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## Drug Utilization Review on Cardiovascular Diseases in Guntur City Hospitals

			
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**Keywords:** Drug Utilization Review, Cardiovascular Diseases, Coronary Artery Disease, Myocardial Infarction, prospective observational study.

### ABSTRACT

**Background:** Cardiovascular diseases (CVD) account for high morbidity and mortality all over the world. A study of prescription pattern ensures rational pharmacotherapy and assures quality medical care to the patients. **Objectives:** This study was conducted to determine drug utilization pattern of cardiovascular drugs in Guntur city hospital. The main objective is to evaluate drug utilization pattern among patients approaching cardiology department. To observe the cardiovascular diseases which were most frequently treated and to evaluate the drug utilization pattern in them. **Methodology:** It is a prospective observational study done at Guntur city hospitals. The records of all patients who had cardiovascular diseases within given period were isolated, screened and relevant data was extracted by using patient data collection form and filled forms were analysed. **Results:** A total of 200 patients consisting of 136 males (68%) and 64 females (32%) were enrolled. Among them age group of 21-30 were 5(2.5%), 31-40 were 14(7%), 41-50 were 33(16.5%), 51-60 were 45(22.5%), 61-70 were 69(34.5%), 71-80 were 34(17%). The most commonly encountered disease was CAD (26%) followed by MI (26%), angina pectoris and hypertension. The most commonly prescribed drugs were anti-platelets (22.95%) followed by vasodilators, Statins and so on. **Conclusion:** This study states that among total cases collected men(68%) are relatively higher in number than women (32%) suffering from cardiovascular diseases and the patients aging between 61-70 years were found to be high followed by 51-60 age. Here the commonly found CVD's are CAD, MI, angina, hypertension, CHF. of these coronary artery disease is most common among all the patients followed by MI, angina, Hypertension and CHF. CAD is mainly treated with antiplatelets, anticoagulants and statins. Among prescribed cardiovascular drugs, antiplatelet drugs occupies major portion and ACE inhibitors occupies less. Our study highlights the need for encouraging prescription of generic drugs and drugs from essential medicine list.

## INTRODUCTION

DUR is an authorized and structured on-going review of practitioner prescribing, pharmacist dispensing and patient use of medications. The purpose of DUR is to ensure drugs are used appropriately, safely and effectively to improve patient health status. Predetermined criteria for appropriate drug therapy are compared against a patient's or a population's records. Non-adherence to criteria results in drug therapy changes. In addition, continual improvement in the appropriate, safe and effective use of drugs has the potential to lower the overall cost of care <sup>[1, 2, 3]</sup>. DUR allows the pharmacist to document and evaluate the benefit of pharmacy intervention in improving therapeutic and economic outcomes while demonstrating the overall value of the pharmacist <sup>[1]</sup>.

The world health organization (WHO) expands on this definition by including outcome variables in their definition. Drug utilization is defined by WHO as the marketing, distribution, prescription and use of the drugs in society, with special emphasis on the resulting medical, social and economic consequences <sup>[4]</sup>.

During past few years, numerous research studies have been conducted worldwide to determine the safe and effective drug utilization indicating that inappropriate drug use is a universal phenomenon<sup>[5]</sup>. Trend of drug utilization studies is raised globally in different health setups to examine the use of drugs in a society. This results in enormous social, economic and medical significance. Such type of drug utilization assessments is helpful to determine the prescribing patterns and to set the priorities to avoid the irrational drug use <sup>[6]</sup>.

The drug utilization research is increasing and it is being carried out in health setups, in order to study the use of drugs in a society. This has immense medical social and economic consequences. Drug utilization studies are needed to identify the trends as well as to set the priorities, not only in the interest of the regulatory control but also as a basis of the planning program of education and information<sup>[7]</sup>. Importance of drug utilization studies in pharmacoepidemiology has been increasing due to their close association to other areas like public health, pharmacovigilance, pharmacoconomics and pharmacogenetics<sup>[8]</sup>. Irrational prescribing of drugs may tend to produce an unproductive and a risky treatment to an individual; such a prescription may exacerbate or prolong the illness making higher the costs of treatment or both. On the other hand, using a rational drug prescription would see to a least number of drugs being used and also to obtain the best possible therapeutic effect of the drug

in short time with a reasonable cost <sup>[9]</sup>. Drug utilization [DU] studies can identify the most frequent prescribing errors and their causes, providing numbers that can be analysed. DU studies are a potential tool in the evaluation of health systems <sup>[10]</sup>. Drug utilization research is thus an essential part of pharmacoepidemiology as it describes the extent, nature and determinants of drug exposure. The principal aim of drug utilization research is to facilitate rational use of drugs in populations. For the individual patient, rational use of a drug implies the prescription of a well-documented drug in an optimal dose on the right indication, with the correct information and at an affordable price <sup>[11]</sup>. Knowledge about drug prescription is required to discuss whether the treatment followed is rational or irrational and to plan for better prescribing pattern.

### **Cardiovascular Diseases:**

Cardiovascular diseases (CVDs) are major health problem throughout the world and common cause of premature morbidity and mortality. According to the reports of World Health Organization (WHO) 17.5 million patients in 2008 died from CVDs (Cardiovascular diseases) also it was reported that by 2015 approximately 20 million patients will die mainly due to heart disease <sup>[12]</sup>. India will notice a large number of people between 35 and 64 years die of CVD over the next 30 years as well as an increasing level of morbidity due to CVD<sup>[13]</sup>. This trend is particularly alarming because of its potential impact on one of Asia's fastest growing economies <sup>[14]</sup>. Cardiovascular diseases are those diseases that affect heart or blood vessels which include arteries and veins. The major risk factors for a fatal cardiovascular disease are high blood cholesterol, high blood pressure, smoking, diabetes, poor diet and overweight. The common cardiovascular diseases are aneurysm, angina, atherosclerosis, cerebrovascular accident (stroke), cerebrovascular disease, congestive heart failure, coronary artery disease, myocardial infarction (heart attack) and peripheral vascular diseases <sup>[15]</sup>. The risk factors for CVDs are multiple such as elevated cholesterol and blood pressure levels, excessive smoking habits, diabetes, malnutrition and fatness etc <sup>[16]</sup>. 80% of deaths due to chronic diseases are in low and middle income countries and half are women. Prevalence of CVD in adults has risen four-fold in 40 years and in rural areas it doubled over the past 30 years <sup>[17]</sup>. A changing lifestyle in developing countries in India has enormously increased the statistical figures of diseases like hypertension (HTN), MI, and angina <sup>[18]</sup>. Acute coronary syndromes (ACSs), including unstable angina and myocardial infarction (MI), are forms of coronary heart disease (CHD) that constitute the most common cause of CVD death <sup>[19]</sup>.

The term cardiovascular disease refers to the diseases that encounter with heart and its blood vessels. Cardiovascular disease includes coronary artery diseases (CAD) such as angina and myocardial infarction (commonly known as a heart attack) <sup>[20]</sup>. Other CVDs include, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, heart arrhythmia, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, and venous thrombosis <sup>[21, 22]</sup>.

## MATERIALS AND METHODS

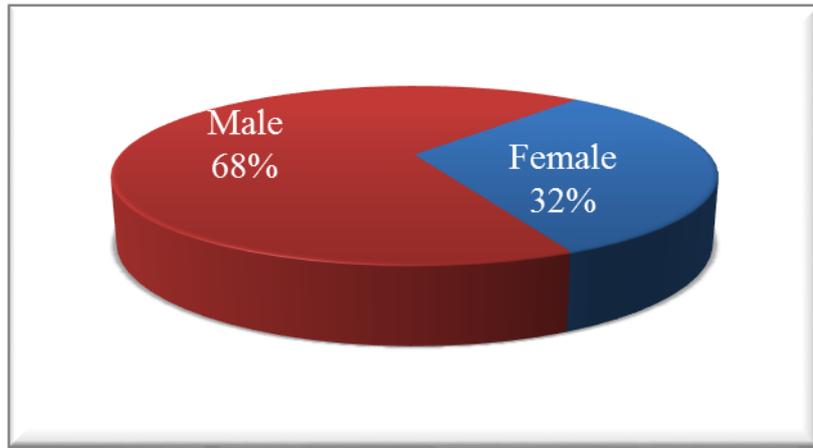
This Prospective Observational Study was conducted at Guntur city hospitals, Guntur. This Study was carried out in 200 patients for a period of 6 months From September 2017 to February 2018. Patients who are admitted with cardiovascular diseases, Patients with age in between 20-80 years were included in this study and pregnant women, Breastfeeding women & Pediatric Patients were excluded from the study. Data collection form contains patients demographics (Age, Sex), date of admission, date of discharge, reasons for admission, final diagnosis of the patient, treatments given (medication chart) to the patient during the course of hospital stay and at the time of discharge was collected from patient Case Sheets and Medical Records.

## RESULTS AND DISCUSSION

The present non-interventional prospective observational study was done at Guntur City Hospital, for a period of 6 months (from September 2017 – February 2018). Total 200 cases were collected and analysed under drug utilization study of cardiovascular diseases.

**Table: 1 Distribution based on Gender of patients (n=200)**

Gender	No .of patients n=200	Percentage (%)
Male	136	68
Female	64	32

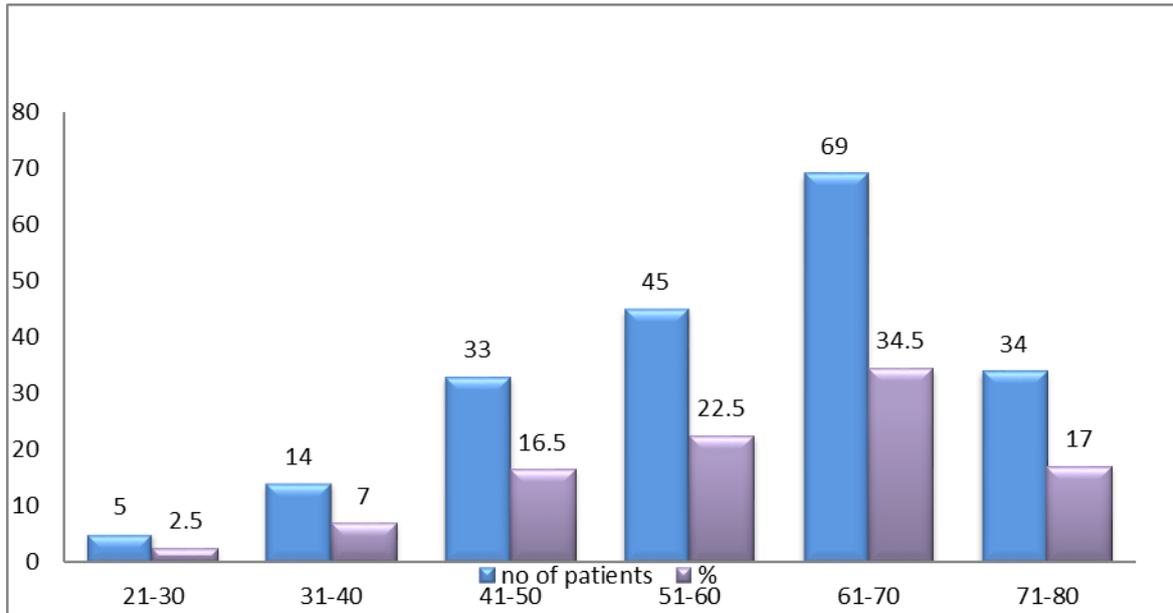


**Figure: 1 Distribution based on gender of patients (n=200)**

In this study, 200 cases of cardiovascular diseases are reviewed prospectively at Guntur City Hospital. Among them 68% (n=136) were male and 32% (n=64) were female. Demographic data reveals that males are more prone to cardiovascular diseases compared to females.

**Table: 2 Age Distribution of patients (n=200)**

SL. NO.	AGE GROUP	NO .OF PATIENTS	PERCENTAGE
1	21-30	5	2.5
2	31-40	14	7
3	41-50	33	16.5
4	51-60	45	22.5
5	61-70	69	34.5
6	71-80	34	17

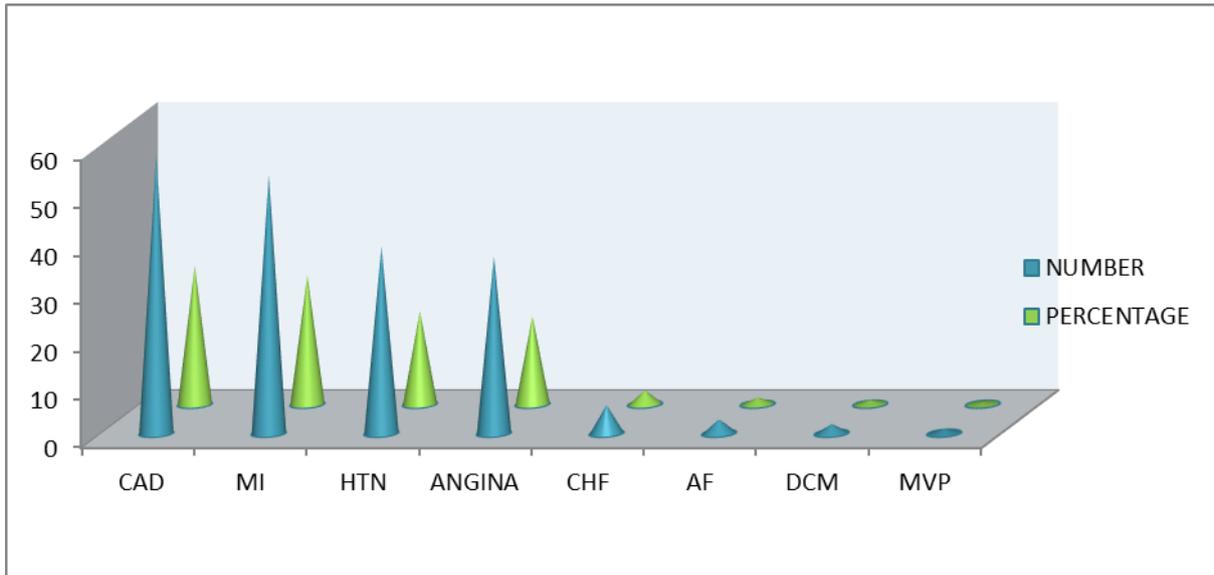


**Figure: 2 Age distribution of patients (n=200)**

According to age group Analysis, numbers of cases in age group of 21-30 were 5(2.5%), 31-40 were 14(7%), 41-50 were 33(16.5%), 51-60 were 45(22.5%), 61-70 were 69(34.5%) and 71-80 were 34 (17%). This data reveals that the patients aging between 61-70years were found to be high followed by 51-60 age.

**Table: 3 Disease pattern distribution in the study subjects.**

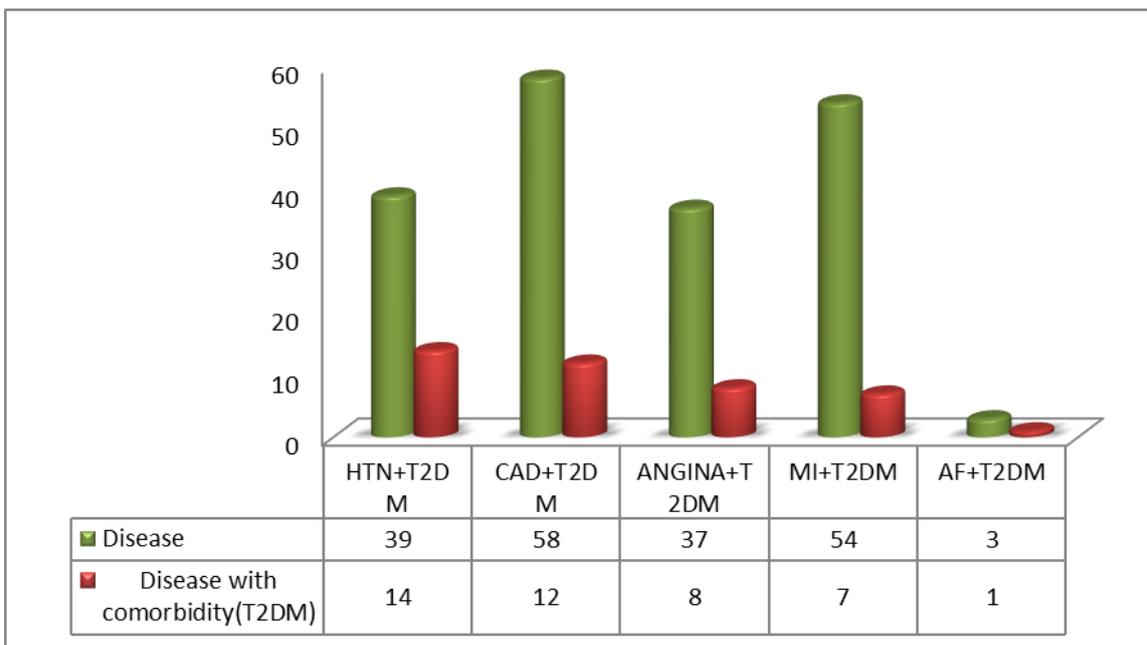
CLINICAL CONDITION	NO. OF PATIENTS (200)	PERCENTAGE
CAD	58	29
MI	54	27
HTN	39	19.5
ANGINA	37	18.5
CHF	6	3
AF	3	1.5
DCM	2	1
MVP	1	0.5



**Figure: 3 Disease pattern distribution in the study subjects**

Out of 200 cases collected, the pattern of disease distribution were found to be 58 (29%) CAD, 54(27%) MI, 39(19.5%) HTN, 37(18.5%) Angina, 6 (3%) CHF, 3(1.5%) AF, 2(1%) DCM, 1(0.5%) MVP. Among, 200 cases CAD and MI are the most encountered diseases followed by hypertension then angina then others (CHF, atrial fibrillation, DCM,) and finally the least encountered is MVP.

**Distribution of patients as per disease and co-morbid condition.**



**Figure: 4 Distribution of patients as per disease and co-morbid condition**

Out of 200 cases collected, the above chart is drawn dividing the patients as per their primary condition and comorbid condition (T2DM). The y-axis indicates the number of patients and x-axis indicates the diseased.

Here the green colour indicates the total no of patients with particular disease and red colour following each blue is indicating co-morbid patients from the total HTN with T2DM is 14, CAD with T2DM is 12, ANGINA with T2DM is 8, MI with T2DM is 7, AF with T2DM is 1.

**Table: 4 Commonly prescribed cardiovascular drugs**

Sl.no	Drug class	Total no. of drugs (1098)	percentage
1	Anti-platelets	252	22.95
2	Vasodilators	158	14.38
3	Dyslipidemics	150	13.66
4	Other antianginals	118	10.74
5	Diuretics	106	9.65
6	Anti-coagulants	88	8.01
7	CCB	55	5
8	Beta-blockers	29	2.64
9	Anti-arrhythmics	27	2.45
10	Beta-agonists	16	1.45
11	Fibrinolytics	15	1.36
12	Alpha+beta blockers	14	1.27
13	K+ channel openers	12	1.09
14	Calcium sensitizers	11	1
15	Aldosterone antagonists	10	0.91
16	ARB'S	10	0.91
17	Vasopressin receptor antagonist	10	0.91
18	Cardiac glycosides	5	0.45
19	Inotropics	5	0.45
20	Alpha blockers	3	0.27
21	ACEI	2	0.18
22	PDE4 inhibitors	1	0.09
23	Bronchodilators	1	0.09

Out of 200 prescriptions, 1098 cardiovascular drugs were found. Among them, anti-platelets were high in number and were prescribed in 146 prescriptions. Most commonly prescribed anti-platelets drugs were Aspirin and Clopidogrel and overall prescribed anti-platelets were 252.

From this study the analysis shows Anti-Platelets, statins are the mostly prescribed drugs in the treatment of coronary artery disease next follows the vasodilators among different cardiovascular drugs used to treat CAD.

Ivabradine is the antianginal drug which is mostly prescribed for treating the angina pectoris condition and followed by other antianginals.

**Table: 5 ATC classification of commonly prescribed drugs with no. of prescriptions.**

Sl.No	Drugs	ATC Classification	No. of Prescriptions
1	Nitroglycerin	C01DA02	108
2	Enoxaparin sodium	B01AB05	81
3	Clopidogrel	B01ACO4	143
4	Atorvastatin	C10AA05	146
5	Diltiazem	C08DB01	17
6	Glyceryl trinitrate	C01DA02	32
7	Dobutamine	C01CA07	4
8	Furosemide	CO3CA01	88
9	Ivabradine	C01EB17	111
10	Noradrenaline	CO1CA03	16
11	Aspirin	D01AC06	107
12	Telmisartan	C09CA07	5
13	Nebivolol	C07AB12	1
14	Heparin	B01AB01	1
15	Retepase	B01AD07	1
16	Dopamine	C01CA04	1
17	Prazosin	C02CA01	3
18	Olmesartan	C09CA08	2
19	Cilnidipine	C08CA14	6
20	Amiodarone	C01BD01	20
21	Metoprolol	C07AB02	27
22	Torasemide	C03CA04	15

23	Tolvaptan	C03XA01	10
24	Isosorbidedinitrate	C01DA08	16
25	Nicorandil	C01DX16	12
26	Carvedilol	C07AG02	11
27	Tirofiban	B01AC17	4
28	Eplerenone	C03DAO4	10
29	Losartan	C09CA01	3
30	Warfarin	B01AA03	1
31	Amlodipine	CO8CA01	32
32	Labetalol	C07AG01	3
33	Streptokinase	B01AD01	15
34	Moxonidine	C02AC05	2
35	Ticagrelor	B01AC24	2
36	Ranolazine	C01EB18	5
37	Hydralazine	C02DB02	2
38	Levosimendan	C01CXA08	11
39	Trimetazidine	C01EB15	2
40	Digoxin	C01AA05	5
41	Lidocaine	D04AB01	5
42	Cilostazol	B01AC23	1
43	Dicoumarol	B01AA01	1
44	Ramipril	C09AA05	2
45	Theophylline	R03DA04	1
46	Fenofibrate	C10AB05	1
47	Rosuvastatin	C10AA07	2
48	Mannitol	R05CB16	1
49	Spiranolactone	C03DA01	2
50	Propranolol	C07AA05	1

## CONCLUSION:

In conclusion, this study provides an insight on the various cardiovascular disorders encountered in a hospital setting and the spectrum of cardiovascular drug utilization in them. Predominance of male gender, age <60 years were observed.

The present study demonstrates the drug utilization pattern in cardiovascular diseases that are commonly seen. Every minute a men dies from heart disease as per studies. This study states

that among total cases collected men (68%) are relatively higher in number than women (32%) suffering from cardiovascular diseases.

The patients aging between 61-70 years were found to be high followed by 51-60 age. Here the commonly found cardiovascular diseases are CAD, MI, Angina, HTN, CHF, of these coronary artery diseases is most common among all the patients followed by MI, Angina, HTN and CHF.

Here the patients are treated majorly with Anti-Platelets (22.95%), Vasodilators (14.38%), Dyslipidemics (13.66%), Other Anti-Anginals, Diuretics, Anti-Coagulants, CCB, Beta Blockers, Anti-Arrhythmics, Beta-Agonists, Fibrinolytics, Alpha+Beta blockers, Potassium Channel Openers, Calcium Sensitizers, Aldosterone Antagonists, ARB's, Anti-Diuretics, Cardiac Glycosides, Inotropics, Alpha Blockers (0.27%), ACEI (0.18%).

The data on patterns of drug utilization was largely similar to those recorded in hospital and registry-based studies in India. However, it has identified areas to further rationalize and evidence based use of medications like newer Antiplatelet agents and newer Anti-Anginal agents.

Antiplatelet drugs and statins dominated the prescribing pattern with high prescribing trend from National essential drug list. However, there is a need to sensitize the cardiologist and make them aware to adopt generic drugs, so as to ensure rational utilization of drugs.

Analysing the WHO core indicators, the percentage of drugs prescribed in generic name was very less (5.91%). Prescribing generic drugs will ensure the patients to get more affordable drugs and will also reduce hospital burden on the patients. 40% of the drugs were only prescribed from essential drug list. Prescribing more drugs from essential list will ensure rational prescription and also avoid unnecessary over prescription without appropriate indication.

Our study highlights the need for encouraging prescription of generic drugs and drugs from essential medicine list.

Finally, this study concludes that the cardiovascular drugs have worked effectively for the patients which were used.

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