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CARDIOVASCULAR DISEASE PREVALENCE AND PRESCRIPTION PATTERNS AT A TERITARY LEVAL HOSPITAL

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ABSTRACT

The study is mainly observing the prevalence, prescribing pattern and the method of treatment used for the treatment of several cardiovascular diseases. The patients from other hospital departments or below 18 years, pregnant and lactating women are excluded from this study. The patients who diagnosed with any CVDs other than the above categories are selected for the study. In this study a total of 500 patients were selected by the inclusion and exclusion criteria. Out of the 500 patients selected 301 (60.2%) patients were male and the remaining 199 (39.8%) patients were female. In this study most of the patients came under the category of male than female, it may be due to their daily activities, smoking and alcoholic habits. Cardiovascular diseases may affect any age of the life but by increasing the age the chance for CVD is also increased. In this study the maximum number of patients comes under the age 51-60 years followed by 61-70 years of old. Extensive diagnosis made by the physician's revealed different clinical conditions prevailing among the patients. Definitely, 29.73% of patients were reported to have hypertension whereas 19.86% of patients were diagnosed with coronary artery disease. Almost 9.41% of CVD patients were reported with arrhythmia. Ischemic heart disease was reported in 6.65% of patients, cardiac myopathy in 6.54% of patients, while 6.31% of patients were reported with aortic valve stenosis and 5.9% of patients were diagnosed with heart failure. The study concluded that most of the patients included in the study were suffering from hypertension and coronary artery disease. These may be due to their food habits, smoking, less exercise and poor health hygiene.

KEYWORDS: Cardiovascular Disease, Prevalence, Prescription Patterns, Tertiary Level Hospital.

INTRODUCTION

Cardiovascular diseases are the leading cause of death in the world.1 In India, drug utilization study demonstrates the existence of a wide range of cardiovascular drugs for prophylaxis and therapeutic use.[1,2] Drug utilization study is a solid investigational measure to estimate the current model of drug usage and the relevance of prescriptions.[3] DUS evaluates the safety and rationality of the drug therapy. It has a positive impact on the prescribing physician and improves the prescribing pattern of the physician and assist them in changing the treatment strategies whenever required, identify and make an appropriate decision for safe and cost-effective therapy.[4] Multiple drugs are often required due to several comorbidities which turn out to be a barrier to get appropriate therapy. Drug interactions may occur as a result of polypharmacy, complicating the diagnosis and leading to other undesirable outcomes.[5] Comorbidities related to cardiovascular diseases include diabetes mellitus, obesity, COPD, HTN, CAD, CVA, arrhythmia, OA, thyroid disease, hyperlipidaemia, renal dysfunction and anemia. Drug-drug interaction (DDI) arises mostly whenever a patient receives more than one drug and chances in increase with number of drugs taken. There are a variety of DDIs that can cause toxicity, alteration of the desired therapeutic effects or even result in a life-threatening condition. Polypharmacy used to treat the patient's comorbidities, is one of the risk factors for drug-drug interactions.[6] Drug-drug interactions is the one of major cause of adverse drug reactions (ADR) resulting in hospital and emergency department.[7] Polypharmacy plays a key role in drug interaction and which leads to further complications.[8]

The main aim of the study was the prevalence and drug prescription pattern of cardiovascular disease in a tertiary care hospital.

METHODOLOGY

Study Site

The study is carried out in outpatient department of cardiology in tertiary care hospital, Hyderabad, Telangana, India.

Duration of study

The duration of study is 10 months (July 2023 - February 2024).

Study design

It is a retrospective observational study.

Source of Data

- Patient's medication profile.
- Physicians prescribing records.
- Nursing charts.

Parameters for Evaluation

- Gender distribution.
- Average age range of patients.
- Types of cardiovascular diseases found.
- Associated diseased conditions.
- Types of drugs mainly used for CVD.
- Types of other adjuvant drugs used for treatment.

STUDY CRITERIA

Inclusion Criteria

- Any patients visited the cardiology department during study period.
- Patients with other co-morbid conditions.
- Patients in 18 years and above.

Exclusion Criteria

- Patients in other departments of the hospital.
- Pregnant and lactating women.
- Patients below 18 years.
- Surgery patients.

STUDY PROTOCOL

- Designing a data entry form with all details of patients, medication and diagnostic methods.
- Collecting the case histories of the patients from the medical records.
- Analyzing the data's and divides into various categories and concluding it.
- Prescription analysis has to be performed by the help of medical records.

TABLES AND GRAPHS

Table 1: Prevalence of Cardiovascular diseases in study population.

Sl. No	Total number of patients visited the hospital during study period	Number of CVD prescriptions during study period (n)	Percentage (%)
1.	5275	500	9.478

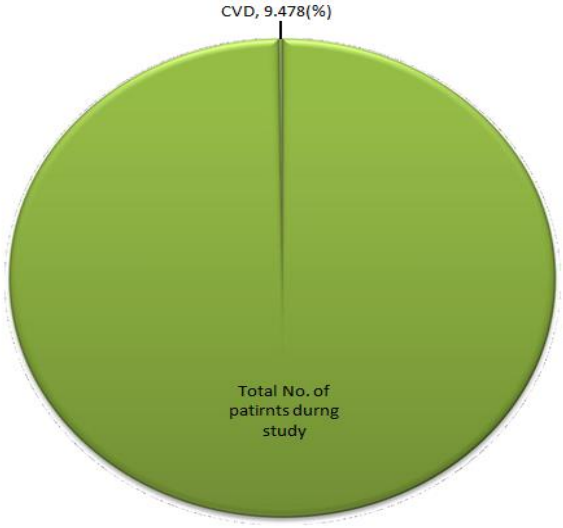

Figure 1: Prevalence of Cardiovascular diseases in study population.

Table 2: Sex wise Distribution of CVD patients.

Sl. No	Sex	Number of patients (n=500)	Percentage (%)
1.	Male	301	60.2%
2.	Female	199	39.8%

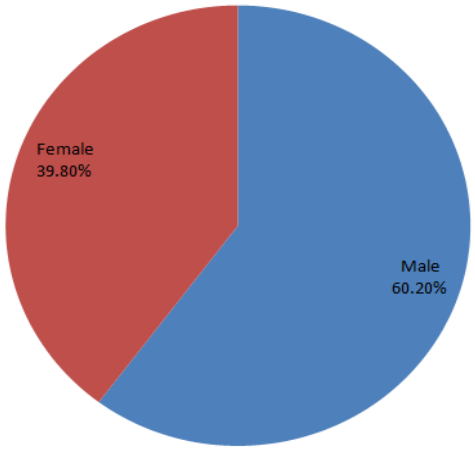

Figure 2: Sex wise Distribution of CVD patients.

Table 3: Age wise Distribution among CVD patients.

Sl. No	Age	Number of patients (n=500)	Percentage (%)
1.	18-20	4	0.8%
2.	21-30	23	4.6%
3.	31-40	46	9.2%
4.	41-50	67	13.4%
5.	51-60	157	31.4%
6.	61-70	115	23%
7.	71-80	68	13.6%
8.	81-90	16	3.2%
9.	90>	4	0.8%

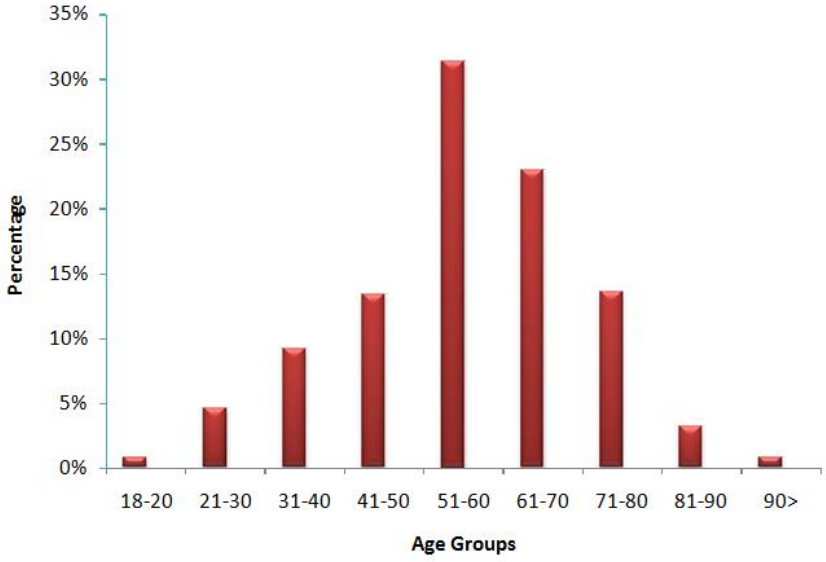

Figure 3: Age wise Distribution among CVD patients.

Table 4: Cardiovascular diseases observed in study population.

Sl. No	Medical condition	Number of patients (n=871)	Percentage (%)
1.	Hypertention	259	29.73%
2.	Coronary artery disease	173	19.86%
3.	Aortic valve stenosis(mitral valve replacment)	55	6.31%
4.	Cardiac myopathy	57	6.54%
5.	Ischematic heart disease	58	6.65%
6.	Heart failure	52	5.9%
7.	Myocardial infarction	28	3.21%
8.	Dyslipidemia	45	5.16%
9.	Stroke	16	1.83%
10.	Angina	38	4.36%
11.	Rheumatic heart disease	8	0.91%
12.	Arrhythmia	82	9.41%

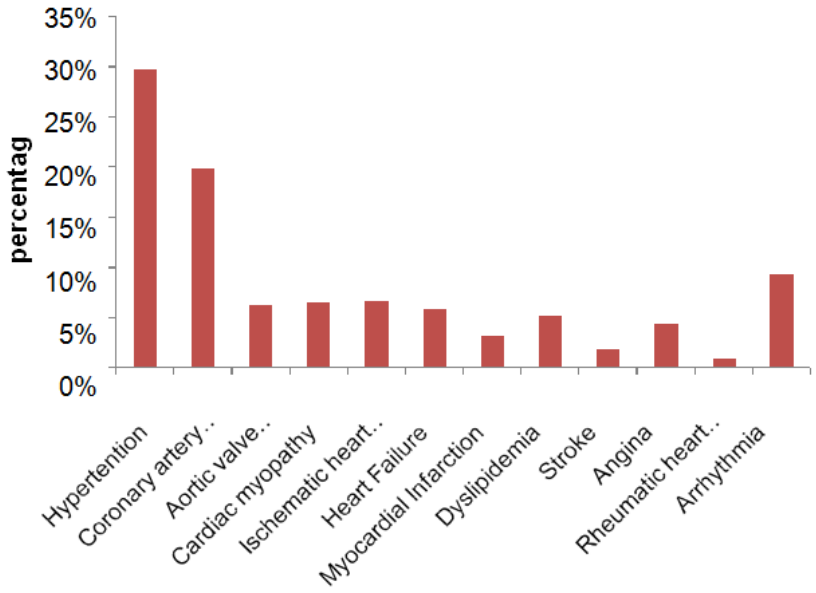

Figure 4: Cardiovascular diseases observed in study population.

Table 5: Co-morbid diseases.

Sl. No	Medical condition	Number of patients (n=500)	Percentage (%)
1.	Diabetes mellitus	180	36%
2.	Anemia	5	1%
3.	Asthma	8	1.6%
4.	COPD	5	1%
5.	Renal disorders	18	3.6%
6.	Thyroid disorders	17	3.4%
7.	GI disorders	11	2.2%
8.	Others	35	7%
9.	None	221	44.2%

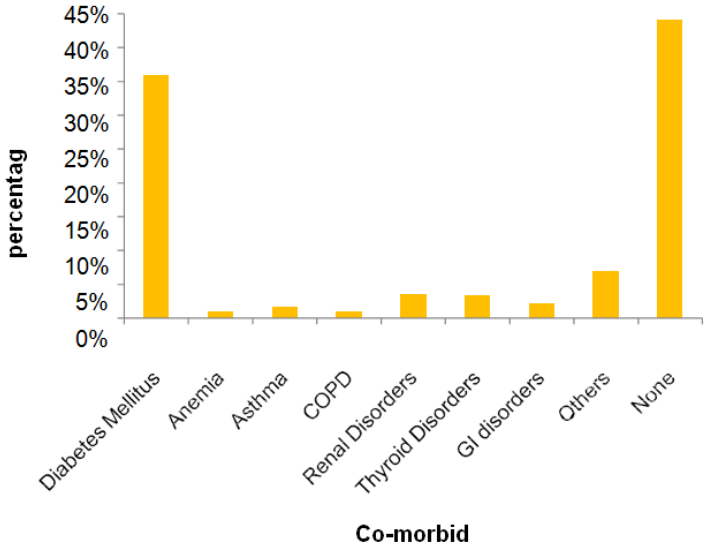

Figure 5: Co-morbid diseases.

Table 6: Prescribing Pattern of Physicians.

Sl.No	Category of drugs	Number of drugs (n=2741)	Percentage (%)
1.	Lipid lowering agents	326	11.89%
2.	Antiplatelets	460	16.78%
3.	Anticoagulants	82	2.99%
4.	Antianginal	301	10.98%
5.	ACE Inhibitors	162	5.91%
6.	ARB	141	5.14%
7.	Alpha Adrenergic blockers	3	0.10%
8.	Beta Adrenergic blockers	149	5.43%
9.	Beta, Alpha Adrenergic receptor blockers	238	8.68%
10.	Calcium Channel blockers	116	4.23%
11.	Anti Arrhythmia	9	0.32%
12.	Anti Heart Failure	17	0.62%
13.	Vasodilators	16	0.58%
14.	Diuretics	269	9.81%
15.	Anti ulcers	150	5.47%
16.	Anti diabetics	133	4.85%
17.	Others	184	6.73%

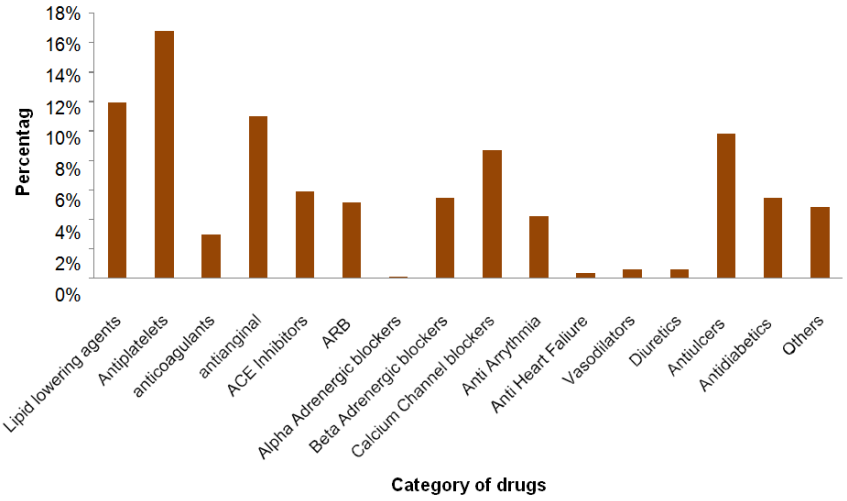

Figure 6: Prescribing Pattern of Physicians.

Table 7: Lipid Lowering Agents.

Sl.No	Lipid lowering agents	Number of drugs (n=326)	Percentage (%)
1.	Atorvastatin	325	99.69%
2.	Fenofibrate	1	0.30%

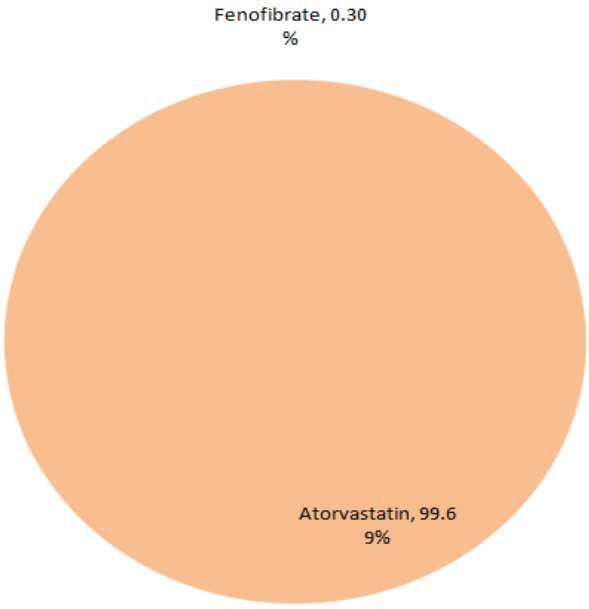

Figure 7: Lipid Lowering Agents.

Table 8: Anti-platelets.

Sl. No	Anti- platelets	Number of druds (n=460)	Percentage (%)
1.	Aspirin	329	71.52
2.	Clopidogrel	131	28.47

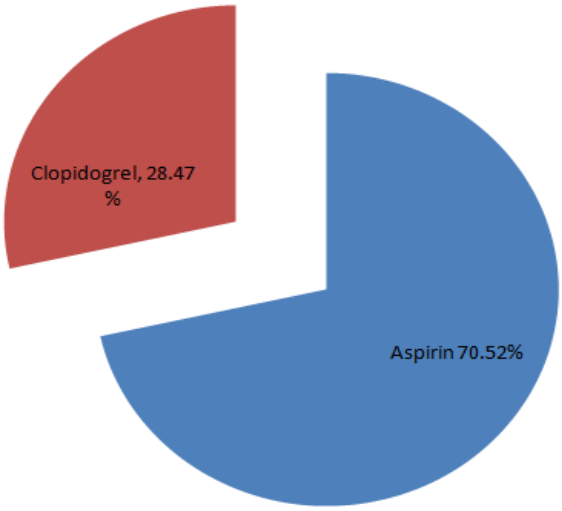

Figure 8: Anti-platelets.

Table 9: Anticoagulants.

Sl. No	Anticoagulants	Number of drugs (n=82)	Percentage (%)
1.	Warfarin	42	51.21%
2.	Heparin	23	28.04%
3.	Riaroxaban	17	20.73%

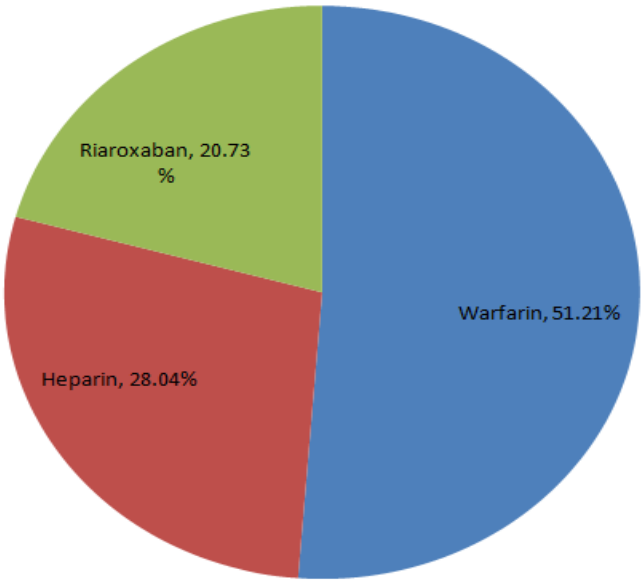

Figure 9: Anticoagulants.

Table 10: Angiotensin Converting Enzyme Inhibitors (ACE-I).

Sl. No.	ACE Inhibitors	Number of drugs (n=162)	Percentage (%)
1.	Lisinopril	157	96.91%
2.	Captopril	3	1.85%
3.	Enalapril	2	1.23%

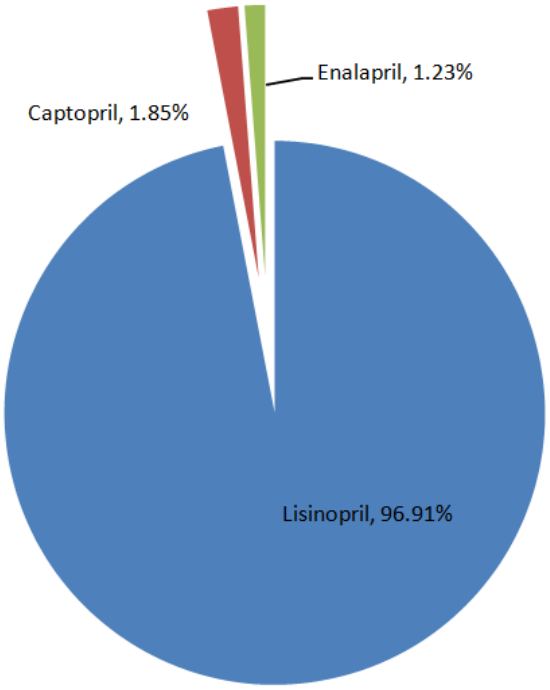

Figure 10: Angiotensin Converting Enzyme Inhibitors (ACE-I).

Table 11: Anti-anginal Drugs.

Sl. No	Anti-anginal	Number of drugs (n=301)	Percentage (%)
1.	Isosorbid dinitrate	91	30.23%
2.	Nitroglycerin	155	51.49%
3.	Ivabradine	53	17.60%
4.	Trimetazidine	2	0.66%

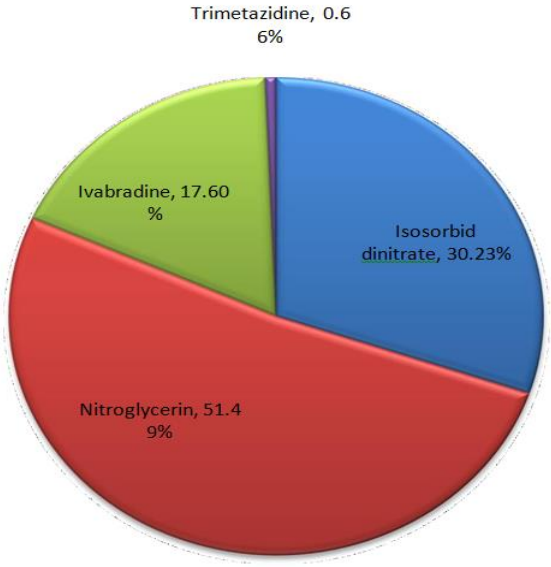

Figure 11: Anti-anginal Drugs.

Table 12: Alpha Adrenergic Receptors.

Sl. No	Alpha Adrenergic receptors	Number of drugs (n=3)	Percentage (%)
1.	Prazocin	1	33.33%
2.	Tamsulosin	2	66.66%

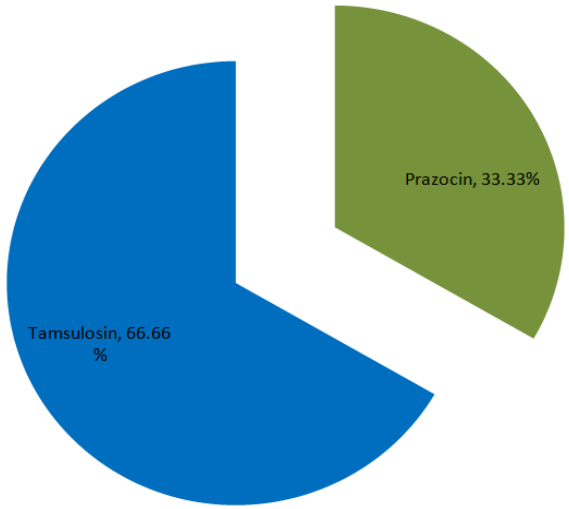

Figure 12: Alpha Adrenergic Receptors.

Table 13: Beta Adrenergic Blockers.

Sl. No	Beta Adrenergic Blockers	Number of drugs (n=387)	Percentage (%)
1.	Carvedilol	238	61.49%
2.	Atenolol	137	35.40%
3.	Propranolol	11	2.84%
4.	Sotalol	1	0.25%

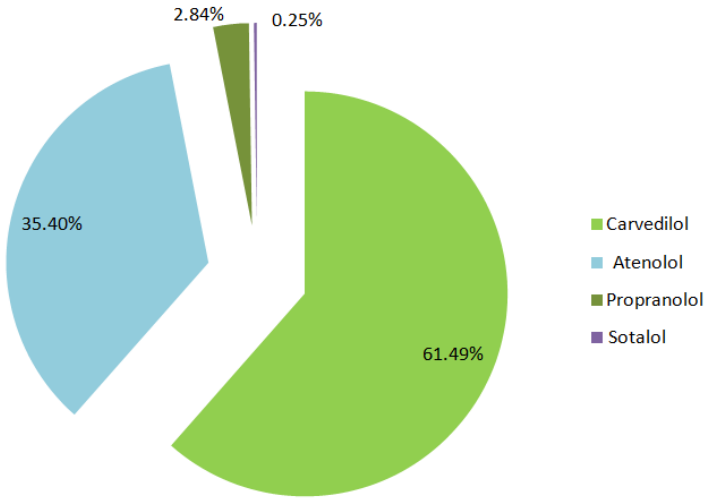

Figure 13: Beta Adrenergic Blockers.

Table 14: Calcium Channel Blockers.

Sl. No	Calcium channel blockers	Number of drugs (n=116)	Percentage (%)
1.	Amlodipine	105	90.51%
2.	Diltiazem	7	6.03%
3.	Verapamil	4	3.44%

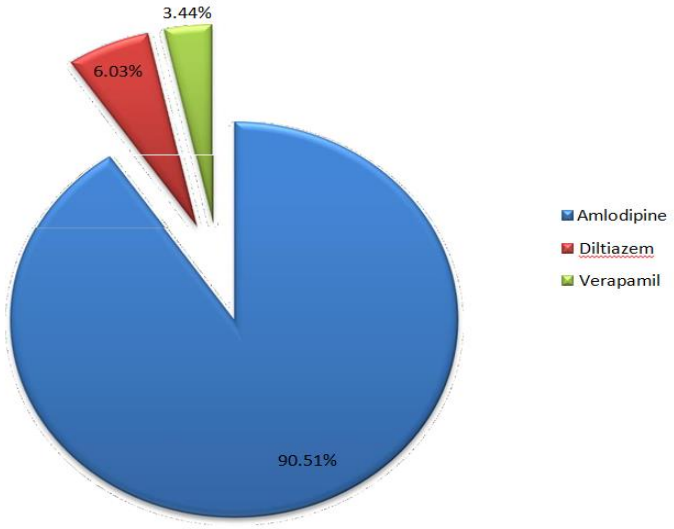

Figure 14: Calcium Channel Blockers.

Table 15: Anti-arrhythmic Drugs.

Sl. No	Anti- arrhythmia	Number of drugs (n=9)	Percentage (%)
1.	Amiodarone	3	33.33%
2.	Flecainide	6	66.66%

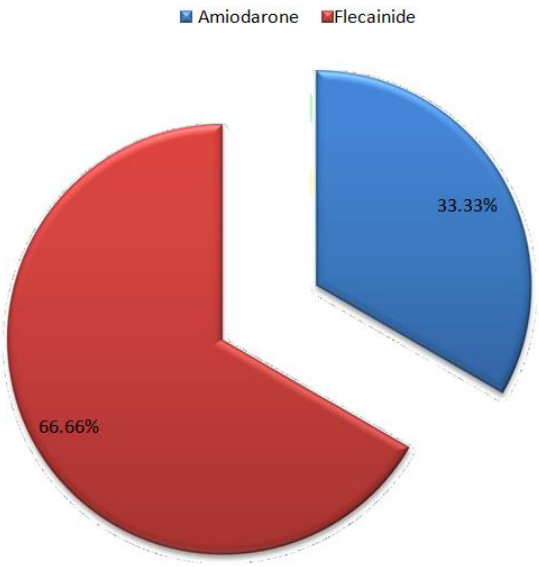

Figure15. Anti-arrhythmic Drugs.

Table 16: Anti-Heart Failure Drugs.

Sl. No	Anti Heart Faliure	Number of drugs (n=17)	Percentage (%)
1.	Digoxin	15	88.23%
2.	Dopamaine	1	5.88%
3.	Dobutamaine	1	5.88%

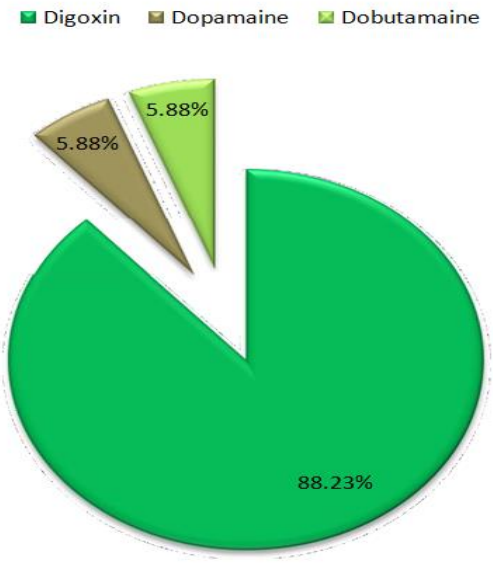

Figure -16: Anti-Heart Failure Drugs.

Table 17: Diuretics.

Sl. No	Diuretics	Number of drugs (n=269)	Percentage (%)
1.	Furosemide	143	53.15%
2.	Spironolactone	113	42%
3.	Hydrochlorothiazide	12	4.46%
4.	Mannitol	1	0.37%

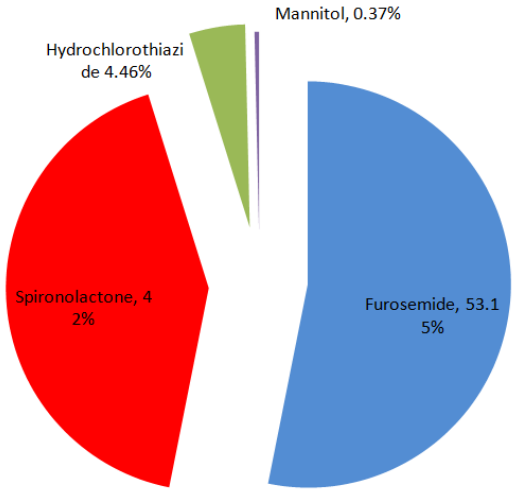

Figure 17: Diuretics.

Table 18: Anti- Ulcer Drugs.

Sl. No	Anti Ulcers	Number of drugs (n=154)	Percentage (%)
1.	Omeprazole	114	74.02%
2.	Ranitidine	36	23.37%
3.	Antacid suspension	4	2.59%

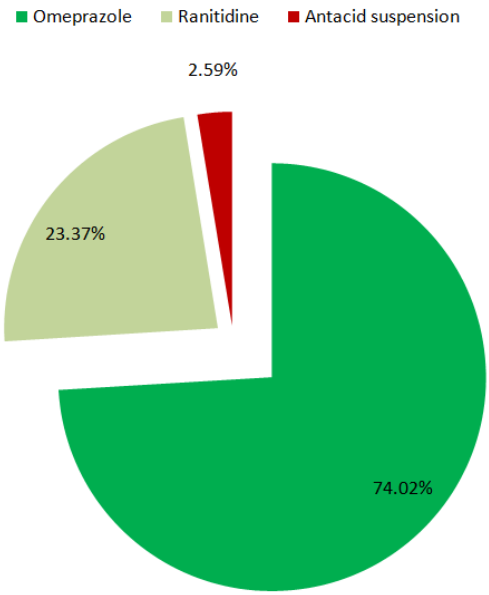

Figure 18: Anti- Ulcer Drugs.

Table 19: Anti Diabetes.

Sl. No	Anti Diabetics	Number of drugs (n=133)	Percentage (%)
1.	Metformin	52	39.09%
2.	Gliclazide	23	17.29%
3.	Glimipride	6	4.51%
4.	Gibenclamide	7	5.26%
5.	Sitagliptin	9	6.76%
6.	Insulin Analogues	36	20.06%

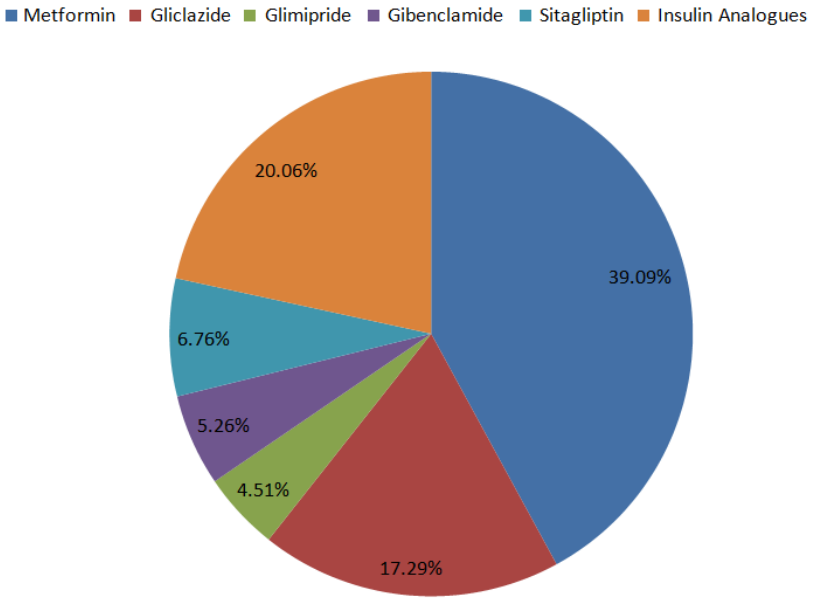

Figure 19: Anti Diabetes.

RESULTS AND DISCUSSION

The cross sectional study was conducted on a tertiary care hospital in a time period of 10 months (July 2023 – February 2024). The study is mainly observing the prevalence, prescribing pattern and the method of treatment used for the treatment of several cardiovascular diseases. The patients from other hospital departments or below 18 years, pregnant and lactating women are excluded from this study. The patients who diagnosed with any CVDs other than the above categories are selected for the study.

The study mainly observed the patients data like age, sex, previous and current medical profile and the various class of treatments and its important in the treatment. The data were obtained from patients profile medical records.

During the study period around 5275 patients visited the hospital. From that 500 were diagnosed as cardiovascular disease patients so, the prevalence of cardiovascular disease was found to be 9.478%.

In this study a total of 500 patients were selected by the inclusion and exclusion criteria. Out of the 500 patients selected 301 (60.2%) patients were male and the remaining 199 (39.8%) patients were female. The patients were divided in different age groups: between18-20 years (0.8%), 21-30 years (4.6%), 31-40 years
(9.2%), 41-50 years (13.4%), 51-60 years
(31.4%), 61-70 years (23%), 51-80 years
(13.6%), 81-90 years (3.2%) and >90 years (0.8%).

In this study most of the patients came under the category of male than female, it may be due to their daily activities, smoking and alcoholic habits. In a study conducted by Md. Abdul Muhit et al. for CVD prevalence and prescription patterns observed that most of the patients were male than female.

Cardiovascular diseases may affect any age of the life but by increasing the age the chance for CVD is also increased. In this study the maximum number of patients comes under the age 51-60 years followed by 61-70 years of old. That is complied with the previous report of drug utilization evaluation of CVD that the common age group of CVD observed as 40-60 years.

Extensive diagnosis made by the physician's revealed different clinical conditions prevailing among the patients. Definitely, 29.73% of patients were reported to have hypertension whereas 19.86% of patients were diagnosed with coronary artery disease. Almost 9.41% of CVD patients were reported with arrhythmia. Ischemic heart disease was reported in 6.65% of patients, cardiac myopathy in 6.54% of patients, while 6.31% of patients were reported with aortic valve stenosis and 5.9% of patients were diagnosed with heart failure. In addition, 5.16% of CVD patients were reported with dyslipidemia, 4.36% of patients were diagnosed with angina, 3.21% of patients were reported with myocardial infarction, 1.83% of CVD patients were reported with stroke and 0.91% of patients were reported with rheumatic heart disease.

About half of the population was suffering from hypertension, which increase the risk of coronary heart disease. One study revealed that hypertension is the second leading cardiovascular disease, which is the major cause of other diseases such as heart failure, stroke, myocardial infarction and angina pectoris.[80] Other population based studies suggest that elevated insulin levels, which often occurs in type II diabetes mellitus, is an independent

risk factor and co-exist with cardiovascular disease. Other cardiovascular risk factors in diabetic individuals include abnormalities of lipid metabolism, platelet function, and clotting factors.[81]

The physicians also diagnosed several different medical conditions in the patients. For example, 36% of CVD patients were diabetic patients. Around 3.6% of patients were suffering from renal disorders, 3.4% of patients thyroid disorders. Other associated medical conditions included gastro intestinal disorders (2.2%), asthma (1.6%), COPD (1%), anemia (1%), plus many others.

The possibility of cardiovascular diseases in old patients is more than the younger, so associated diseases like diabetes mellitus, renal disorders, thyroid disorders, anemia, asthma, COPD and GI disorders. In this study the maximum number of associated diseases reported was diabetes mellitus. In a study conducted by Mukesh Kumar et al. for CVD prevalence and drug utilization patterns reported that diabetes, anemia and asthma were the co-morbidities associated with CVDs.

Physicians prescribed several and different pharmacological therapeutic classes of drugs. These drugs prescribed to the patients in different groups have been categorized. Most of the patients were advised to take anti-platelets (17.37%) followed by lipid lowering agents (12.31%), anti-anginal drugs (11.36%) and anticoagulants (3.09%). Several anti-hypertensive drugs were prescribed to the patients such as beta adrenoreceptor blockers (8.98%), ACE inhibitors (6.11%), angiotensin receptor blockers (5.32%), calcium channel blockers (4.38%), alpha adrenergic blockers (0.11%), and diuretics (1.01%). The physicians prescribed 5.66% of anti-ulcer drugs for the patients with or without ulcers.

Among the lipid lowering agents, atorvastatin was given to the most of the patients (99.69%). Aspirin and clopidogrel were given to (71.52%) and (28.47%) of patients respectively for reducing clotting for obtaining synergistic anti-platelet effect of the both compounds. Warfarin, heparin and rivaroxaban were prescribed to only (51.21%), (28.04%) and (20.73%) patients, respectively.

Anti-angina agents such as vasodilators were used commonly. Nitroglycerin was prescribed in 51.49% of patients whereas isosorbide dinitrate were prescribed in 30.23% of patients. Ivabradine was prescribed in 17.60% of patients for those who cannot take beta blockers.

Anti-hypertensive agents are predominantly used among the patients. The most preferred options were beta blockers, ACE inhibitors and diuretics. Adrenergic receptor blockers are given to the patients with hypertension. Most of the physicians prescribed carvedilol (61.49%) and atenolol(35.40%). On the other hand some physicians prescribed propranolol (2.84%) and sotalol (0.25%). ACE inhibitors had a great chance in the prescriptions. Lisinopril was given to the most of the patients (96.91%). Diuretics were the third preferred option by the physicians, Furosemide (53.15%) and spironolactone (42%).

The drugs that were mostly prescribed by the specialist doctors (cardiologist and heart specialist) will add value for the general practitioners. The study reveals that most of the patients with lipid profile disorders should take lipid lowering agents. To circumvent this, physicians prescribed worlds mostly prescribed and vended drug namely atorvastatin. It decreases the blood LDL cholesterol level effectively with increasing the HDL level. It also reduces the risk of coronary artery disease, myocardial infarction and stroke effectively with fewer side effects.[82]

The patients with coronary artery disease were treated with anti-atherogenic agents to prevent clotting at the coronary vessels that may be fatal to them ultimately. This type of narrowing blood vessels may cause of sudden myocardial infarction or stroke. In order to prevent this, physician prescribed clopidogrel and aspirin. Nitroglycerine was the preferred option for the relief of stable and unstable angina. It dilates the blood vessels and supply adequate oxygen to the heart within few minute. Nitrates were the second choice for this purpose.

Beta adrenergic receptors include a class of cardiovascular drugs, which are used for hypertension. Cardio-protective and anti-hypertensive effects of this class of drugs justify much larger use as observed in this study. Beta blockers reduce mortality rate when for primary and secondary prevention of myocardial infarction and chronic heart insufficiency.[83],[84] Carvredilol and atenolol were the mostly prescribed drugs in this study. It's followed by ACE inhibitors and diuretics. This could be explained by widening of indications for their use in hypertension, diabetic nephropathy, heart failure, etc. in the last decade ACE inhibitors become almost the most important drugs in cardiology, taking into consideration their cardio-protective and reno-protective effects. Many clinical studies confirmed reduction in morbidity and mortality in patients with acute myocardial infarction and congestive heart failure with the use of ACE inhibitors.[84]

Thiazide diuretics are fundamentals of anti-hypertensive therapy whereas loop diuretics or high ceiling diuretics are used as potent anti-hypertensive agents when used alone. Combination of furosemide and spironolactone were prescribed in order to overcome the side effects (viz. severe hypertension) of the former one. Diuretics are recommended as initial mono-therapy in older patients with stage I or II of hypertension, or in combination with severe hypertension.

CONCLUSION

The study concluded that most of the patients included in the study were suffering from hypertension and coronary artery disease. These may be due to their food habits, smoking, less exercise and poor health hygiene.

The prescribing pattern was rational and it follows the standard treatment guidelines so, the treatment was effective because of recovery of normal life of patient.

The maximum number of patients was male; it may be due to smoking and alcoholic habits.

Analysis divulges that statins and anti-atherogenic agents are dominant cardiovascular drugs when compared to others. Beta blockers, ACE inhibitors, diuretics are predominant in anti-hypertensive group.

The study has some restrains which leads to say it cannot be a standard one because it is carried out in one tertiary level hospital, may not accord with the data to other generalized hospitals. Beside that the sample size does not reflect the actual population and prescription pattern in the whole state or country.

Under use of calcium channel blockers and angiotensin receptor blockers should be changed by undertaking educative interventions to change the prescribing practice.

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