



**ANALYSIS OF DRUG PRESCRIBING PATTERN AND SOCIODEMOGRAPHIC  
BACKGROUND IN PATIENTS WITH CORONARY ARTERY DISEASE IN A  
TERTIARY CARE HOSPITAL.**

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**ABSTRACT**

**Objective:** The objective of the study was to analyze the drug prescribing patterns and sociodemographic background of coronary artery disease patients in the Cardiology department of a tertiary care hospital. **Method:** In this study, we analyzed data of 130 patients of In Patient and Out Patient department of a tertiary care hospital in south India over a period of 6 months and assessed their baseline characters, clinical Co morbidity and drugs prescribed. This study has provided a picture of cardiovascular drug prescribing patterns and sociodemographic background. In total number of 130 patients, assessment of drug prescribing pattern was performed. **Result:** Result obtained reveals that among Coronary artery disease drugs, Antiplatelet drugs (43.8%) were the most prescribed drugs followed by Nitrates (15.59%), Anticoagulant drugs (11.13%), Beta blockers (8.1%), Angiotensin receptor blockers (6.93%), Potassium channel openers (6.93%), Calcium channel blockers (4.2%) and Angiotensin converting enzyme inhibitors (3.2%). Among Non Coronary artery disease drugs, Hypolipidaemic drug (31.6%), other drugs (29.4%), hypoglycemic drugs (18.39%), Anti-ulcer drugs (16.74%), Anti asthmatic and Thyroid products (1.8%). Drug interactions were found in 77% of prescriptions. The patients were found mostly within 71-80 age group. Higher incidence among males, the majority of patients had good educational status and income and most patients had a normal BMI. **Conclusion:** Drug prescribing pattern was analyzed and incidence of polypharmacy was identified. CAD drugs constitute only 48.79% of total drug prescribed and 51.2% was constituted by Non CAD drugs, the study provides a picture of sociodemographic background of patients.

**KEYWORDS:** prescribing patterns, coronary artery disease, sociodemographic background, tertiary care hospital.

**INTRODUCTION**

Coronary artery disease (CAD) is defined as an acute or chronic form of cardiac disability arising from imbalance between the myocardial supply and demand for oxygenated blood. Narrowing of obstruction of the coronary arterial system is the most common cause of myocardial anoxia.<sup>[1]</sup> Ischemic heart disease is already the leading cause of mortality in India. It is projected that ischemic heart disease will result in two and one-half million Indian deaths by 2020.<sup>[2]</sup>

Each year, more than 3.2 million will experience an Acute coronary syndrome (ACS) and 2, 20,000 will die of a myocardial infarction (MI). In the US more than 17.6 million persons, age 20 years and older have CHD and 3.6% have survived an MI. The median length of hospital stay for MI in 2001 was 4 days, but had decreased to a median of 3 days in 2006.<sup>[3]</sup> In 2000, there were an estimated 29.8 million people with CAD in India, out of a total estimated population of 1.03 billion people or a nearly 3% overall prevalence (Gupta, 2008,

India Census, 2001).<sup>[4]</sup> 20% of all deaths in Kerala are caused by coronary heart disease (CHD/CAD). The age-adjusted CAD (coronary artery disease) mortality rates per 100,000 are 382 for men and 128 for women in Kerala. These CAD rates in Kerala are higher than those of industrialized countries and 3 to 6 times higher than Japanese and rural Chinese. The heart attack rate among men in this age group increased 40-fold by 1990 with at least 20% heart attacks occurring before age 40 and 50% before age 50.<sup>[5]</sup>

The formation of atherosclerotic plaques is the underlying cause of CAD in most patients.<sup>[6]</sup> The prevalence of risk factors is high even in rural Kerala: diabetes, 20%, high blood pressure, 42%, high cholesterol (>200mg/dl) 72%, smoking (42% in men) and obesity (body mass index >25) 40%, physical inactivity 41%, unhealthy alcohol consumption 13%.<sup>[5]</sup>

Analysis of literature has shown that limited studies are available about drug prescribing patterns of CAD

patients. Irrational prescribing of drugs is of common occurrence in clinical practice<sup>[7]</sup>, important reasons being lack of knowledge about drugs, unethical drug promotions and irrational prescribing habits of clinicians. Inappropriate prescribing habits lead to ineffective and unsafe treatment, prolongation of illness, distress and unnecessary economic burden to the patient.<sup>[8]</sup> Studies of prescribing patterns and drug utilization are useful to identify the problems and provide feedback to prescribers so as to create awareness about rational use of drugs.<sup>[9]</sup> Therefore, this study attempts Studies on drug prescribing pattern definitely improve the quality of prescription writing so study of drug prescribing pattern is relevant in the present scenario.

## MATERIALS AND METHODS

### Study site

The study was carried out in the Cardiology department of 350 bedded multi specialty hospital located in Thiruvananthapuram over a period of 6 months beginning from march 2015. Before commencement of the project, Ethical committee approval was attained from hospital for conducting the study.

### Study design

Study was carried out at the cardiovascular department of a tertiary care hospital. A written informed consent was taken in the prescribed format from patients with CAD attended cardiology department. Patients who met the inclusion criteria were enrolled in the study. All information relevant to the study was collected from case records and direct interview of the patients with the help of a physician. The demographic characters, educational qualification, monthly income, co morbid conditions, cardiology investigation results, drug dose frequency etc. were documented in the proforma.

### Enrollment

#### Inclusion criteria

- Patients above 18yrs of age presenting with coronary artery disease and dyslipidemia.
- Patients willing to participate in the study

#### Exclusion criteria

- Patients aged below 18 years.
- Pregnant women.
- Presence of serious or unstable medical or psychological conditions.
- Renal impairment (CrCl<30ml/min).
- Acute liver disease (AST or ALT> 100IU/L) or unexplained persistent elevations of serum transaminases.
- Patients not willing to participate in the study.

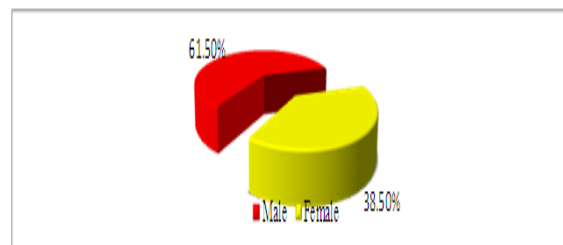
### Statistical Analysis

For data entry we had used the software Microsoft excel and for the analysis, SPSS (statistical package for social science) version 17.0.

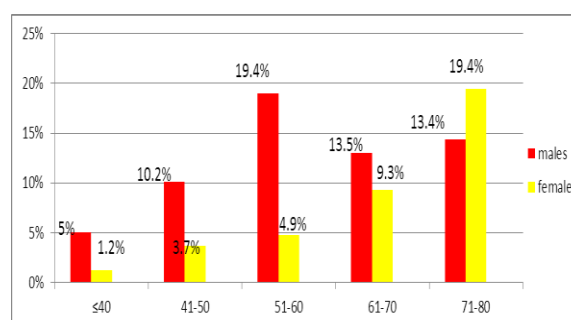
## RESULT AND DISCUSSION

In this study, we analyzed the data of 130 patients visited/admitted in the cardiology department of a tertiary care hospital in south India over a period of 6 months from march 2015. This study had provided a picture of cardiovascular drug prescribing patterns and sociodemographic background of patients.

### Socio demographic background



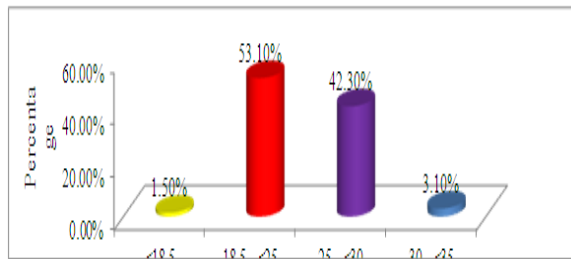
**Fig. 1 Percentage distribution of the sample according to sex (N=130)**



**Fig.2 Percentage distribution of the sample according to age (N=130)**

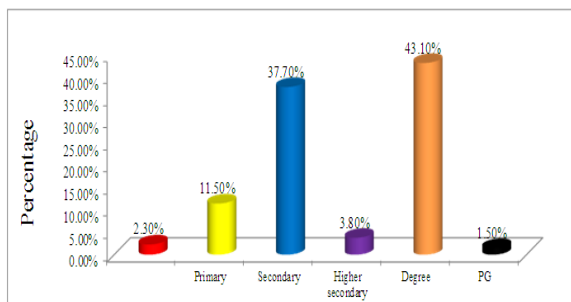
From Fig. (1) and (2), it was found that the majority of the patients (33.8%) were in the age group of 71- 80 years among them 19.4% were females. About 23.8% patients belong to the age group of 51-60 followed by age group 61-70 (23.3%). Only 6.2% were in the age group of less than 40 and 13.8% were in the age category of 41-50 years.

In a study conducted by Kamath A et al<sup>[10]</sup>, Out of the 349 patients, 81% were males and 19% were females. In a retrospective study conducted by TasneemSandozi and FouziaNausheen<sup>[11]</sup>, 96% of patients were men and 4% of them were women. In another study by Jesso George et al<sup>[12]</sup>, out of 574 patients admitted to CCU for a period of one year, the majority of patients were males (65.1%) and average age was above 60 years. In the present study majority were male patients 61.5% and only 38.5% were females (Fig: 2). Majority of patients were found to be in the age of 71 to 80 yrs. The results of this study were found to be in concordance with previous studies and indicated that male were more prone to coronary artery disease compared to female. This study also points out that females have higher prevalence of CAD above 70 yrs of age.



**Fig.3 Percentage distribution of the sample according to BMI (N=130)**

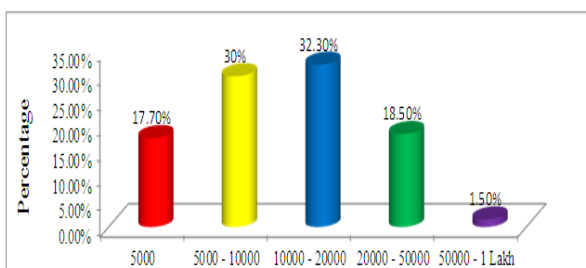
The present study shows that the incidence is more in patients with normal body weight (Fig: 3). In the study done by Labouty TM et al.<sup>[13]</sup> individuals with increased BMI have greater prevalence, extent and severity of CAD that is not fully explained by the presence of traditional risk factors. A higher BMI is independently associated with increased risk of intermediate-term risk of myocardial infarction. The result of the present study is not supported by a study done by Labouty TM et al.



**Fig.4 Percentage distribution of the sample according to Education (N=130)**

It was observed that, majority of patients (44.6%) were with education of degree and above.

Prevalence of CAD was found least among illiterate people. 37.7% of patients had secondary level education and 11.5% were with primary school education(Fig: 4). This is not supported by the study done by Gupta R. et al<sup>[14]</sup> which showed that the prevalence is more in less educated people. Dewan et al<sup>[15]</sup> and Jajoo et al<sup>[16]</sup> studied rural populations in northern and central India respectively, but did not examine the relation of socioeconomic status or education with coronary heart disease.



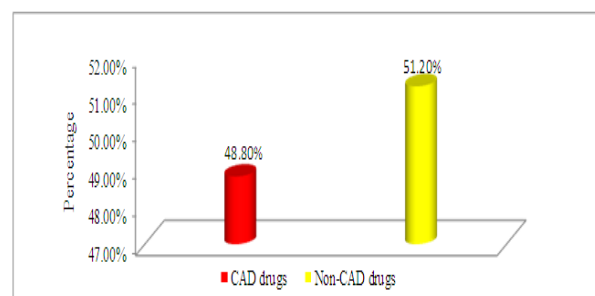
**Fig.5 Percentage Distribution of the Sample According to Monthly income (N=130)**

It was observed that, the majority of patients (32.3%) was having monthly income of 10,000 to 20,000 (Fig: 5). From the study it was clear that CAD is more in people with monthly income more than 10,000 (52.3%), it may relate to food habits and sedentary lifestyle. The result of the present study is supported by the study done by Sarvotham S G et al.<sup>[17]</sup>

**Drug prescribing pattern in patients with coronary artery disease**

**Table.1 Percentage distribution of sample according to the drug group (N=824)**

Drug group	Count	Percentage
CAD drugs	404	48.8%
Non-CAD drugs	424	51.2%

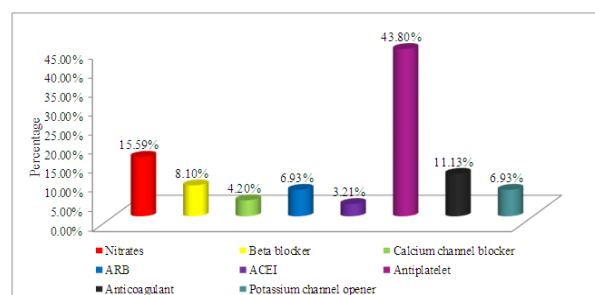


**Fig.6 Drugs prescribed (N=824)**

In the present study CAD drugs constitute only 48.79% of total drug prescribed and 51.2% was constituted by Non CAD drugs (Table 1). Study done by Jessogeorge, et al<sup>[12]</sup> showed that 69% of CAD drugs and 31% non CAD drugs were prescribed.

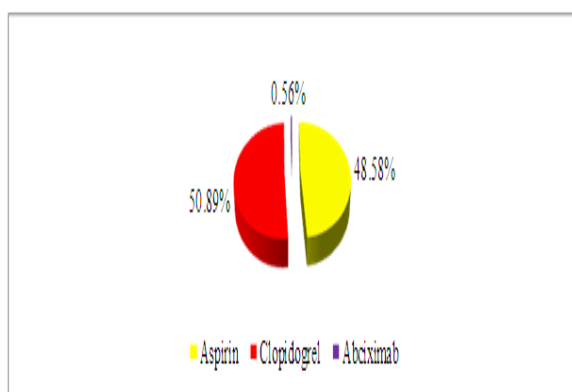
**Table. 2 Percentage distribution of the sample according to the drug group under CAD Drugs (N=404)**

Drugs	Count	Percentage
Nitrates	63	15.59%
Beta blocker	33	8.1%
Calcium channel blocker	17	4.2%
ARB	28	6.93%
ACEI	13	3.21%
Antiplatelet	177	43.8%
Anticoagulants	45	11.13%
Potassium channel opener	28	6.93%



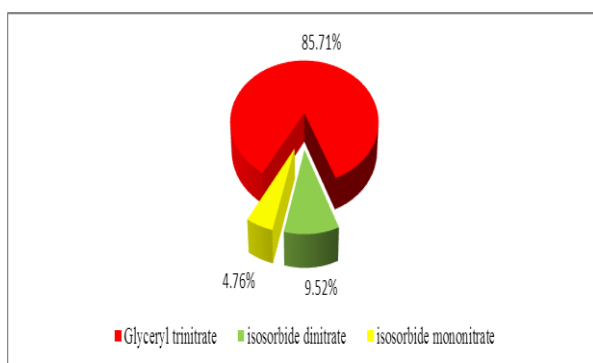
**Fig 7: Coronary artery disease drugs prescribed (N=404)**

The common classes of CAD drugs prescribed were Antiplatelet (43.8%), Nitrate (18.89%), Anticoagulant (11.13%), Beta blocker (8.1%) and ARB (6.93%) (Fig: 7). In a study conducted by Jessogeorge, et al<sup>[12]</sup>, the drug prescription rates for Antithrombotic agents, Beta-blockers, ACE-inhibitors/Angiotensin receptor blockers and lipid lowering drugs were 91%, 58%, 50% and 63% respectively. Both studies have similar results. In another study by Raj kumarvenisetty et al<sup>[18]</sup>, the drug prescription rates of Anti-thrombotic agents were 99.41%, Beta-blockers 59.41%, ACE-inhibitors/Angiotensin receptor blockers and lipid lowering drugs were 52.35% and 95.29% respectively. In study by J. George et al<sup>[12]</sup>, the five commonly prescribed subgroups were platelet aggregation inhibitors excluding Heparin (23.5%), Statins (11.4%), Heparin group (9.4%), ACE-inhibitors (8.9%) and selective Beta-blocking agents (7.3%).



**Fig.8 Prescribing pattern of Anti platelet drugs (N=177)**

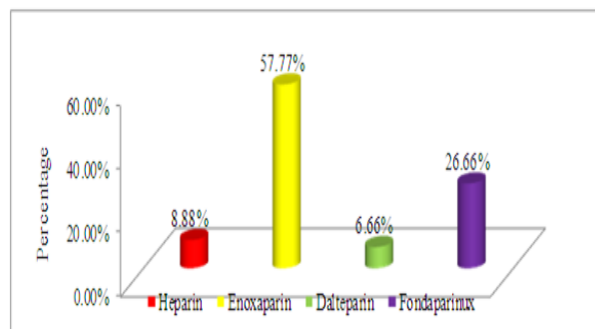
The utilization of Antiplatelet drugs in the present study was found to be 43.8%. Among Antiplatelet drugs pattern of utilization was Clopidogrel (50.89%), Aspirin (48.58%) and Abciximab (0.56%) (Fig.8). Clopidogrel was the most commonly prescribed drug and this is in accordance with study conducted by J George et al.<sup>[12]</sup>



**Fig.9 Prescribing pattern of Nitrates (N=63)**

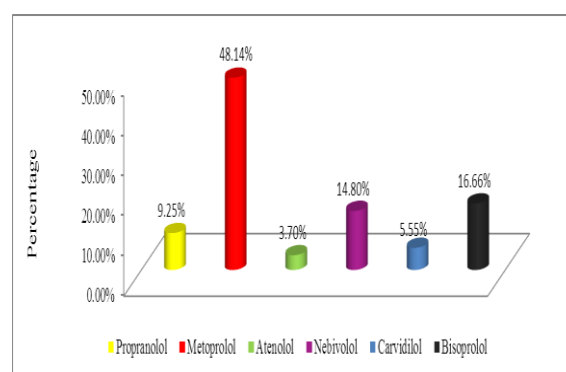
The Nitrate constitutes about 15.59% total drug prescribed (Fig: 7). A study by Rajkumar venisetty et al<sup>[18]</sup> showed 36.7% of nitrates prescribed. Among Nitrates pattern of prescribing was found to be 85.71%

for Glyceryl trinitrate, 9.52% for Isosorbide dinitrate and 4.76% for Isosorbide mononitrate(Fig: 9).



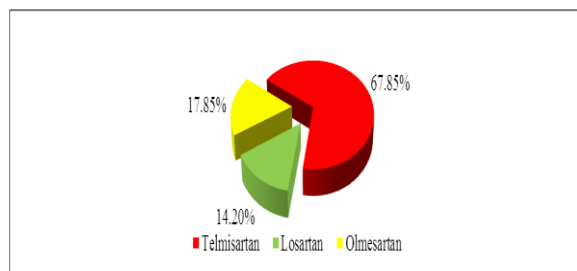
**Fig.10 Prescribing pattern of Anticoagulant drugs (N=45)**

In the present study, Anticoagulants used were Enoxaparin (57.77%), Fondaparinux (26.66%), Heparin (8.88%) and Dalteparin (6.66%). In a study by Tasneem Sandozi et al., anticoagulant utilization was found to be Heparin(55.7%) and LMWH(20%). The present study is in opposition to study by Tasneem Sandozi et al.<sup>[11]</sup> The present study is in concordance with J.George et al.<sup>[12]</sup>, showing increased use of fractionated Heparin. The increased utilization of LMWH is supported by the fact that the risk for Heparin induced Thrombocytopenia is reduced with LMWH.<sup>[19,20]</sup>



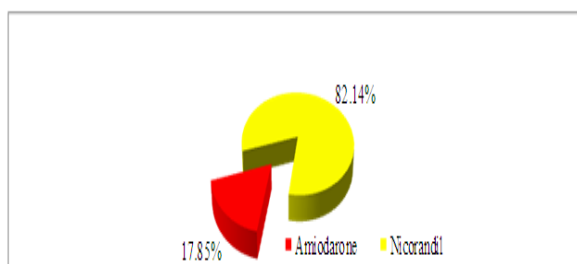
**Fig.11 Prescribing pattern of Beta blockers (N=53)**

The utilization of beta blocker in the study population was found to be 8.1% (Fig no:7). Among Beta blockers commonly prescribed were Selective Beta blockers (88.86%) including Metoprolol (48.14%), Bisoprolol (16.66%), Nebivolol(14.81%), Carvedilol (5.55%) and Atenolol(3.70%). The Non-selective Beta blocker utilization was found to be 9.25% and Propranolol was commonly prescribed. In study by Raj Kumar Venisetty et al. utilization of selective Beta blocker found in 99% and non-selective Beta blocker found to be 1%. The present study is in concordance with study done by Rajkumar venisetty et al.<sup>[18]</sup>



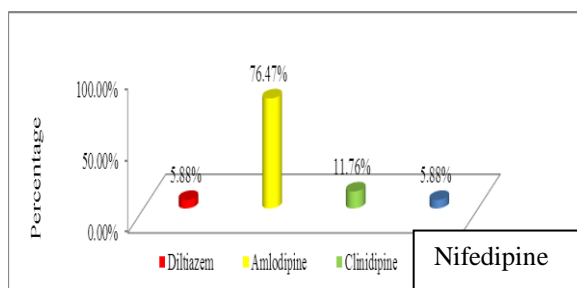
**Fig.12 Prescribing pattern of Angiotensin receptor blockers (ARBs) (N=28)**

In the present study utilization of ARB's was found to be 6.93%, out of that Telmisartan was found to be 67.85%, Olmesartan (17.85%), Losartan (14.2%). In study by Raj Kumar Venisetty et al.<sup>[18]</sup>, utilization of ARB found to be Losartan(58.1%), Telmisartan (30.23%) and Olmesartan (13.95%) showing Losartan being commonly used.



**Fig. 13 Prescribing pattern of Potassium channel openers (N=28)**

In the present study utilization of potassium channel opener was found to be 6.93%, out of that Nicorandil was commonly used (82.14%) and followed by Amiodarone (17.85%).



**Fig.14 Prescribing pattern of Calcium channel blockers (N=17)**

According to present study Calcium channel blockers being a commonly prescribed antihypertensive agent. The utilization of Calcium channel blocker was found to be Amlodipine (76.49%), Cilnidipine (11.76%), Nifedipine and Diltiazem (5.88%) (Fig: 14). In a study by Raj kumar Venisetty et al.<sup>[18]</sup> the utilization of CCB was found to be Amlodipine (77.77%) and Diltiazem (22.22%). The most commonly used CCB in both studies was found as Amlodipine.

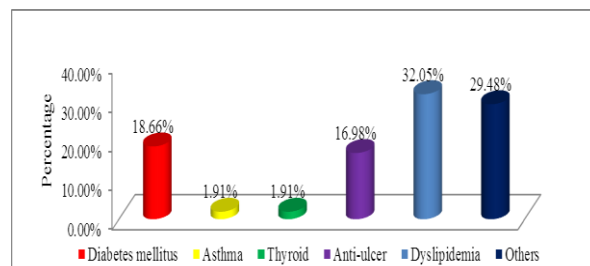
**Table.3 percentage distribution of sample according to the drug group under Angiotensin converting enzyme inhibitor (ACEI) N=13**

Drugs	Count	Percentage
Ramipril	13	100%

The only ACEI prescribed was Ramipril. This study is in concordance with Raj kumar venisetty et al.<sup>[13]</sup>, in which the utilization of Ramipril was 84.78%. The Study to Evaluate Carotid Ultrasound changes in patients treated with Ramipril and vitamin E (SECURE), a sub study of the HOPE trial, thus demonstrated reduced progression of carotid atherosclerosis in patients treated with Ramipril<sup>[21]</sup> and Other investigations also revealed improved endothelial function in patients receiving ACE inhibitors.<sup>[22,23]</sup>

**Table. 11 Percentage distribution of sample according to the drug group under Non-CAD drugs (N=424)**

Co morbid condition	Count	Percentage
Diabetes mellitus	78	18.66%
Asthma	8	1.91%
Thyroid	8	1.91%
Anti-ulcer	71	16.98%
Dyslipidaemia	134	32.05%
Others	125	29.48%

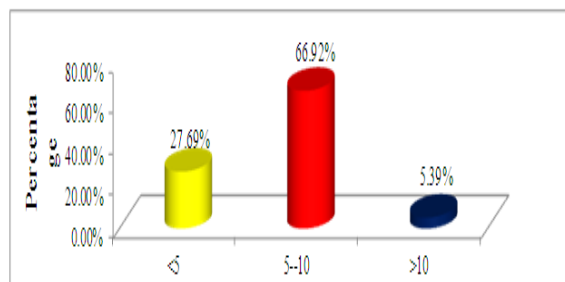


**Fig.15 Prescribing pattern of Non CAD drugs (N=424)**

The drug groups prescribed for co morbid conditions were found as Hypolipidaemic agent (32.05%) followed by hypoglycaemic agents (18.66%), Antiulcer agents (16.48%) and Anti-asthmatic drugs (1.91%) (Fig: 15). In a study by Raj kumar venisetty et al.<sup>[18]</sup>, various co-morbid conditions like Hypertension, Diabetes mellitus, Hypothyroidism, Dyslipidaemia were seen among patients. Many of these were found to be risk factors of coronary artery disease. In the present study dyslipidaemia is found as common co morbid condition. In study by Raj kumar venisetty et al, Hypertension and diabetes were the two most common co-morbid conditions found in most of the patients which increase the risk of coronary artery disease. Diabetes is a co morbid disease and independent risk factor for CAD<sup>[21]</sup>

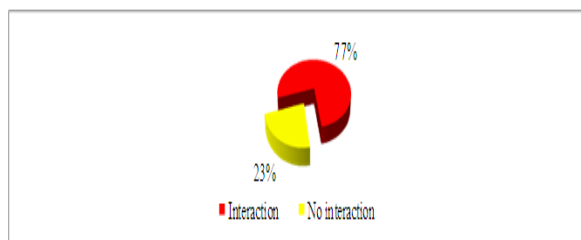
The coexistence of diabetes mellitus and hypertension is also important as they are multiple risk factors for macrovascular and microvascular disease, resulting in increased risk of cardiac death, coronary heart disease,

congestive heart failure, cerebrovascular disease and peripheral vascular disease.<sup>[24]</sup>

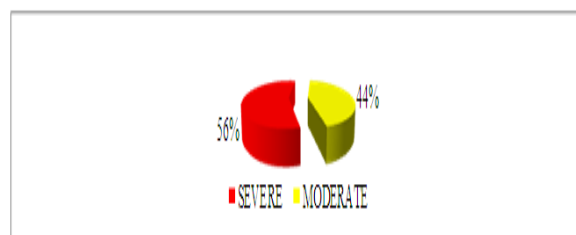


**Fig.16 Number of drugs per prescription (N=130)**

About 66.92% of patients had 5 to 10 drugs per prescription. Only 5.39% of patients had more than 10 drugs per prescription and 27.69% of patients had less than 5 drugs per prescription. The percentage of patients receiving more than five drugs (70.5%) was quite high. Polypharmacy may be justified as this was a tertiary critical care setting where the majority of patients were hospitalized with multiple co-morbidities<sup>[12]</sup> The interplay of polypharmacy and multiple comorbidities are proven risk factors for ADRs, which significantly increase the duration of hospital stay.<sup>[22]</sup>



**Fig.17 Percentage of interactions found (N=130)**



**Fig.18 Percentage of interactions (severity) (N=356)**

Drug-drug interaction is of major concern in patients with complex therapeutic regimens. The involvement of cardiovascular medicines in drug interaction is higher. Drug drug interaction database system(Micromedex) was used to identify and analyze drug interactions. on the basis of severity interactions classified as major, moderate and mild. Major and moderated interactions are considered in the present study. From the figure. 17 and 18, it was found that drug interactions were found in 77% of the patients and 23% had no interactions, out of that 44% cases were moderate and 56% cases were severe. The present study shows cardiac patients are at

high risk of drug interactions, the result is in concordance with study by Sharma S,C.P Diwal.<sup>[25]</sup>

## CONCLUSION

In the present study, prevalence of CAD and dyslipidemia is high. CAD was found more among 71 to 80 age group. Prevalence of CAD was found greater among patients with normal BMI. The most frequent co morbidity among CAD patients was dyslipidemia. Polypharmacy was noted in the prescriptions. Complex regimens can lead to more ADRs and also contribute economic burden to patients hence so the need of lifestyle modification and proper exercise must be emphasized. This study also highlights the need of intense monitoring for those who has been identified with drug interactions. Studies on drug prescribing pattern definitely help the physician to improve the prescribing patterns and efficient management delays the progression of disease and improves the quality of life. For future research the study should be done in a large sample and for long duration of period as a multicentre study.

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