ORIGINAL RESEARCH

Evaluation of Drug Utilization in Cardiovascular Disease: A Prospective Analysis

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ABSTRACT
Background: Cardiovascular disease (CVD) is the major reason of mortality among noncommunicable diseases (NCDs), constituting 26% in India. The present study was conducted to evaluate drug utilization in cardiovascular disease.
Material and methods: The prospective observational study was conducted for a period of 6 months to evaluate drug utilization in cardiovascular disease. The study included a total of 600 patients admitted to intensive coronary care unit. All the medical prescriptions were collected and the data was used to analyze the prescription pattern by prescribing indicators and individual drug use by DDD measure. The data was collected and analyzed for counts and percentages. The mean and standard deviation was computed for continuous variables.
Results: Of the total 600 records, males were 60% and females were 40%. Ischemic Heart Disease (31.66%) and Hypertension (30.25%) were the most common cardiovascular diseases in the study population. Clopidogrel and Isosorbide dinitrate were most commonly prescribed Cardiovascular Drugs. It was found that Clopidogrel (51.80%), atorvastatin (48.95%), Isosorbide dinitrate (50.76%), were highly used. DDD was highest of Enalapril maleate i.e. 4.43. The average drugs per prescription during hospitalization was 4.15. Percentage number of drugs Prescribed by generic names was 71.5%. Percentage of Drugs Prescribed From National Essential Drug List was 88%.
Conclusion: The present study concluded that the most commonly prescribed medications are Clopidogrel, Isosorbide Dinitrate. Percentage of drugs prescribed by Generic name should be improved. The percentage of drugs prescribed form national Essential Drugs List was satisfactory but still have to be improved.
Keywords: Drug Utilization, Cardiovascular Disease, Prescription.

INTRODUCTION

The World Health Organization (WHO) reports an estimated 17.9 million people died from cardiovascular disease (CVDs) in 2016, representing 31% of all global deaths, of these deaths 85% are due to heart attack and stroke.[1] The WHO has estimated that the current burden of

CVD in India would lose $237 billion from the loss of productivity and spending on health care over a 10-year period 2005–2015,[2] by 2025 deaths from CVDs are predicted to rise to almost 50 million in India. Cardiovascular disease (CVD) is the major reason of mortality among noncommunicable diseases (NCDs).[3,4] In India, patients with acute coronary syndrome (ACS) have higher rate of ST-elevation myocardial infarction (STEMI) than do patients in developed countries; the treatment options differ between rich and poor which significantly altered mortality and morbidity.[5] Women develop CVD at older age and have greater comorbidities than men, though treatment and outcome did not differ after adjusting potential confounders.[6] Drug utilization pattern study is a powerful exploratory tool to evaluate present trends of drug use and appropriateness of prescriptions. It is a descriptive and analytical method of collection, quantification, understanding and evaluation of the prescribing pattern, as well as dispensing and consumption for the advancement of existing therapy and enhancement of patient safety.[7] Nowadays inappropriate drug use is a common hurdle which receives the support of numerous worldwide research studies to determine the safe and effective drug utilization.[8] The present study was conducted to evaluate drug utilization in cardiovascular disease.

MATERIALS AND METHODS
The prospective observational study was conducted for a period of 6 months to evaluate drug utilization in cardiovascular disease. The study included a total of 600 patients admitted to intensive coronary care unit. Before the commencement of the study ethical approval was taken from the ethical committee of the institute and informed consent was taken from the patient. Prescriptions of patients aged between 30to80years old (NPCDCS-National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke)[9], both males and females with all kind of cardiovascular diseases, prescriptions of cardiology outpatient department only, prescriptions of cardiovascular disease patients with or without other complications and prescriptions of patients only those willing to participate were included in this study. Prescriptions of patients with age <30 and >80, pregnancy, lactation, critically ill patients, patients with lifestyle modification alone, prescriptions of outpatients of other departments, prescriptions of patients diagnosed with non-cardiac diseases, prescriptions of patients who were advised to hospitalize, prescriptions of patients those not willing to participate were excluded from this study. All the medical prescriptions were collected and the data was used to analyze the prescription pattern by prescribing indicators[10] and individual drug use by DDD measure. The WHO indicators intended to be used in primary care center/ambulatory patients, but in this study, it was extended to assess prescription pattern during hospitalization too. The prescribing indicators are (a) average number of drugs per prescription, (b) percentage of the drugs prescribed by their generic names, (c) percentage of the prescriptions with antibiotics prescribed, (d) percentage of the prescriptions with injections prescribed, and (e) percentage of the drugs prescribed from the essential drug list (EDL) or the hospital formulary.[11] The quantification of the individual drug was done using DDD. This concept was developed to surmount the objection besides the traditional measurement units of drug utilization. It is expressed as DDD (for each drug in individual patient); DDD/100 bed-days (for inpatients in a hospital); and DDD/1000 persons-years (for inhabitants in a region/country). In the present study, DDD was expressed as DDD/100 bed-days since inpatients' drug use was considered and calculated using the equation.[12]The data was collected and analyzed for counts and percentages. The mean and standard deviation was computed for continuous variables.

RESULTS

Of the total 600 records, males were 60% and females were 40%. Ischemic Heart Disease (31.66%) and Hypertension (30.25%) were the most common cardiovascular diseases in the study population. Clopidogrel and Isosorbide dinitrate were most commonly prescribed Cardiovascular Drugs. It was found that Clopidogrel (51.80%), atorvastatin (48.95%), Isosorbide dinitrate (50.76%), were highly used. DDD was highest of Enalapril maleate i.e. 4.43. The average drugs per prescription during hospitalization was 4.15. Percentage number of drugs Prescribed by generic names was 71.5%. Percentage of Drugs Prescribed From National Essential Drug List was 88%.

Table 1: Prevalence of cardiovascular diseases in the study population

Cardiovascular diseases	N(%)
Ischemic Heart Disease	190(31.66%)
Hypertension	182 (30.33%)
Myocardial Infarction	79 (13.16%)
Stable Angina (Angina pectoris)	50 (9%)
Cardiovascular Atherosclerosis	36(6%)
Unstable Angina	70(11.66%)
Cardiac Arrhythmia	15(2.5%)
Cardiomyopathy and myocarditis	8(1.33%)
Congestive heart failure	5(0.83%)
Endocarditis	1(0.16%)

Table 2: Commonly Prescribed Cardiovascular Drugs

Commonly Prescribed Cardiovascular Drugs	(N)
Clopidogrel	215
Isosorbide dinitrate	155
Atorvastatin	152
Aspirin	145
Metroprolol	92
Furosemide	78
Ramipril	47
Amlodipine	47
Losartan Potassium	44
Digoxin	42
Enalapril maleate	40
Atenolol	12
Telmisartan	8
Torsemide	6
Amiodarone	5
Diltiazem	2

Table 3: DDD of some cardiovascular drugs

Name of drug	ATC CODE	WHO DDD	Percentage	DDD/ 1000/DAY
Atorvastatin	C10AA05	20 mg	48.95%	4.12
Clopidogrel	B01AC04	75mg	51.80%	4.22
Isosorbide dinitrate	C01DA08	20mg	50.76%	4.18
Enalapril maleate	C09AA02	10mg	10.80%	4.43
Metoprolol	C07AB02	0.15g	27.09%	3.70
Furosemide	C03CA01	40mg	23.45%	1.90

Digoxin	C01AA05	0.25mg	11.29%	0.91
Ramipril	C09AA05	2.5mg	12.70%	21.0
Amlodipine	C08CA01	5mg	12.70%	1.08
Losartan	C09CA01	50mg	12.16%	0.5

Table 4: Prescribing Indicators

Average no. of Drugs/Prescription	4.15
Percentage of Drugs Prescribed by Generic Name	71.5%
Percentage of Drugs Prescribed From National Essential Drug List	88.0%

DISCUSSION

Appropriate and safe drug use is a key factor in achieving quality health and accurate health care for hospitalized as well as ambulatory patients. Extensive disparity exists in the pharmacotherapy pattern among CVD patients where rational drug use plays a pivotal role in promoting safety and efficacy. Polypharmacy is warranted in CVDs as it results in irrationality; hence, prescribing indicators were developed to assess the prescribing performance in primary care by the International Network for Rational Use of Drugs and World Health Organization (WHO).[13]

Of the total 600 records, males were 60% and females were 40%. Ischemic Heart Disease (31.66%) and Hypertension (30.33%) were the most common cardiovascular diseases in the study population. Clopidogrel and Isosorbide dinitrate were most commonly prescribed Cardiovascular Drugs. It was found that Clopidogrel (51.80%), atorvastatin (48.95%), Isosorbide dinitrate (50.76%), were highly used. DDD was highest of Enalapril maleate i.e. 4.43. The average drugs per prescription during hospitalization was 4.15. Percentage number of drugs Prescribed by generic names was 71.5%. Percentage of Drugs Prescribed from National Essential Drug List was 88%.

After comparing the drugs under the parameter of the observed and expected DDD/100/days, it was observed that there were some drugs had 2 times dose given or some had less than half dose as compared to DDD given by WHO which resembles the findings reported by another study.[14]

Rational drug prescribing is defined as the use of the least number of drugs, to obtain the best possible effects in the shortest period at a reasonable cost.[15] While analyzing rationality of therapy given to the CAD patients. It was found that the route of administration in 99 drugs used was appropriate, while dosing or frequency prescribed was in 74% cases rational and in 26% was irrational. In case of the prescribed dose majority of the drugs 65% had appropriate dose, only 35% prescribed drugs had Irrational dose. Even though 26% or 35% may sound like not much, but we must not forget the consumer is a human being. Each and every drug can do more harm than good if given in any wrong way. The reason behind this irrational therapy can be due to the lack of availability of rationalized and reliable drug information for the prescribers. Irrational drug prescribing pattern indicate a very important health related problem and is considered to be a major challenge for doctors.[16]

Antiplatelets, statins, ACE inhibitors, and diuretics were mostly prescribed, which certainly improved the treatment outcomes. Almost all patients received antiplatelets similar to other centers in Southern India.[17,18] Enoxaparin was found effective in treating pulmonary embolism, venous thrombosis, and unstable angina,[19] and the utilization of anticoagulants was optimal to other Indian studies (75%–85%).[20,21]

CONCLUSION

The present study concluded that the most commonly prescribed medications are Clopidogrel, Isosorbide Dinitrate. Percentage of drugs prescribed by Generic name should be improved. The percentage of drugs prescribed form national Essential Drugs List was satisfactory but still have to be improved.

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