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A Study on Prescription Pattern for Various Cardiovascular Diseases in a Tertiary Care Teaching Hospital

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ABSTRACT: Cardiovascular disease (CVD) is a general category of disease that affects the heart and the blood vessels. It is a common cause of mortality and morbidity. The prospective observational study was conducted for a period of 6 months. The data was collected from 181 enrolled subjects. Collected data was observed, assessed and results was drawn out of the study. Incidence of CVDs were more in males and prevalence of CVDs were more at age group more than 60years. Most common CVDs were MI (30.4%) followed by IHD (14.4%) etc. Treatment of cardiovascular disease involves various categories of drugs namely antiplatelets, anticoagulants, hypolipidemics, diuretics, fibrinolytics, antianginals, antihypertensives etc. Out of 181 patients drug interactions were found in 169 patients among which 385 were major, 66 were moderate and 3 were minor.The potential drug interactions were more in the cardiovascular drugs prescriptions co-morbid conditions which required the prescription of more medications.

Key words: Cardiovascular disease (CVD), Myocardial infarction (MI), Ischemic heart disease (IHD) prescription pattern monitoring studies (PPMS).

I. INTRODUCTION:

Prescription pattern monitoring studies are a tool for assessing the prescribing, dispensing and distribution of medicines. The main aim of PPMS is to facilitate rational use of medicines and effective medical care, particularly in the economically developing countries.[1,2] Prescription pattern studies are powerful exploratory tools to ascertain the role of drugs in society. In a tertiary care centre, prescribing is expected to be judicious, appropriate, safe, effective and economical.[2] Pharmaceutical care has been defined as "the responsible provision of drug therapy for the purpose of achieving defined outcomes that improve patient's quality of life".[3] Cardiovascular disease (CVD) is a general category of disease that affects the heart and the blood vessels. It is a common cause of mortality and morbidity. In 2015 ,estimated 422.7 million CVD cases and 17.92 million CVD deaths have been occurred globally.[4] Both pharmacological and non-pharmacological therapies are important in management of CVD.[5] Cardiovascular drugs are among the most complicated groups of drugs due to overlapping indications, equivalent therapeutic effectiveness and side effects.[6] Appropriate drug selection and use are crucial to achieve the desired treatment outcomes in various disease state management including CVD.[7] The knowledge of prescribing pattern can lead us towards the rational drug use and help to take measures to improve prescribing habits.[8,9]

II. METHODOLOGY:

- **Study location and duration:**Thestudy will be carried out at Department of General medicine , VIMS Ballari District, Karnataka for the period of six months from October 2019 to March 2020.
- **Data collection:** Patients who met the inclusion criteria were enrolled in the study. All information relevant to the study was collected from case records. The demographic characters, co-morbid conditions, cardiology investigation results, drug dose frequency, drug interactions, adverse drug reactions were documented in the proforma.
- **Inclusion criteria:**

Patients of age above 18 years
Patient those who were diagnosed with cardiovascular diseases (with /without co - morbidities)
Including both male and female inpatients

- **Exclusion criteria :**

Out patients
Patient who are not willing to sign inform consent form
Emergency department
Pregnant women

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III. RESULTS:

A total of 181 subjects were recruited during the period of study, out of which 106 (58.6%) were males and 75 (41.4%) were females represented in fig 1. The incidence of cardiovascular disease was more common in males compared to females. In this study, among 181 subjects prevalence of CVDs was more in age group >60 years represented in fig 2. Most common cardiovascular diseases were myocardial infarction(30.4%) followed by Ischemic heart disease (14.4%) etc as shown in table 1. Among 181 subjects 49 were not having any co-morbidity. Other cardiovascular diseases (23.2%), Hypertension and DM (11%), hypertension + diabetes were the most commonly found co-morbidities as shown in table 2. Treatment of cardiovascular disease involves various categories of drugs namely antiplatelets, anticoagulants, hypolipidemics, diuretics, fibrinolytics,antianginals, antihypertensives etc. Total 1011 different class of drugs were prescribed by the physicians, which belong to different pharmacological therapeutics class. We have categorized all the drugs prescribed to the patients in different groups. Most of the patients were advised for antiplateletagent(28%), followed by hypolipidemics(15.7) etc as shown in table 3. In our study it was observed that out of 181 prescriptions, Atorvastatin (15%), Aspirin (14.8%), Clopidogrel (11%), Furosemide(11.6%), Heparin(8.1%) were the most commonly prescribed cardiovascular drugs as shown in table 4. Out of 181 subjects, 25 were discharged within 3 days of admission to hospital, 119were discharged from 4 to 6 days and 37 were admitted for more than 6days. In our study, out of 181 subjects 146 were recovered before discharges, 14 were referred to higher center, 18 were discharged against medical advice and 3 deaths occurred. In our study we observed that among 181 patients newly diagnosed cardiovascular cases were 113 and remaining were already a known case of cardiovascular disease. In our study 63 male smokers were present and there were no any female smokers but tobacco chewers were present. Alcohol is also considered as the risk factor, in our study among 181 subjects, 35 were male alcoholics and 5 were female alcoholics. Hypolipidemics and antiplatelet (aspirin + clopidogrel) was the most commonly used combination therapy followed by Anticoagulants + vasodialators etc, represented in table 5. Out of 181 cases drug interaction were found in 169 cases among which 358 were major, 66 were moderate and 3 were minor as shown in table 6.

IV. DISCUSSION:

This is in accordance with a study conducted by PranayWal et al., where aspirin and clopidogrel were the most prescribed antiplatelet drugs for the therapeutic management of cardiovascular disease and the present study shows the similar results.[11]In the present study, use of atorvastatin was found to be more among antihyperlipidemic drugs which was also previously conducted study. This finding was found like a study conducted by Supratim Datta et al.[12,13] streptokinase was the most used fibrinolytics for management of STEMI. Rohan P Christian et al conducted a study sharing a similar conclusion and similar results were seen in this study.[13] Heparin was most frequently prescribed drug when compared to other anticoagulants.[14] It is observed that Metoprolol, enalapril, amlodipine, atenolol and telmisartan were the most commonly used antihypertensives.[15, 16]Atorvastatin, Aspirin, Clopidogrel, Furosemide, Heparin and isosorbidedinitrate were the most commonly prescribed cardiovascular drugs.In the present study, combination therapy found to have a good cardiovascular outcome on longer follow-up as compared with single medication therapy can optimally control CVDs and prevent further risk of cardiovascular events.[17] Management of cardiovascular disease involves complex therapeutic regimens. As a result, drug interactions are a major concern in these patients.[18, 19] Drug-drug interaction was analysed using "IBM micromedex drug interaction checker". Severity of drug interaction were classified as major, moderate and minor.

V. CONCLUSION:

Today in the evolving world we can clearly observe a crowning phenomenon of increased health risks. There is a similar growth in the case of cardiovascular related diseases. 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 theircomplications.[20]Drug-drug interaction is a trouble maker in management of CVDs as it requires multiple therapy. Out of 181 cases, drug

interactions were found in 169, among which 358 were major, 66 were moderate and 3 were minor. Effective strategies, regular monitoring must be implemented to improve the patient compliance and achieve a better outcome.Clinical pharmacist play a crucial role in chronic diseases on multiple drug therapy to check the drug interactions, drug duplication and involvement of clinical pharmacist in clinical rounds promotes rational drug use and drug adherence which may improve the patient quality of health care.

Statement Of Human And Animal Rights:

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

INFORMED CONSENT: Written informed consent was obtained frompatient 1 and patient 2 for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST:

Nil

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Figure 1: Distribution Of subjects According To Gender

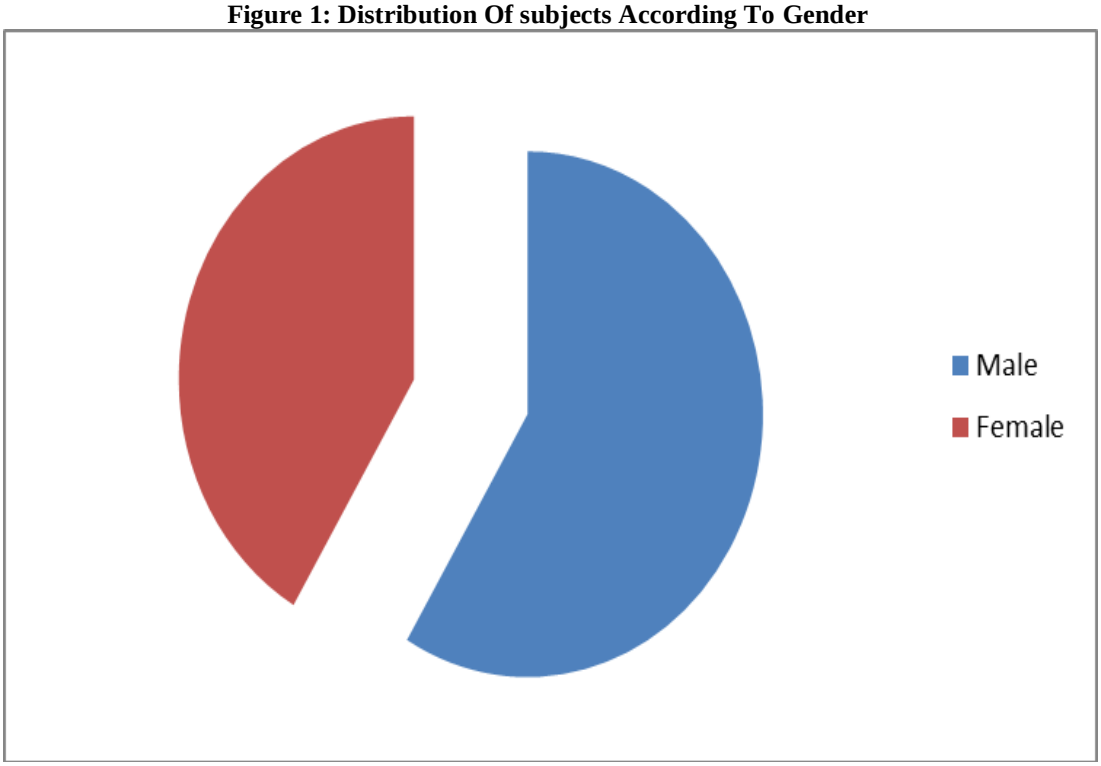

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Figure 2:Distribution Of Subjects According To Age

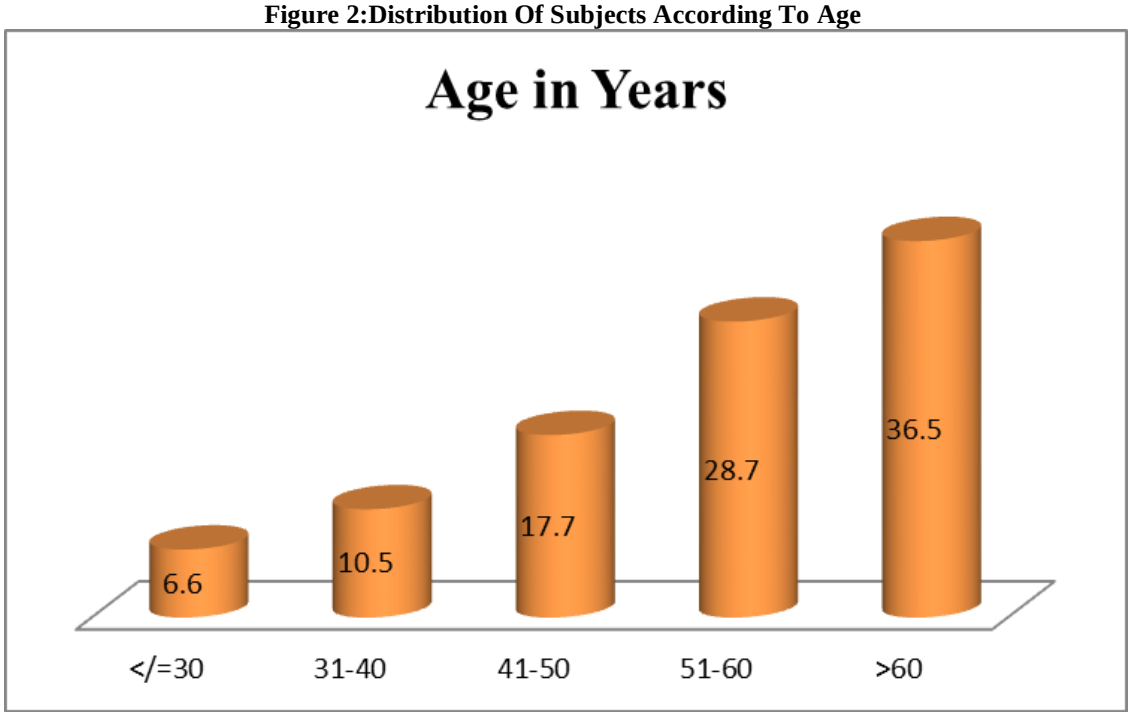

Table 1: Distribution of patients based on Diagnosis

DIAGNOSIS	TOTAL NUMBER	PERCENT
MYOCARDIAL INFACTION	55	30.4
ISCHEMIC HEART DISEASE	26	14.4
ARRHYTHMIA	19	10.5
CONGESTIVE CARDIAC FAILURE	18	9.9
DIALATED CARDIOMYOPATHY	16	8.8
HYPERTENSIVE EMERGENCY/ URGENCY	14	7.7
ANGINA	9	5.0
RHEUMATIC HEART DISEASE	9	5.0
CEREBROVASCULAR ACCIDENT	8	4.4
HYPERTENSIVE HEART DISEASE	4	2.2
TRANSIENT ISCHEMIC ATTACK	2	1.1
CORPULMONALE	1	0.6
TOTAL	181	100.0

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Table 2: Distribution Of Subjects With Co-morbidities:

COMORBIDITY	TOTAL NUMBER	PERSENT
No Comorbidity	49	27.1
Other CVDs	42	23.2
HTN + DM	20	11.0
Kidney disease	11	6.1
DM	10	5.5
HTN	10	5.5
COPD	9	5.0
Seizures	5	2.8
Liver diseases	5	2.8
Hypothyroidism	5	2.8
HTN + DM + CKD	3	1.7
DM + CKD	3	1.7
HTN + CKD	3	1.7
TOTAL	**181**	**100**

Table 3: Different Class Of Cardiovascular Drugs Prescribed:

DRUG CLASS	TOTAL NUMBER	PERCENT
ANTIPLATELETS	261	25.8
HYPOLIPIDEMICS	159	15.7
DIURITICS	152	15.0
ANTICOAGULANTS	101	10
BETA BLOCKERS	93	9.1
NITRATES	78	7.7
ACEI	44	4.4
INOTROPICS	28	2.8
CCB	28	2.8
THROMBOLITICS	22	2.2
ARB	13	1.3
ANTIARRHYTHEMICS	12	1.2
VASODIALATOR	8	0.8
CARDIAC GLYCOSIDE	8	0.8
ALPHA BLOCKER	2	0.2
CENTRALLY ACTING ALPHA AGONIST	2	0.2
TOTAL	1011	100

Table 4: Distribution Of Subjects As Per Drugs Prescibed

DRUGS	TOTAL NUMBER	Percent
Atorvastatin	150	15.0
Aspirin	149	14.8
Clopidogrel	117	11.6
Furosemide	108	10.7
Heparin	82	8.1
ISDN	65	6.4
Metoprolol	58	5.8
Enalapril	35	3.5
Amlodipine	27	2.7
Spironolactone	26	2.5
Hydralazine, Dobutamine	18	3.4

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Atenolol	16	1.5
Nitroglycerin, Streptokinase, Acenocoumarol	15	4.2
Carvedilol	14	1.3
Telmisartan	13	1.2
Noradrenaline	11	1.0
Digoxin	10	0.99
Diltiazem	8	0.7
Torsemide, Ramipril	7	1.38
amiodarone	6	0.59
Nicardipine	5	0.49
Prazosin	4	0.39
Clonidine	3	0.29
LMWH, Warfarin	2	0.19
TOTAL	1006	100

Table 5: Distribution Of Subjects As Per Combination Therapy Used:

COMBINATIONS	TOTAL NUMBER	PERCENT
Hypolipidemics + Antiplatelets	150	49.8
Anticoagulants + vasodialators	26	11.6
ACEI + Beta Blockers	26	11.6
Anticoagulants + Thrombolytics	20	15.0
Beta Blockers + CCBs	13	4.3
Beta Blockers + Vasodialators	11	3.7
ARB + CCB	9	2.9
Beta Blocker + Diuretic	9	2.9
ACEI + Diuretic	9	2.9
CCB + Diuretic	8	2.7
Cardiac glycoside + diuretic	7	2.3
ARB + Diuretic	4	1.3
ARB + Beta Blocker	3	1.0
Anticoagulent + Antiarrhythemic	2	0.7
Cardiac Glycoside + Anticoagulant	2	0.7
ARB + CCB + Dirutic	2	0.7
TOTAL	**301**	**100**

Table: 6 Drug Interactions

MAJOR INTERACTIONS

INTERACTING DRUGS	No	INTERACTION EFFECT	PROBABLE MECHANISM
Heparin + Aspirin / Clopidogrel	114	Concurrent use of ANTICOAGULANTS and ANTIPLATELET AGENTS may result in increased risk of bleeding.	additive effects
Clopidogrel + Aspirin	111	Concurrent use of ASPIRIN and CLOPIDOGREL may result in an increased risk of bleeding.	additive effects
Aspirin + Furosemide / Spironolactone	87	Concurrent use of NSAIDS and LOOP DIURETIC or POTASSIUM-SPARING DIURETICS may result in reduced diuretic effectiveness, hyperkalemia, or possible	decreased renal prostaglandin synthesis

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		nephrotoxicity.	
Streptokinase + Heparin	22	Concurrent use of ANTICOAGULANTS and FIBRINOLYTICS may result in an increased risk of bleeding	additive effects
Enalapril + Spironolactone	9	Concurrent use of POTASSIUM-SPARING DIURETICS and ANGIOTENSIN CONVERTING ENZYME INHIBITORS may result in hyperkalemia.	increased potassium retention secondary to lowered aldosterone levels
Nitroglycerine + Heparin	7	Concurrent use of HEPARIN and NITROGLYCERIN may result in a decrease in partial thromboplastin time.	unkoown
Ramipril + Spironolactone	2	Concurrent use of POTASSIUM-SPARING DIURETICS and ANGIOTENSIN CONVERTING ENZYME INHIBITORS may result in hyperkalemia.	increased potassium retention secondary to lowered aldosterone levels
Digoxin + Diltiazem	1	Concurrent use of DIGOXIN and DILTIAZEM may result in increased digoxin exposure; increased risk of complete heart block.	inhibition of digoxin clearance; additive effects on AV node conduction
Clonidine + Atenolol	1	Concurrent use of ATENOLOL and CLONIDINE may result in increased risk of sinus bradycardia; exaggerated clonidine withdrawal response (acute hypertension).	unknown; unopposed alpha effect
Digoxin + Spironolactone	1	Concurrent use of DIGOXIN and SPIRONOLACTONE may result in increased digoxin exposure.	inhibition of active tubular secretion of digoxin
Warfarin + Aspirin	1	Concurrent use of WARFARIN and ANTIPLATELET AGENTS may result in increased risk of bleeding.	additive effects
Telmisartan + Digoxin	1	Concurrent use of DIGOXIN and TELMISARTAN may result in an increased risk of digoxin toxicity (nausea, vomiting, arrhythmias).	unknown
Atenolol + Digoxin	1	Concurrent use of BETA-ADRENERGIC BLOCKERS and DIGITALIS GLYCOSIDES may result in increased risk of bradycardia and possible digitalis glycoside toxicity.	additive effects on AV node conduction
TOTAL	358		

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MODERATE INTERACTIONS

INTERACTING DRUGS	TOTAL NUMBER
Enalapril + Furosemide	19
Streptokinase + Aspirin	14
Nitroglycerine + Aspirin	11
Digoxin + Furosemide	6
Metoprolol + Hydralazine	4
Ramipril + Furosemide	2
Aspirin + Labetalol	2
Ramipril + Torsemide	2
Amioderone + Atorvastatin	1
Ranolazine + Atorvastatin	1
Warfarin + Heparin	1
Telmisartan + Spironolactone	1
Losartan + Spironolactone	1
Clopidogrel + Torsemide	1
TOTAL	66

MINOR INTERACTIONS

INTERACTING DRUGS	TOTAL NUMBER
Hydralazine + Furosemide	3