



## Research Article

# A study on prescription pattern of cardiovascular drugs in inpatient department at a tertiary care centre

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### ABSTRACT

High It has been found that cardiovascular disease is the most frequent cause of morbidity and mortality throughout the world. The objective of present study was to focus on the trends in prescribing patterns of most frequently treated cardiovascular emergencies among the patients admitted to intensive cardiac care unit (ICCU). Prior permission from the Institutional Ethics Committee was obtained. A prospective observational study of 6 months duration was undertaken from October'17- March'18. A total number of 120 indoor cardiovascular disease patients' case sheets were utilized for our study from medicine and ICCU department of a tertiary care hospital. The data was analyzed and the results were expressed as counts and percentage. Of 120 patients, most of the patients were of the age group of 61-80 years (55%). The prevalence of CVDs was higher in males (60.84%) than females (39.16%). Coronary artery disease along with co-morbid conditions as hypertension, diabetes mellitus was found to be predominant CVDs. Heparin (64.957%), Furosemide (27.350%), Aspirin (17.088%), Atorvastatin (12.341%) were the most commonly prescribed cardiovascular drugs. The potential drug-drug interactions observed in the study was of Aspirin and Heparin (9.756%). The average number of drugs per prescription was 6.4. The present study shows that most of drugs were prescribed rationally according to the standard treatment guidelines. In addition to prescribing drugs, patients should be educated about the risk factors of cardiovascular disease and how they can be prevented to avoid co-morbidity associated polypharmacy.

**Key words:** *Cardiovascular disease: Prescription pattern Drug-drug interactions, Intensive cardiac care unit, Tertiary care centre.*

### INTRODUCTION

Cardiovascular diseases (CVD) have emerged as the leading cause of mortality with developing countries accounting for 80% of cardiovascular deaths. The mortality data from first phase of the million Death study showed CVDs as the largest cause of death in India leading to 1.7-2 million deaths annually.<sup>1</sup> There is a global rise in CVDs in the 20<sup>th</sup> and 21<sup>st</sup> centuries among all races, ethnic groups, and cultures. CVDs are highly prevalent diseases, diagnosed in 80 million adults, i.e., one-third of the adult population. CVDs remain the most common cause of death, accounting for 35% of all deaths, i.e. almost one million deaths each year. Approximately one-fourth of these deaths

are sudden. More than 80% of the deaths occurred in low and middle income countries.<sup>2</sup>

According to the Global burden of disease study in India, coronary artery disease (CAD) is the largest contributor to CVD accounting for over 35% of disease burden. As per prediction from studies by the National commission for Macroeconomics and Health, government of India, the number of patient with CAD is set to increase over 60 million by 2015. Drug therapies in critically ill patient are often complicated by the altered physiology and coexistence of multiple co-morbidities that warrants polypharmacy. Polypharmacy may increase the risk of adverse drug reactions, medication errors and

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patient non-compliance with treatment<sup>1</sup>. Cardiovascular disease is a group of general category diseases that affects the heart and the circulatory system. CVD is caused by disorders of the heart, blood vessels that includes coronary heart diseases, congestive heart failure, stroke, hypertension, peripheral artery disease and rheumatic heart disease<sup>3</sup>. Industrialization, urbanization, and associated lifestyle changes lead to increase prevalence of obesity, type-2 diabetes mellitus, and metabolic syndrome, which are important risk factors for atherosclerosis and also for cardiovascular diseases<sup>3</sup>. Important modifiable risk factors of CVDs are unhealthy diet, physical inactivity, tobacco use and the effects insinuate abnormal blood lipid profile and obesity. Less physical activity and excess fat rich diet are two major health concerns in affluent society<sup>2</sup>.

For promoting well - being and human health drugs play a crucial role, but for this desired effect they have to be safe and efficacious and have to be used rationally and in addition to the burden of CVD, errors identified in the prescription are common and raised due to ignorance or lack of knowledge about the disease, pharmacotherapeutic management of CVD patient. In the drug related problems drug interactions is the major problem and drug interaction is defined as when the effect of one drug is changed by the presence of another drug, food or by some environmental chemical agent. Drug interactions create a significant challenge to health care providers and may affect mortality, morbidity and a quality life of patients<sup>4</sup>.

Certain drugs like anti platelets, anti coagulants, and fibrinolytics are needed to be administered at the earliest to these critical patients. There are many drugs prescribed in a single patient simultaneously in ICCU (Intensive Cardiac Care Unit) with the aim of maximizing efficacy in a particular condition. Prescribing rationally in ICCU is important to minimize chances of drug interactions, adverse drug reactions, and unduly high cost of treatment<sup>3</sup>.

### **The most commonly seen cardiovascular disorders are as follows:**

**Hypertension** is a common disease globally. It is a major public health concern and is associated with high morbidity and mortality. The prevalence of hypertension has been increasing worldwide and it is has estimated that it will increase to 29.2% by 2025 representing about 1.56 billion people. However, majority of hypertensive patients will require at least two antihypertensive drugs for optimal control<sup>5</sup>. Hypertension is high blood pressure. Blood pressure is the force of blood pushing against the walls of arteries as it flows through them<sup>6</sup>.

The cause of hypertension is not known in 90 to 95 percent of the people who have it. Hypertension without a known

cause is called Primary or Essential Hypertension<sup>6</sup>.

Fewer than 10% of patients have Secondary Hypertension where either a co morbid disease or drug is responsible for elevating B.P.<sup>7</sup>.

**Angina** is chest pain, discomfort, or tightness. It may present in the form of an *angina* attack, pain that typically lasts from 1 to 15 minute (or) it is a tightness, pain, or discomfort in the chest that occurs when an area of the heart muscle receives less blood oxygen than usual<sup>8</sup>.

**Rheumatic heart disease** is a heart damage caused by rheumatic fever. Treatment involves prevention of re-infection with streptococcus and use of medications to treat any heart complications, as needed<sup>6</sup>.

**Myocardial infarction** is acute myocardial infarction is the medical name for a heart attack. A heart attack is a life-threatening condition that occurs when blood flow to the heart muscle is abruptly cut off, causing tissue damage. This is usually the result of a blockage in one or more of the coronary arteries. A blockage can develop due to a build-up of plaque, a substance mostly made of fat, cholesterol and cellular waste products<sup>9</sup>.

To our knowledge, there are limited numbers of studies from India in this direction. Hence, this study was aimed to evaluate prescribing pattern in indoor patients of cardiovascular diseases in a tertiary care hospital admitted in ICCU<sup>3</sup>. Our aim is to study the prescription pattern in inpatient admitted in cardiology units at a tertiary care centre. To study the potential DDI (drug-drug interactions) in inpatient admitted in cardiology units at a tertiary care centre.

### **Study Objectives**

- To study pattern of medical conditions among in patient of CVD's patients
- To observe the distribution pattern of cardiovascular drug therapy
- To study the number of single dose and fixed dose combinational cardiovascular drug therapy
- To observe the potential drug-drug interaction in CVD's patient
- To study the average number of drugs per patient.

## **MATERIALS AND METHODS**

A Prospective, Observational and Non- interventional study was carried out at cardiac inpatient and cardiac ICU in Yashoda Multi Speciality Hospital with 500 beds at Secunderabad. The study will be observed in

inpatient admitted over age of group >20years. The inclusion criteria was patients who are admitted under cardiac department and cardiac ICU with CVD and exclusion criteria was patient who are undiagnosed, pregnant, lactating women. Total case sheets observed / assessed are 120 during the study period. Duration of study was from October'17-March'18 (6 months).

**Study procedure**

The cases were collected from IP (In Patient) department and ICU of cardiology units on regular basis from 10am to 4pm. The observed cases were documented and assessed to study the prescription pattern of CV Drugs. A Data Collection Form is designed to collect patient data regarding the following aspects as: Patient Demographic: Patient Name, Age, Gender: Height, chief complaints of the patient, Past History (medical and medication), Social History: Smoking and Alcohol, Vital signs, Laboratory values, Final diagnosis and Medication chart.

**Drug-drug interaction form** was designed to observe and document the potential drug- interaction in the patient case sheet. This form is designed consisting of: Interacting Drugs, Interaction Severity, Drug interaction mechanism and Management.

**Data handling and management** Patients were assigned a specific case number along with their initials, and only this was used while collecting relevant information. Their names were kept confidential. Strict privacy and confidentiality was maintained during data collection. Descriptive statistics was used.

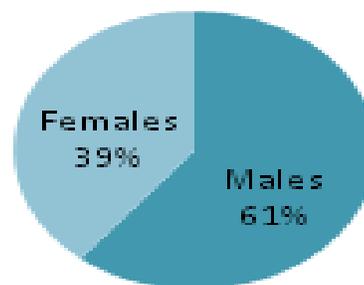
Data analysis is done by using statistical methods such as frequency, percentage, mean and standard deviation. The study was initiated after getting approval from Institutional Ethics Committee (IEC).

**RESULTS AND DISCUSSION**

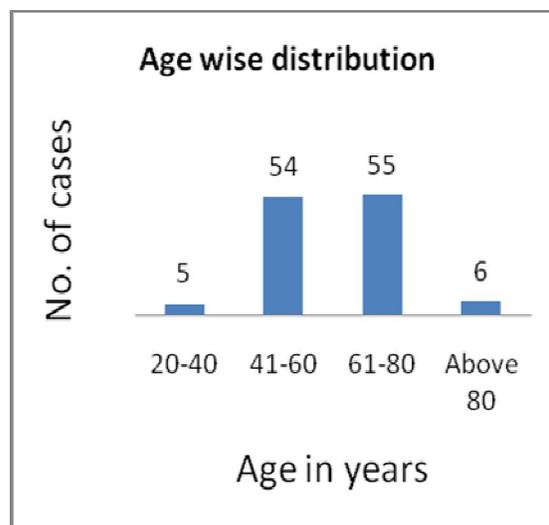
In our study it was observed that out of 120 patients, 60.84% patients were Male and 39.16% were Female (Figure 1). In our study it was observed that maximum number of patients of 55% were in the age group of 61-80 years, followed by 54% patients in the age group of 41-60 years, whereas in another study it was observed that a maximum number of patients were in the age group of 51-60 years (39%), followed by 27% patients in the age group of 61-70 years<sup>10</sup> as in Figure 2.

In our study out of 9 patients having CVD of single disease consisted of maximum patients having MI(myocardial infection) out of which 6 cases (67%) patients had Inferior wall myocardial infarction

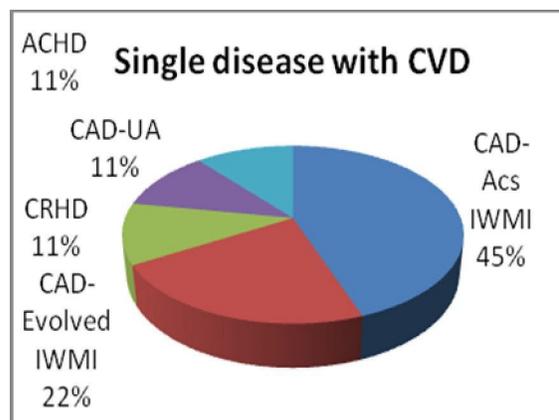
(IWMI), followed by CRHD (Chronic Rheumatic Heart Disease), UA(Unstable Angina) and ACHD (Adult Congenital Heart Disease) of (11.111%) which is in comparison to a study where it was observed that out of 41 patients of MI, 38 patients had ST evolved MI, followed by UA in 27 patients, followed by CCF (congestive cardiac failure) in 4 patients<sup>11</sup> as in Figure 3.



**Fig. 1:** Gender distribution of patients



**Fig. 2:** Age wise distribution



**Fig. 3:** Single disease with CVD

In our study it was observed that out of 120 prescriptions, Heparin (64.957%), Furosemide (27.350%), Aspirin (17.088%), Atorvastatin (12.341%) were the most commonly prescribed cardiovascular drugs, whereas in another study it was observed that Atorvastatin was given in 60 cases (60%), followed by Ramipril given in 54 cases (54%) and followed by

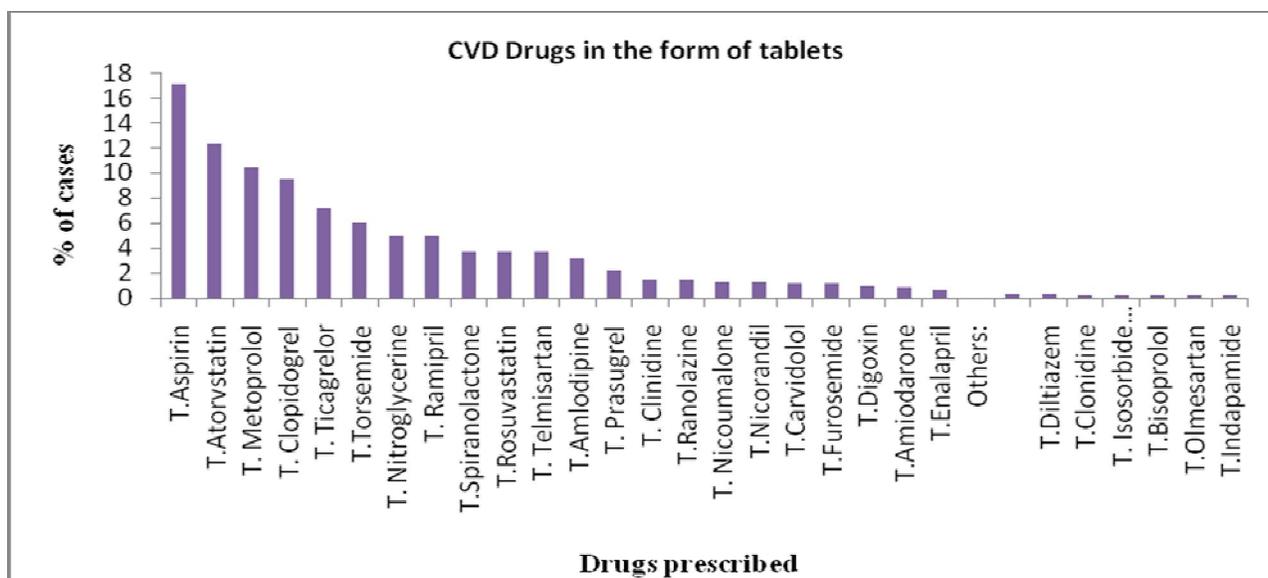
**Table 1:** CVD drugs given as monotherapy in injection's form

Sl. No.	Drugs prescribed	No. of cases	% of cases
1.	Inj. Heparin	76	64.957
2.	Inj. Furosemide	32	27.350
3.	Inj. Nicorandil	3	2.564
4.	Inj. Fundaparunix sodium	2	1.709
5.	Inj. Amidarone	2	1.709
6.	Inj. Nitroglycerin	1	0.854
7.	Inj. Dalteparin sodium	1	0.854
	Total	117	100%

Nitroglycerine given in 43 cases (43%)<sup>4</sup>. as in figure 4 and Table 1. The commonly used infusions were Dobutamine and Noradrenaline in various doses as monotherapy for CVD as shown in Table 2.

**Table 2:** CVD drugs given as monotherapy as Infusion's form

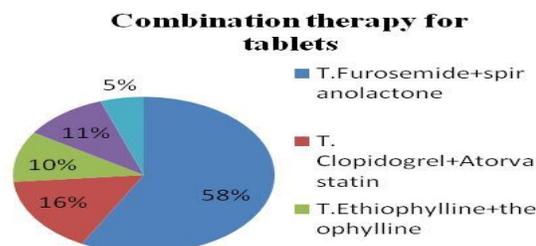
Sl. No.	Drug prescribed	No. of cases	Dose administration
1.	Dobutamine	9	1ml/hr, 3ml/hr, 1ml/hr, 2ml/hr, 1mg/ml, 1ml/hr, 2.4ml/hr 2mg/ml
2.	Noradrenaline	8	1ml/hr, 3ml/hr, 1ml/hr, 2ml/hr, 1mg/ml, 1ml/hr, 0.5ml/hr 2mg/ml
	Total	17	



**Fig. 4:** CVD drugs in the form of tablets

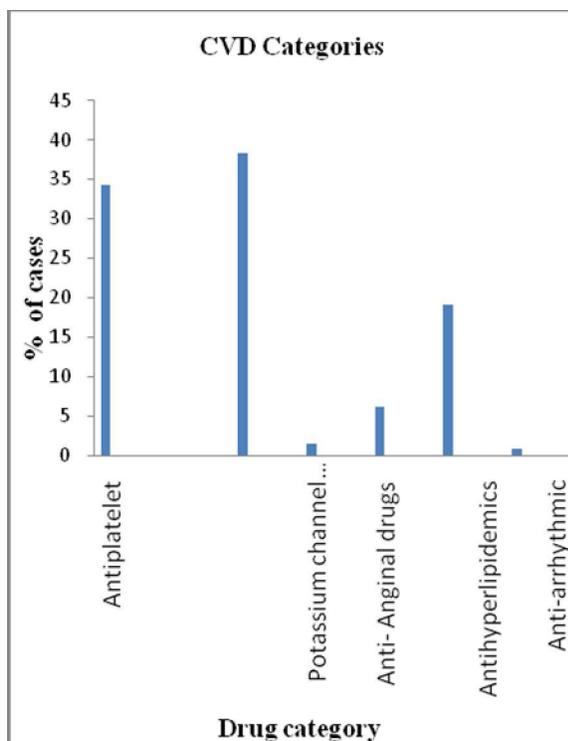
In our study out of 120 cases it was observed that most common used combinations drugs are Furosemide + spiranolactone given in 11 cases (57.894%), followed by Clopidogrel + Atorvastatin given in 3 cases (15.789%) and then followed by Ethiohylline + Theophylline given in 2 cases (10.526%) whereas in another study it was observed that out of 100 patients Aspirin + Clopidogrel was given in 76 cases(76%), followed by Aspirin + Clopidogrel + Atorvastatin given in 5 cases (5%) and followed by Aspirin + Atorvastatin and Telmisartan +

Amlodipine was given in 2 cases (2%)<sup>4</sup> as in Figure 5.



**Fig. 5:** Combination therapy for tablets

In our study it was observed that most commonly used medication was Anti-hypertensive (38.415%), followed by Anti-platelets (34.274%) and followed by Anti-hyperlipidemics (19.020%) whereas in another study it was observed that the commonly used medication was Anti-platelets given in (90.24%) cases, followed by Anti-hypertensives given in (87.80%) cases and followed by Anti-hyperlipidemics given in (81.30%) of cases<sup>12</sup> as in Figure 6.



**Fig. 6:** CVD drugs categories given in inpatient

In our study out of 120 cases Potential Drug-Drug Interaction identified from prescription the most frequently occurred were those with Aspirin + Heparin and Atorvastatin + pantoprazole with moderate severity given in 32 cases (9.756%), followed by Aspirin + ticagrelor given in 25 cases (7.621%) with moderate severity and whereas as in a study done by Bandla Aswani et al., it was observed that Atorvastatin + Clopidogrel with moderate severity given in 89 cases, followed ACE Inhibitors + Aspirin with moderate severity in 74 cases<sup>10</sup>.

In our study out of 120 cases the Potential Drug-Drug Interaction consisted of (81.097%) with moderate severity, (9.757%), with severe DDI followed by (9.146%) minor severity which was in comparison to a study in which it was observed that 46.15% constitutes moderate, followed by 30.76%

severe and 23.071% with minor severity<sup>10</sup> as in Table 3. The details of drug therapy pattern in cardiovascular disease patients are given in concise manner in Table 4.

**Table 3:** Severity of drug-drug interactions

	No. of cases	% of cases
Severe	32	9.757
Moderate	266	81.097
Minor	30	9.146
TOTAL	328	100%

**Table 4:** Details of drug therapy in cardiovascular disease patients

Sl. No.	Details of drug therapy during hospitalization	Number's
1.	Total no. of prescription analyzed	120
2.	Total no.CVD drugs prescribed as tablet	29
3.	Average no. of drugs per patient	6.4
4.	Total no. of Infusion prescribed in CVD	2
5.	Total no. of Injection in CVD	7
6.	Single (non-combinational) CVD therapy	38
7.	Fixed dose combinational CVD therapy	5

## CONCLUSION

In this study, the data collected was evaluated for demography and treatment pattern. Aspirin, Heparin and Atorvastatin were mostly commonly prescribed in this hospital to treat various cardiovascular disorders. The potential drug interactions were more in the cardiovascular drugs prescriptions co-morbid conditions which required the prescription of more medications. It was observed that co-morbidities were the main cause for cardiovascular diseases and their complications. By controlling the co-morbid conditions there could be substantial decline in the cardiovascular diseases and their complications. The

non cardiological drugs prescribed to treat associated medical conditions were antidiabetic drugs, antimicrobial agents, antiulcer agents, bronchodilators, corticosteroids and multivitamins as per the need of the disease condition. Most of the drugs were prescribed rationally according to the standard treatment guidelines. In addition to prescribing drugs, patients should be educated about the risk factors of CVD and how they can be prevented.

### Limitations of the study

The sample size and short study duration does not reflect the actual population and prescription pattern in the whole country. Moreover, the study based on a tertiary level hospital, may not accord with the data to other generalized hospitals.

### Future Scope

Establishing the interventions in the form of educational programs can improve the healthy well-being of the patient and decrease the risk of cardiovascular complications and also improve the overall drug therapy of the patient.

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## Conflict of Interest

There is no conflict of interest

**Abbreviations:** CVD-Cardio Vascular Disease; BP-Blood Pressure; ICF-Informed Consent Form, ICCU- Intensive Cardiac Care Unit.

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