Analysis of Prevalence, Risk Factors and Therapeutic drug Management of Cardiovascular Disorders

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ABSTRACT

Background: Cardiovascular disease is the leading cause of death and disease burden globally. Multimorbidity is common in old age. Deaths associated with cardiovascular events remains constant in many countries due to new therapeutic approaches for prevention and treatment of cardiovascular diseases. This condition is widely attributable to unhealthy outcomes in its association with risk factors such as Hypertension, Diabetes mellitus, smoking, alcohol consumption and sedentary lifestyle which play a significant role in the progression of cardiovascular diseases. **Objectives: Primary:** 1) To analyse the prevalence of cardiovascular disorders. 2) To study the risk factors for cardiovascular disorders. 3) To analyse the treatment given for cardiovascular disorders. **Secondary:** To analyse the drug interactions between the drugs used for the treatment of cardiovascular disorders. **Study Design:** A Cross-Sectional study was carried out in the General Medicine Department, MIMS Teaching Hospital and Research Centre, Mandya, Karnataka, using a well-designed patient data collection form. **Results:** In this study, among 202 cases of cardiovascular diseases analysed, 128(63.36%) patients were males and 74(36.64%) were females. Out of these 51 patients (25.25%) were known case of Cardiovascular disease consisting of 37 males (28.9%) and 14 females (18.91%) and 151 patients (74.75%) were newly detected cases of Cardiovascular disease consisting of 91 (71.09%) males and 60 females (81.9%). **Conclusion:** Uncontrolled DM, Hypertension, Smoking and Alcohol intake are the major etiologies and risk factors for developing cardiovascular disorders. The treatment given for various cardiovascular disorders were found to be ineffective in patients to reduce their symptoms and prevent further complications due to existing co-morbid conditions.

INTRODUCTION

Cardiovascular disorders (CVDs) are the group of disorders that involves the heart and blood vessels. Cardiovascular diseases are the leading cause of death globally. Deaths from CVD are more common and largely the product of interactions among modifiable risk factors that are increasing in much of the developing world while rates have declined in most of the developed countries. Most of the CVDs affect older adults. The increase in CVDs could be attributable to (i) increase in the population size due to natural growth, (ii) ageing of the population which makes people more vulnerable to chronic diseases at older ages, and (iii) increased vulnerability due to lifestyle changes. Cardiovascular disease includes coronary artery diseases such as Angina pectoris, Myocardial infarction (MI), Congestive Heart Failure (CCF), Stroke, Hypertension (HTN), Atherosclerosis, Thrombosis, Endocarditis, Myocarditis, Arrhythmias, Pulmonary Hypertension, Peripheral arterial disease, Rheumatic Heart Disease. Together they resulted in 17.3 million deaths (31.3%) in 2013 up from 12.3 million (23.8%) in 1990. It is also estimated that by 2030, over 23 million people will die from CVD each year. CVD accounted for 30% of an estimated 58 million deaths from all causes in 2005 shifting the focus to an "upstream" approach to primary prevention integrated across different sectors and policies rather than "downstream" approach of medical care has the potential to decrease the individual, social and economic burden of CVD[1].

The death caused by CAD (coronary artery disease) is responsible for approximately half of all deaths from CVD[2].Cardiovascular disease is the leading cause of mortality in many economically developed nations accounting for about 30% of all deaths and its incidence is still increasing[3]. It was reported that the mortality from CVD was projected to decline in the developed countries from 1970 to 2015, while it was projected to almost double in the developing countries[4, 5].

The World Health Report 1999 estimates that in 1998, 78% of the burden of Non-Communicable Diseases and 85% of the cardiovascular burden arose from the low and middle-income countries. It is estimated that 30.9% of all deaths in 1998, as well as 10.3% of the total disease-related burden, in terms of disability-adjusted life year loss (DALY loss) were attributable to CVD[6,7]. The percentage of premature deaths from CVDs ranges from 4% in high-income countries to 42% in low-income countries, leading to growing inequalities in the occurrence and outcome of CVDs between countries and populations[8]. An estimated

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80,000,000 American adults (one in three) have one or more types of cardiovascular disease (CVD), of whom 3,81,00,000 are estimated to be age 60 or older[9].

ECONOMIC IMPACT OF CARDIOVASCULAR DISORDERS:

It has been found that over 80% of deaths and 85% of disability from CVD occur in low and middle-income countries. CVD affects Indians with greater frequency and at a younger age than counterparts in developed countries, as well as many other developing countries. In addition to high rates of mortality, CVD manifests here almost 10 years earlier on an average than other countries in the world, resulting in a substantial number of deaths in working age group. In Western countries where CVD is considered to be a disease of the aged, 23% of CVD deaths occur below 70 years of age, while in India 52% of CVD deaths occur below 70 years of age. Thus, India suffers a tremendous loss of productivity due to increased prevalence of CHD. The total years of life lost due to total cardiovascular disease among the Indian men and women aged 35-64 years has been estimated to be higher than comparable countries such as Brazil and China. These estimates are predicted to increase by 2030 when differences may be even more marked. Age-standardised CVD death rates in people 30- 69 years old are 180 per 100,000 in Britain, 280 per 100,000 in China and 405 per 100,000 in India. Also, 50% of CVD-related deaths in India occur in people <70 years of age, whereas only 22% of CVD-related deaths in western countries occurs in this age group. Between 2005 and 2015, India is projected to cumulatively lose USD 236.6 billion because of heart disease, stroke, and diabetes costing 1% of the GDP[10].

At the beginning of the 20th century, CVD accounted for less than 10% of all deaths worldwide. At the beginning of the 21st century, it accounts for nearly one-half of all deaths in the developed world and 25% in the developing world; by 2020, it will claim 25 million deaths each year and will surpass infectious disease as the world's leading cause of death and disability[11].

EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE IN INDIA:

Cardiovascular diseases (CVD) have been leading cause of morbidity and mortality in India. Cardiovascular diseases have assumed epidemic proportions in India as well. The present evidence suggests an average mortality of 4% in the age group of 20-49 years and 6% in those above 50 years due to CVD. According to a world health organization (WHO) report, the current age-standardised CVD mortality rates among males and

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females in India (per 100,000) are 363-443 and 181-281 respectively[4]. The burden of cardiovascular disease (CVD) is rapidly rising in low and middle-income countries (LMICs). LMICs now account for over three-quarters of all global deaths from heart disease and stroke. A more worrying fact is that the incidence has gone up significantly for people between ages 25-69 years to 24.8%[11]. In more than 90% of cases, the risk of a first heart attack is related to nine potentially modifiable risk factors such as high blood pressure, Smoking/tobacco use, Poor diet, High blood cholesterol, Insufficient physical activity, Obesity, Diabetes, Psychosocial stress (linked to people's ability to influence the potentially stressful environments in which they live), Excess alcohol consumption[12]. Other factors, such as maternal nutrition and air pollution may also be linked to the disease[13]. It is now well established that a cluster of major risk factors (tobacco, alcohol, inappropriate diet, physical inactivity, obesity, hypertension, diabetes, and dyslipidemias) govern the occurrence of CVDs much before these are firmly established as diseases[14].

The present Cross-Sectional study was carried out to establish prevalence of cardiovascular Disorders, the pattern of increase in the incidence of cardiovascular disorders amongst various age groups, risk factors and therapeutic drug management of CVDs in Mandya Institute of Medical Sciences Teaching hospital and research center, Mandya, Karnataka, India. Findings from this study provide a benchmark at local and national level. The results help to monitor the effects, progress and to identify risk factors, opportunities for strategic initiatives, policies to improve healthy well-being and to decrease the cardiovascular disorders.

THERAPEUTIC DRUG MANAGEMENT OF CARDIOVASCULAR DISORDERS:

Most of the chronic medical conditions require treatment and the treatment of choice often remain drug therapy. With increasing use of medications, the rate of noncompliance and the risks of adverse drug reactions, drug interactions, and drug induced hospitalizations raised. The use of pharmaceutical care principles provides a systematic approach to ensuring good patient education. These include assessment, development of a care plan, the establishment of therapeutic goals and follow-up. The assessment process includes an understanding of the patient's disease state and drug therapy. Age-associated physiologic changes must be considered. The older patient's lifestyle and activity level also may affect the response to medications. The use of alcohol, tobacco, and caffeine must be considered, as well as the effect of a disease state on mobility and function. High rates of medication use, complex drug

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regimens, the potential for adverse drug reactions and interactions, self-medication and the likelihood of noncompliance with a therapeutic plan make developing a pharmaceutical care plan challenging. Therapeutic goals should be developed along with the care plan[15].

The role of clinical pharmacist in Drug therapy Management (DTM) can prove to be the best to achieve therapeutic goals in patients and improves treatment outcomes by effective drug use and patient safety. The complexity and intensity of care required by ICU patients is also associated with greater risks. ICU clinicians are faced with making many important drug dosing decisions each day, even when the correct medication is chosen although, few drug-related problems (DRPs) are not preventable as they are unpredictable because of their idiosyncratic nature. Complex pharmacotherapy, simultaneous use of drugs in critically ill patients in ICU often require close monitoring as their safety is of paramount importance. DTM help patients get the most benefit from their medications by monitoring their treatment. Desired outcomes of DTM are appropriate drug use, enhanced patient understanding of appropriate drug use, increased patient adherence, reduced risk of adverse effects and adverse events (AEs) associated with drugs and reduced need for other costly medical services[16].

MATERIALS AND METHODOLOGY

The Ethical clearance for the study was obtained from the Institutional Ethics committee, Mandya Institute of Medical Sciences Teaching Hospital and Research Centre, Mandya. A Cross-Sectional study was carried out in various units such as Intensive Critical Care Unit (ICCU), Respiratory Intensive Care Unit (RICU), Medical Intensive Care Unit (MICU), Medical wards (Male and Female) of the department of general medicine, Mandya Institute of Medical Sciences Teaching hospital and research center, Mandya, Karnataka, India. The essential data for the Cross Sectional study was collected from patient case files using a well-designed patient data collection form.

A total of 202 cardiovascular disease patient's files were screened and data was analysed. Both male and female patients with cardiovascular disease of age > 20 years admitted to hospital were selected. All pregnant women and lactating mothers, patients in other wards and departments of the hospital, individuals who are not willing to be a part of the study, all outpatients in Out Patient Department, Paediatrics, seriously and mentally ill patients were excluded from the study.

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SOURCE OF DATA:

Patient files were screened for the demographic information, date of admission, date of discharge, Inpatient and outpatient number and the department and unit in which he/she was admitted, laboratory investigations, diagnosis, and the medication prescribed each day. A suitably designed patient data collection form was used to record all the necessary data. It also includes the present complaints of the patient, past medical history, past medication history, family history, social history (including diet, alcohol/smoking habits, sleep, bowel and bladder, appetite, exercise habit), physical examination, systemic examination etc. The discharge medications and the adverse drug reaction if any occurred were also mentioned or collected.

STATISTICAL ANALYSIS:

The collected information was analysed using Microsoft Office (MS-Word and Excel) 2010. Descriptive data analysis has been performed in the form of a percentage of demographic variables and drug therapy and related issues were shown as various tables and graphs for a better understanding of data. For the analysis of the results, simple percentage calculations were used to arrive at a conclusion of our study. Drug-drug interactions were analysed by using MICROMEDEX, Epocrates, and CIMS.

RESULTS

A total number of 202 case sheets of cardiovascular disease patients admitted to MIMS teaching hospital were analysed. Among these 202 CVD patients, the majority of the patients were male n=128 (63.36%) and n=74 (36.64%) were females. The patients were divided into 8 groups based on their age and the age group being kept at an interval of 10 years (Figure No.1).
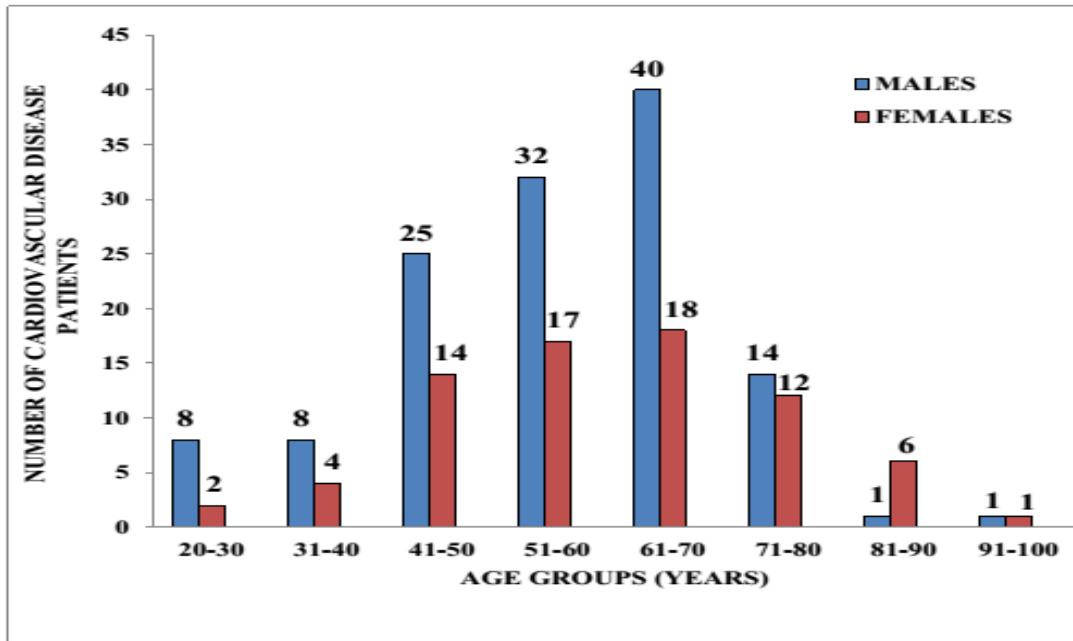
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Figure No.1: Age and gender wise categorization of cardiovascular disease patients

In this study different type of cardiovascular disorders were identified which includes Angina Pectoris, Myocardial infarction (MI), Congestive Cardiac Failure (CCF), Rheumatic Heart Disease (RHD), Pulmonary Embolism, Peripheral Vascular Disease (PVD), Corpulmonale, Arrhythmias, Hypertensive Heart disease, Cardiomyopathy, and Cerebrovascular accident (CVA) and their percentage is given (Figure No.2) and the age wise and gender wise categorization of cardiovascular disorders were given (Table No:1 and Figure No.3)
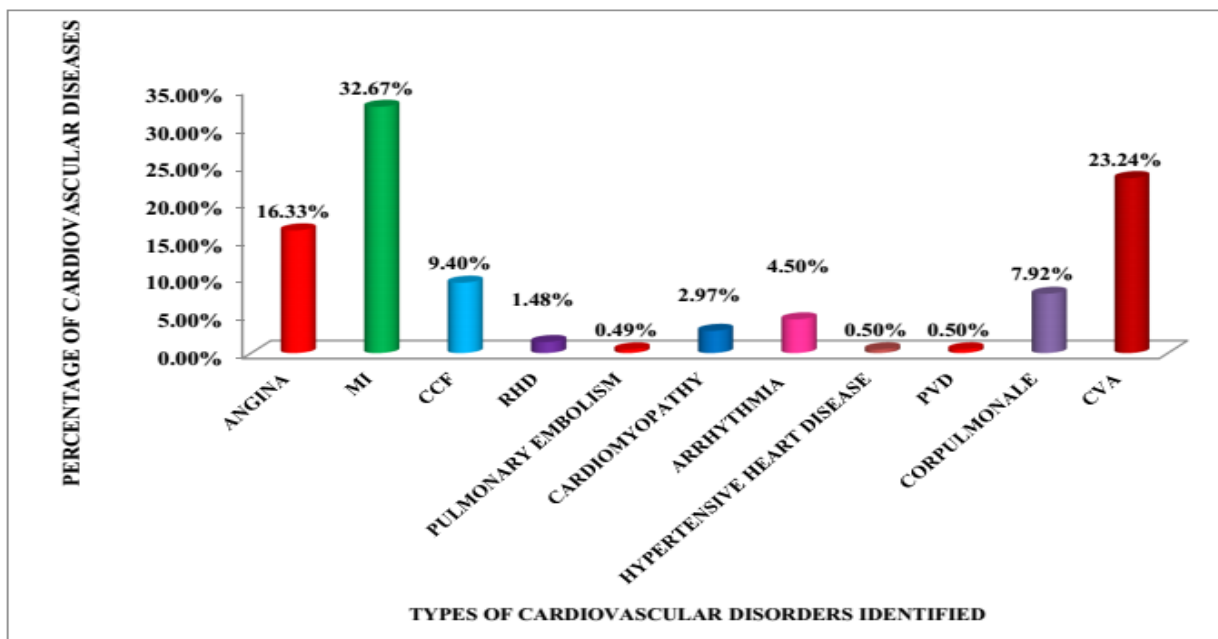

Figure No.2: Percentage classification of Cardiovascular Diseases

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Table No.2: Age and gender wise classification of cardiovascular disorders

CARDIOVASCULAR DISEASE	AGE GROUP (YEARS)																TOTAL	PERCENTAGE
	21-30		31-40		41-50		51-60		61-70		71-80		81-90		91-100			
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
ANGINA PECTORIS	1	2	3	1	2	4	8	3	6	2	1	0	0	0	0	0	33	16.33%
MYOCARDIAL INFARCTION	2	0	3	1	14	7	9	8	8	6	2	3	0	2	1	0	66	32.67%
CONGESTIVE CARDIAC FAILURE	1	0	0	0	3	0	1	1	4	1	0	5	0	2	1	0	19	9.40%
RHEUMATIC HEART DISEASE	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	1.48%
PULMONARY EMBOLISM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.49%
CARDIOMYOPATHY	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	0	6	2.97%
ARRHYTHMIA	0	0	0	0	1	2	1	0	2	1	0	1	0	1	0	0	9	4.45%
HYPERTENSIVE HEART DISEASE	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.49%
PERIPHERAL VASCULAR DISEASE	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.49%
CORPULMONALE	0	0	0	0	2	0	3	1	8	0	0	2	0	0	0	0	16	7.92%
CEREBRO VASCULAR AACCIDENT	3	0	1	0	3	0	8	3	11	6	8	3	0	1	0	0	47	23.26%
																	202	100%

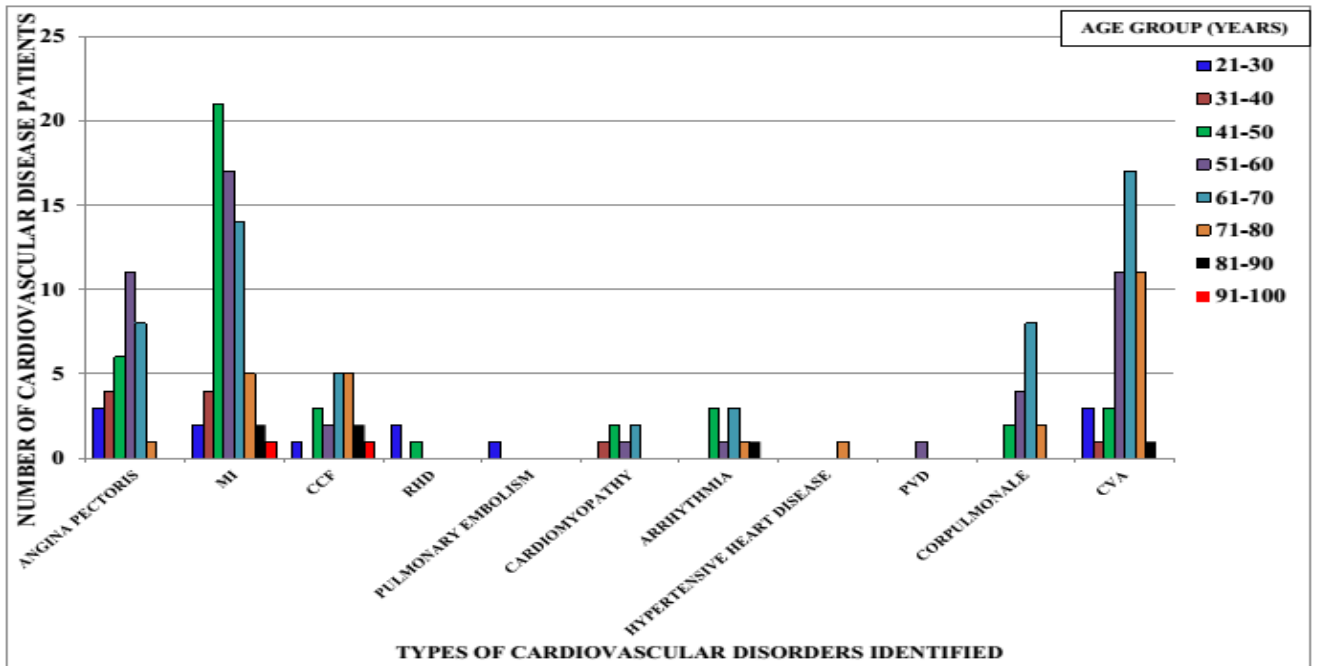*Citation: BATTU RAKESH et al. Ijppr.Human, 2016; Vol. 7 (1): 78-96.*

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Figure No.3: Age wise classification of cardiovascular disorders

KNOWN CASES OF CARDIOVASCULAR DISORDERS:

In 202 cases 51 patients (25.25%) were known case of CVD consisting of 37 males (72.55%) and 14 females (27.45%). These includes 1 (1.96%) male and 3 (5.88%) females within 31-40 years of age, 5 (9.80%) males and 3 (5.88%) females within 41-50 years of age, 9 (17.64%) males and 4 (7.84%) females within 51-60 years of age, 16 (31.37%) males and 1 (1.96%) females within 61-70 years of age, 6 (11.76%) males and 2 (3.93%) females within 71-80 years of age which are represented (Figure No:4).
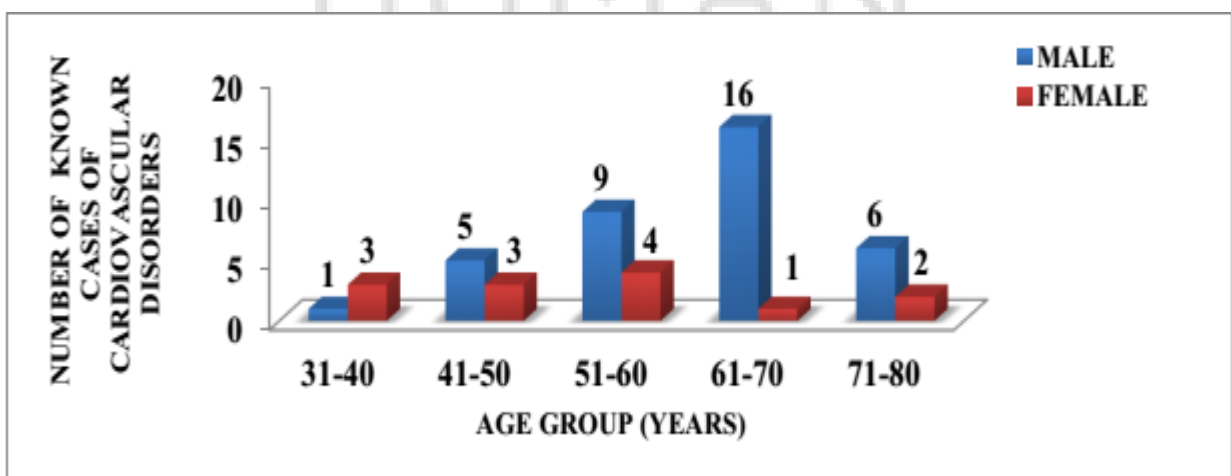

Figure No.4: Age and gender wise distribution of known cases of cardiovascular disorders.

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NEWLY DETECTED CASES OF CARDIOVASCULAR DISORDERS:

In 202 cases 151 patients (74.75%) are newly detected cases of CVD consists of 91 (60.27%) males and 60 females (39.73%). These includes 8 (5.29%) males and 2 (1.32%) females within 21-30 years of age, 7 (4.63%) males and 1 (0.66%) female within 31-40 years of age, 21 (13.90%) males and 11 (7.28%) females within 41-50 years of age, 23 (12.23%) males and 13 (8.60%) females within 51-60 years of age, 23 (15.23%) males and 17 (11.25%) females within 61-70 years of age. 8 (5.29%) males and 10 (6.62%) females within 71-80 years of age, 6 (3.97%) females within 81-90 years of age, 1 (0.66%) male and 1 (0.66%) female within 91-100 years of age (Figure No:5).
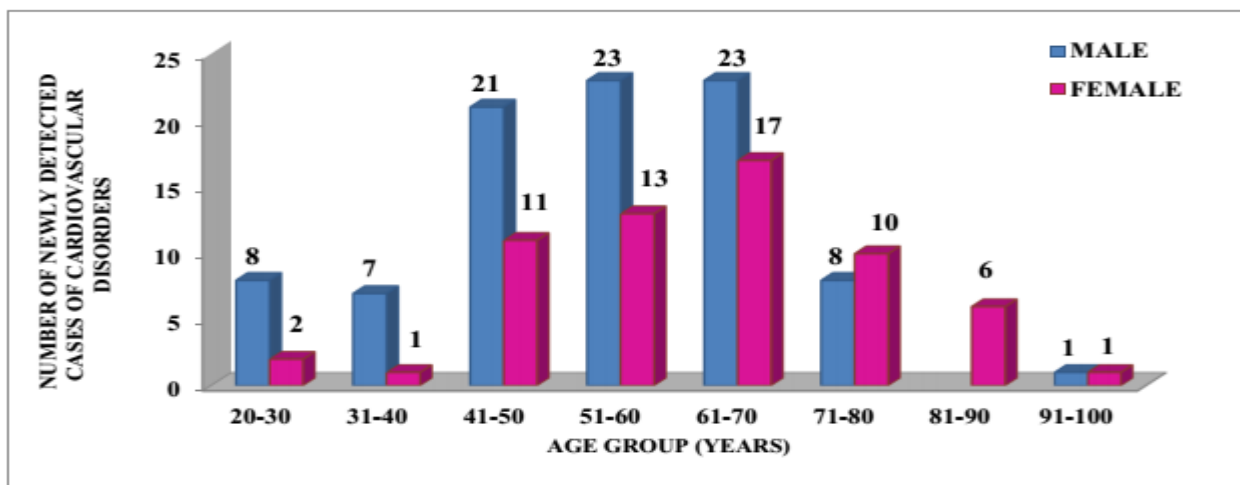

Figure No.5: Age and gender wise distribution of newly detected cases of cardiovascular disorders.

ASSESSMENT OF RISK FACTORS FOR CARDIOVASCULAR DISORDERS:

The main risk factors of cardiovascular diseases include Hypertension, Diabetes mellitus, Smoking, Alcohol intake and Physical inactivity. Out of 202 patients, 18 (8.9%) were found to be Smokers, 21 (10.39%) patients were Alcoholic, 31 (15.34%) patients were found to be smokers+alcoholic, 36 (17.82%) were Hypertensive and 31 (15.34%) patients were found to be Diabetic, 65 (32.17%) patients were found be having Hypertension+Diabetes Mellitus (Figure No.6).
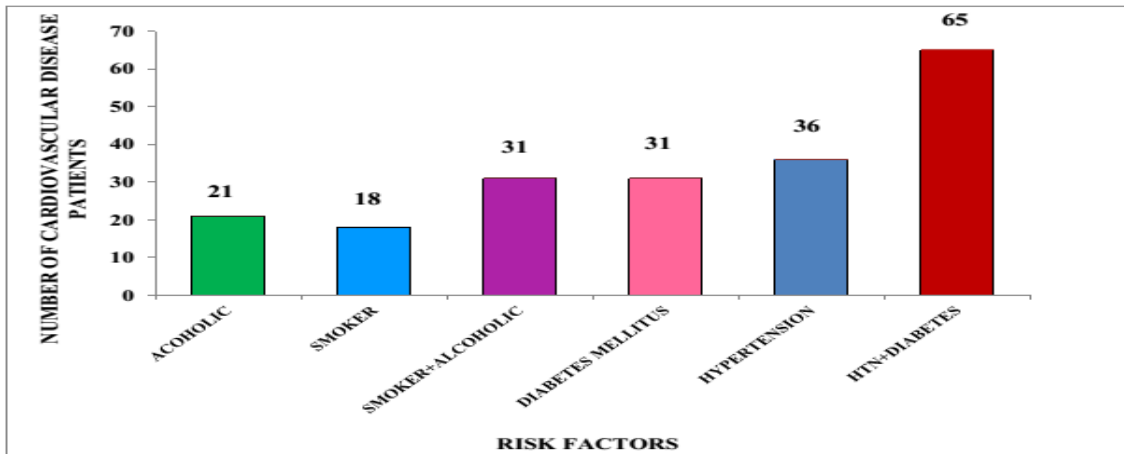
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Figure No.6: Risk Factors for Cardiovascular Disorders

DRUG THERAPY:

Out of 202 patients, 42 (57.54%) females and 31 (42.46%) of males are taking Anti-anginal drugs. 5 (3.9%) males and 1 (1.35%) female were taking Antiarrhythmic drug (Amiodarone). 24 (32%) males and 51 (68%) female were taking Antiplatelet drugs. 35 (27.34%) males and 23 (31.07%) females were taking Anticoagulants. 5 (0.39%) males and 8 (10.8%) females are taking cardiac glycosides. 7 (5.46%) males and 1 (1.35%) females were taking fibrinolytic. 86 (67.2%) males and 54 (22.97%) females are taking dyslipidemic agents. 20 (15.62%) males and 8 (10.81%) females were taking Analgesics. 76 (62.80%) males and 45 (37.19 %) females were taking Diuretics. 97 (60.62%) males and 63 (39.37%) females were taking Antihypertensives. 31 (65.95%) males and 16 (34.04%) females were taking Anti-diabetic agents (Figure No.7).
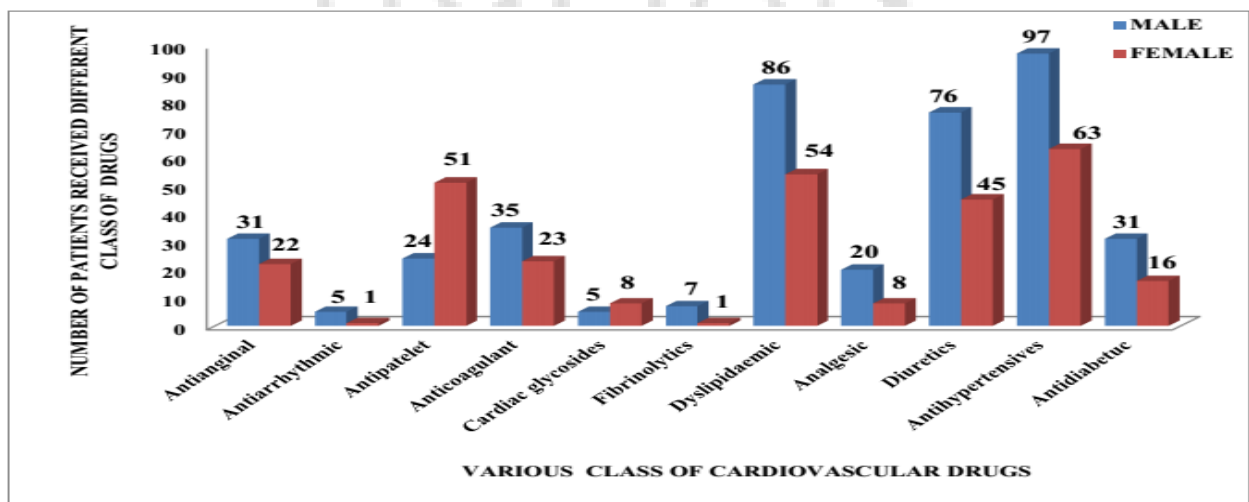

Figure No.7 Drug Therapy of Cardiovascular Disorders

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ANTI-PLATELET THERAPY:

Out of 202 patients, 49 patients are taking Antiplatelet drugs in which 28 males and 15 females are taking Aspirin alone and 3 males and 3 females are taking clopidogrel alone (Figure No.8).
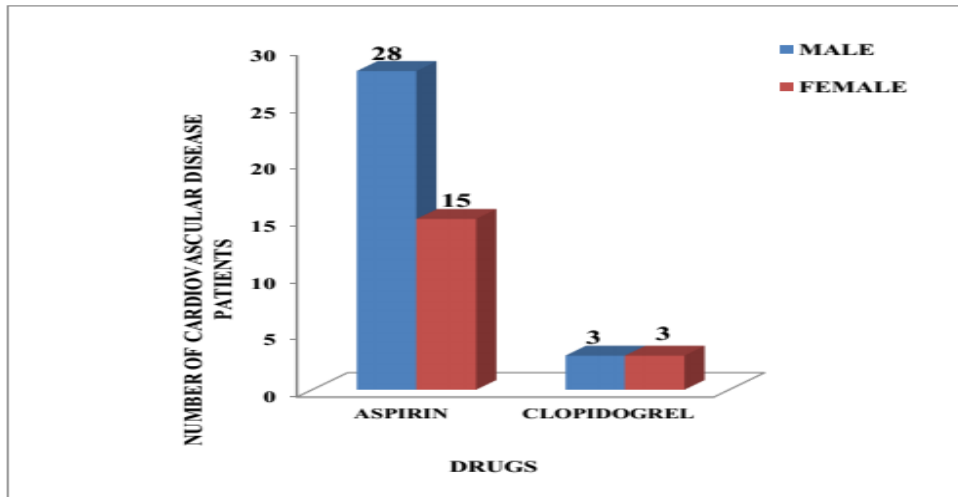

Figure No.8 Total number of cardiovascular disease patients received anti-platelet drugs

ANTI-ANGINAL DRUGS:

Out of 202 patients, 54 were taking Anti-anginal drugs out of which 25 are taking Nitroglycerine alone, 1 patient is taking Nitroglycerine + Amlodipine combination, 26 are taking Isosorbide dinitrate and 2 patients were taking Isosorbide mononitrate alone (Figure No.9).
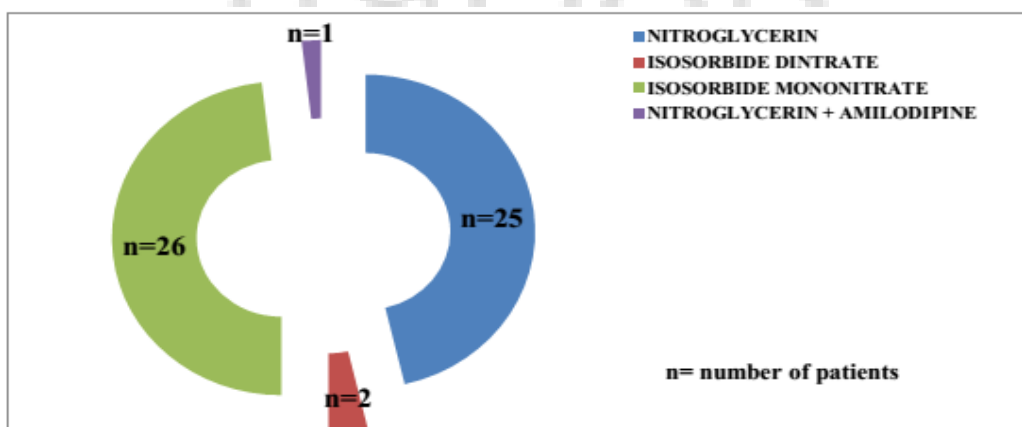

Figure No.9 Total number of cardiovascular disease patients received antianginal drugs.

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DIURETICS:

Out of 202 patients, 121 patients were on Diuretics in which 61 were on furosemide, 8 patients were on mannitol, 8 were on spironolactone, 7 patients were on Lasilactone (Furosemide + Spironolactone combination), 5 patients were on Glycerol, 1 was on Torsemide (Figure No.10).
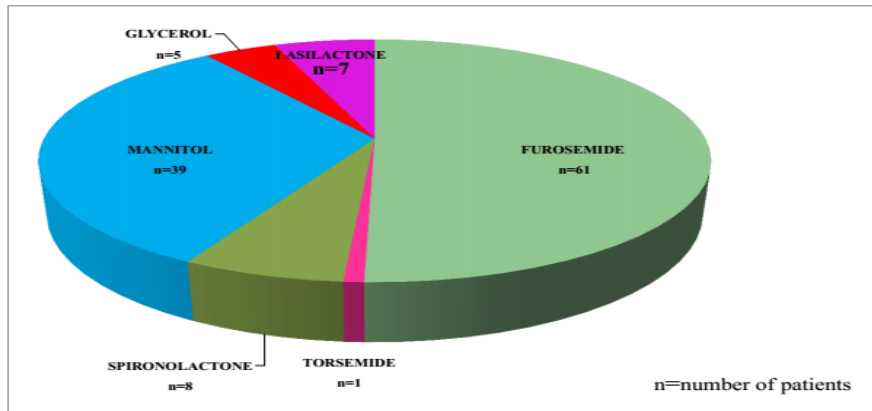

Figure No.10 Total number of cardiovascular disease patients received Diuretics

ANTI-HYPERTENSIVES AGENTS:

Among 202 patients, 160 patients were on Antihypertensives in which 68 were on Angiotensin Converting Enzyme inhibitors (Enalapril, Ramipril), 16 patients were taking Angiotensin Receptor Blockers (Losartan, Telmisartan, Olmesartan), 31 patients were on Beta Blockers (Metoprolol, Atenolol), 36 patients were on Calcium Channel Blockers (Diltiazem, Verapamil, Amlodipine), 7 patients were on Beta+Alpha Blockers (Carvedilol, Labetalol). 2 patients were on Amlokind (Losarton+Atenolol) which are represented (Figure No.11).
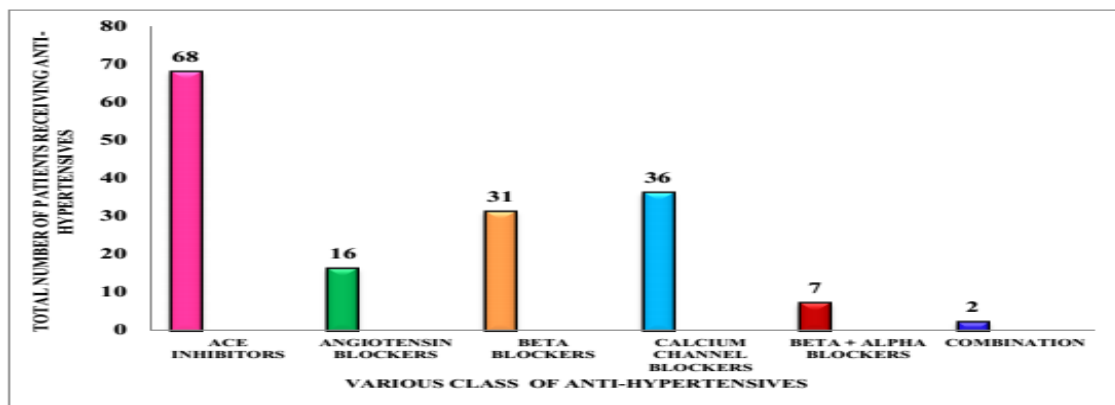

Figure No.11 Total number of cardiovascular disease patients received Anti-Hypertensive

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ANTI-DIABETIC DRUGS:

Out of 202 patients, 47 were taking Anti-diabetic agents of which 29 were on Insulin, 11 were on Metformin, 3 patients were taking Glibenclamide, 3 patients were taking Glimepiride and one patient was on Glimepiride + Metformin combination (Figure No.12).
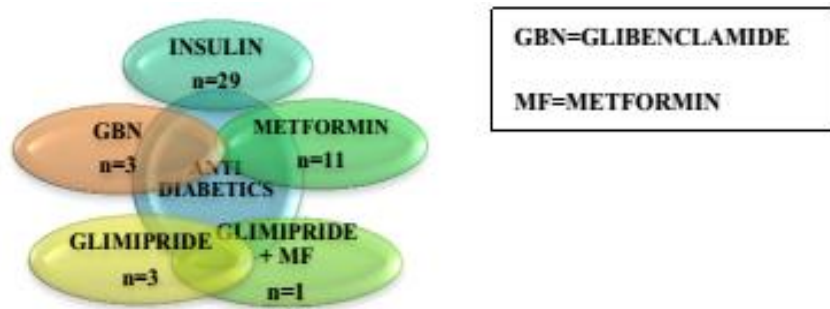

GBN=GLIBENCLAMIDE

MF=METFORMIN

Figure No.12 Total number of cardiovascular disease patients received Anti-diabetics

DISCUSSION

Better healthcare services will have a positive impact on health care system. Many studies were conducted to evaluate the value addition of drug therapy management of the patient care in critical care setting but cardiovascular disease patient were rarely focused as the chances of readmission in hospitals and number of days of hospitalisation is found more in cardiac ill patient, so this study aimed to focus on analysis of prevalence, risk factors and therapeutic drug management of cardiovascular disease patients in tertiary care hospital. A drug therapy plan may require discontinuation or addition of a drug as well dosage adjustments and thus requires more complex decision-making skills. Determining whether a patient actually requires drug therapy is probably the most intricate problem to identify because the outcomes of the patient's drug therapy depend upon the patient's social history as well pathophysiology and pharmacotherapeutics, which is altered due to disease conditions.

Drug therapy management is an effective mechanism to facilitate assessment of the indications, effectiveness, and safety of drug products, especially in patients who are using multiple medications due to concurrent diseases (co-morbidities). Most numbers of studies have shown that many hospital admissions and readmissions are due to co-morbid conditions, adverse drug events, medication errors or suboptimal prescribing. Study result shows that male patients admitted were more compared to female and may infer that male are more prone to cardiac diseases compare to female gender. The average age of patients found was between 61-70 years, which indicates that the cardiac conditions found may be chronic in this

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age group. The majority of the cases in this age group includes Myocardial Infarction and Cerebrovascular accident. This increased prevalence is mainly due to the sedentary lifestyle and co-morbidities, which decreases the blood supply to the heart and brain due to deposition of cholesterol in the arteries supplying blood to the heart and brain.

During the study period, more prevalence of Ischemic Heart Disease and Cerebrovascular accident were found among all cardiac patients. Among all admitted patients in ICCU, RICU, MICU and medical wards (male and female) for cardiac problems, patients were suffering mostly from co-morbid conditions and commonly found co-morbid condition was hypertension and diabetes mellitus, which supports the study that Hypertensive and Diabetic patients are more prone to high risk of cardiac complications. Our data shows that prevalence of Drug interactions was more in ICCU, RICU and MICU, which may directly affect the outcome of treatment and hospital stay. Clinical pharmacists play a significant role in critical care units for the better treatment outcomes in critically ill patients by deciding the right choice of drug and right doses of medications depending on the patient condition. Medication therapy management becomes more important for patients in critical care units, as they require an extra amount of care and consideration as a consequence of complicated and extensive medication regimens.

Various drugs are used to treat cardiovascular disorders and the associated comorbidities of CVD's. Aspirin, Clopidogrel, and Atorvastatin are prescribed to treat myocardial infarction. In case of Thrombosis in MI Streptokinase is used to lyse the clot and Low molecular weight heparin is used to prevent clots. Amlodipine, Enalapril, Furosemide, Telmisartan, Olmesartan, Diltiazem, Verapamil are prescribed to treat hypertension in CVD's patients. For CVA, Mannitol, oral glycerol, Aspirin and Atorvastatin is used commonly. For relief from angina pectoris, Nitroglycerin and Tramadol were commonly prescribed. During CCF furosemide is the most commonly prescribed drug. During ischemic heart disease, aspirin, Atorvastatin were the drug of choice(s). Pulmonary arterial Hypertension is treated by Sildenafil. Diabetes mellitus is treated with Metformin, Glibenclamide, Human Actrapid and Human Mixtard and the combination of Glimepiride+Metfromin.

Out of 202 cases, 111(54.95%) cases are having drug interactions, in which the interactions between the drugs Aspirin and Clopidogrel were more and is of 24.32%, interactions between Antihypertensives and Diuretics (Furosemide+Enalapril) and is of 12.61% and 91(45.04%) cases are not having interactions. Even though Drug Interactions were identified, treatment

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was not stopped as in most of the cases, the drug was absolutely necessary for the patient and the benefits of drug therapy outweighed the risk posed by the Drug Interactions (Figure No.13).
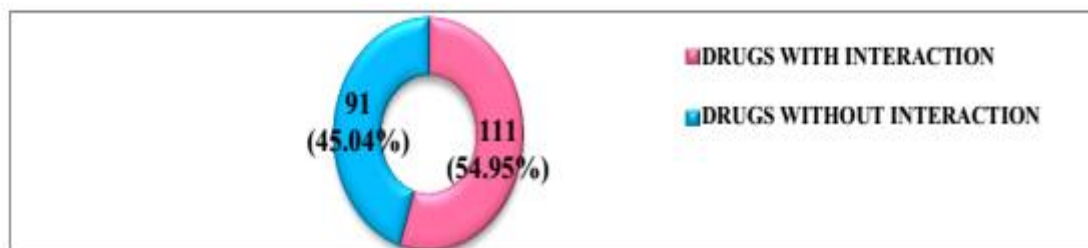

Figure No.13 Drug with and without having interactions

Out of 202 patients, only aspirin is prescribed for 43 patients (28 males and 15 females) and clopidogrel for 6 patients (3 males and 3 females). A combination of aspirin and clopidogrel was prescribed for 75 patients (24 males and 51 females). Anti-coagulant (Inj. LMWH) was prescribed for 57 patients (35 male and 22 female) and fibrinolytic (streptokinase) was prescribed for 8 patients (7 males and 1 female). Out of 202 cases analysed 48 patients (18 females and 30 males) received the combination of aspirin+clopidogrel+low molecular weight heparin. As the major adverse effects of these drugs are bleeding complications and when all of these were combined which further increases the risk of bleeding complications and increases the morbidity and in certain cases fatal when compared to usage of single drug.

CONCLUSION

The treatment given for various cardiovascular disorders were found to be ineffective in patients to reduce their symptoms and prevent further complications. This is because of the fact that as the patient is having co-morbidities and due to this co-morbid conditions it is difficult to treat the existing conditions and leads to polypharmacy which in turn leads to Drug-Drug interactions and adverse drug reactions. This is because, as age increases, there will be declination of the physiological processes in the body. From the study, it is concluded that co-morbidities were the main cause for cardiovascular diseases and their complications. By controlling the co-morbid conditions there is a substantial decline in the cardiovascular diseases and their complications. It is better to treat the patient based on the disease condition but not based on the symptoms. Drug therapy should be aimed at treating both the co-morbidities and existing conditions rather either alone. The other fact is that the lack of new drugs usage and lack of advanced and modern treatment facilities in the hospital leads to

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reference of almost all the cardiovascular disease patients to the higher center despite deaths for better treatment facilities and the availability of modern and advanced treatment in other hospitals. More often few of them stayed for 3-4 days for treatment, then recovered and discharged. But most of them was discharged within 1-2 days, due to the deterioration of the patient condition, and the caretakers request the physicians/doctors to discharge or refer the patient to the higher centers for better treatment options and alternatives.

Clinical pharmacists can play a major role prevention and management of CVD that extends beyond the traditional dispensing of medicines. These roles range from the provision of educational materials, through screening and monitoring of conditions such as blood pressure, to interventions in areas such as smoking cessation, lifestyle modification, medicines management and medication adherence. The presence of clinical pharmacists in medical rounds could assist physicians in optimizing patients' pharmacotherapy. Moreover, clinical pharmacists may reduce adverse effects and medication errors in so far as they contribute significantly to the detection and management of drug-related problems, not least in patients with cardiovascular diseases, who have the highest rank in the frequency of medication errors.

LIMITATIONS OF THE STUDY

● The external validity of the study may have also been limited by the small sample size, short study duration, and follow-up.

● This is the first type of attempt to provide drug therapy management in our setting. Monitoring patients for a longer period would reflect more accurate profile of the natural time frame of the medication views. Also, this study includes the patients of cardiovascular disease only. Other chronic diseases can also be managed in a similar manner.

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

FUTURE SCOPE OF THE STUDY

● This study may be helpful in identifying the new concept of drug therapy management of patients with different disease conditions in critical care and also introduce the new concept of drug therapy management in Karnataka state, India.

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● Pharmacoeconomic evaluation studies of medication therapy can be done to assess the burden of cardiovascular diseases in the population to avoid unnecessary costs of medication.

● Pharmacoepidemiological studies can be done to study the uses and effects of drugs in well-defined populations.

CONFLICT OF INTEREST

There is no conflict of interest in the study.

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