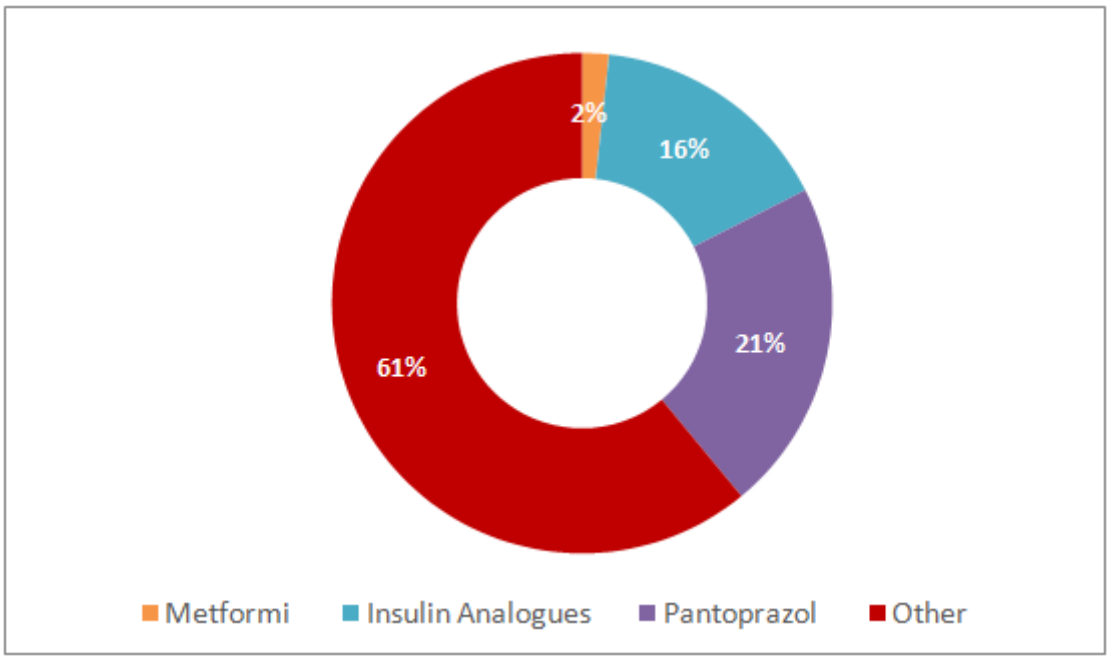

Figure 6: Distribution Based On Other Drugs

Table 11: Drug Interactions

Type of Interaction	No. of Interactions (n =1901)	Percentage (%)
Major	53	2.35
Moderate	1, 407	74.11
Minor	441	23.52

Table 12: Surgical Procedures

Surgical Procedures	No. of Patients
Coronary artery bypass grafting (CABG or CAG)	7
Heart valve repair or replacement	1
Insertion of pacemaker or implantable cardioverter defibrillator (ICD)	2
Radiofrequency ablation	1
Percutaneous Transluminal Coronary Angioplasty (PTCA)	14
Ventricular assist device	2
Thrombolysis	11

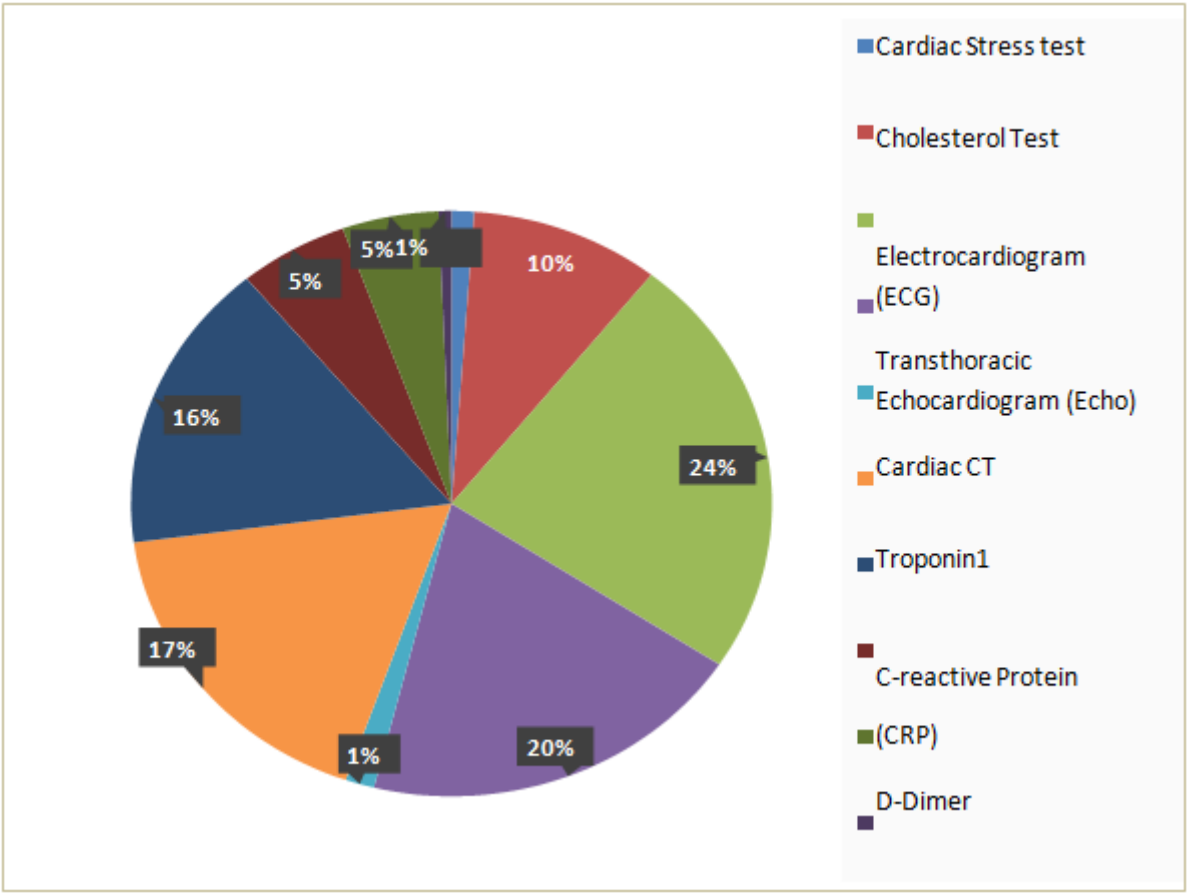

Figure 7: Distribution Based On Cardiac Test