Original Research Article

Prescribing patterns of cardiovascular drugs in cardiology outpatient department in a tertiary care hospital in Western Odisha

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ABSTRACT

Background: Cardiovascular morbidity plays a villainous role globally as well as countries like India. Additionally, irrational prescription incurs greater damage to health and wellbeing. Drug utilization studies scrutinize the appropriateness of treatment and provide favorable feedbacks to strengthen clinical practices. The objective of the study was to describe treatment practices in cardiology outpatient and drug utilization pattern using core prescribing indicators by World Health Organization (WHO).
Methods: A cross-sectional, observational study of 4-month duration was undertaken for cardiology Outdoor patients at a tertiary care hospital. 615 prescriptions were screened and analyzed.
Results: Males (59.84%) were more in number than females (40.16%). Average number of the prescribed drugs per patient were 4.32±2.7 and (3.73±1.1 for cardiovascular drugs). Generic prescription was 60.98%. Percentage encounters with antibiotics 4.11, injectables 2.92%, fixed-dose combinations (FDCs) (11.8%) were documented. Drugs from the National List of Essential Medicines were 75.89%. The most common diagnosis was ischemic heart disease (68.29%). Hypolipidemics (78.25%) followed by antiplatelets (71.14%) were toppers in cardiovascular drug. Antiulcer drugs (PPI/Antacids) comprised 58.54% of total prescriptions.
Conclusions: Less adherence to EDL, less generic prescriptions, use of FDC are major shortcomings. Areas to further rationalization like optimal use of evidence based medication like beta-blockers, newer anticoagulants/anti-platelet agents and newer anti-anginal agents are identified.

Keywords: Prescription auditing, Rational drug use, Drug utilization study, Cardiology outpatient department, Prescribing indicators WHO

INTRODUCTION

The Global burden of Cardiovascular disease is increasing over the years. 85% of all cardiovascular deaths are attributed to heart attack and stroke.[1] Except mortality, morbidity also plays a villainous role. Many hurdles like prompt diagnosis, availability of life-saving medicines, early transfer, proper infrastructure, and above all treatment cost and patient affordability as part of effective treatment are difficult to achieve. Added to these, irrationality in prescription, dispensing and utilization of drugs give rise to many untoward outcomes. So, rational drug prescription is of utmost necessity.

Drug utilization research aims to find the appropriateness of treatment, identify shortcomings, if any. It is important to realize that inappropriate use of drugs represents a potential hazard and add unnecessary expenses to the patients. World Health Organization (WHO) has devised

core drug prescribing indicators that describe prescription practices in a representative sample of health facilities.[2] Periodic review of drug use in each hospital setting provide favorable feedback for treating physicians to plan, modify and strengthen clinical practices to deliver a rational and cost-effective therapy.

Underuse of evidence-based secondary preventive therapies, especially ß blockers, angiotensin converting enzyme (ACE) inhibitors or Angiotensinogen receptor blockers (ARBs) in tertiary care hospitals are a consistent finding in many drug utilization studies.[3,4] A similar study of us in inpatient settings had also presented issues of underutilization of beta blockers, ACE inhibitors/ARBs, along with polypharmacy, overuse of injections, low prescription from essential drug list and some deviations from standardized guidelines.[5]

This present study attempts to find out the patterns of presentation of cardiac diseases along with drug prescribing trends in cardiology outdoor settings over a period of 4 months. The utilization pattern of cardiovascular drugs was also assessed in accordance with their respective clinical diagnoses.

Aims and objective

To describe different disease presentations and treatment practices in cardiology outpatient and drug utilization pattern using core prescribing indicators by WHO.

METHODS

An observational Cross-Sectional Study was undertaken by the department of pharmacology and cardiology, VIMSAR, Burla, a tertiary care teaching hospital, for 4 months (November 2019-February 2020). Institutional Ethics Committee permission was obtained. We went through prescriptions of patients attended cardiology outpatient department (OPD) within the study period. Different diagnoses were sorted. Drug utilization were assessed Using WHO core prescribing indicators. 615 adult patients of either sex having cardiovascular disease with or without co-morbidity attending Cardiology OPD were selected after obtaining written consent, finally enrolled after applying inclusion and exclusion criteria.

Inclusion criteria

Age >18 years of both genders with cardiovascular disease with or without comorbidity.

Exclusion criteria

Vulnerable groups like pregnancy/with psychiatric illness, not willing to participate and give informed consent, patients with acute cardiovascular/medical emergencies, patients attended cardiology OPD for surgical/medical fitness/indoor patients referred for any purposes and follow up visits if not previously documented.

615 prescriptions were studied and included in the final analysis. The demographic data (age, sex), diagnosis, and presence of any other co-morbid conditions were recorded. Diagnoses were grouped and expressed in percentages. Data related to drugs prescribed were recorded as per WHO core prescribing indicators, i.e. average no. drugs per encounter, percentage of drugs prescribed with generics, percentage encounter prescribed injectables, percentage of encounters with antibiotics prescribed, percentage of drugs from EDL (Essential Drug List). Percentage distribution of different classes of cardiovascular drugs (anti-platelets, antianginals, hypolipidemics, miscellaneous) have been studied and analyzed.

Statistical analysis

Data were entered in Microsoft excel 2019 and analyzed. Descriptive statistics expressed in terms of actual numbers, and percentage. Data were compared with other prominent studies.

RESULTS

Total number of patients was 615. From the demographic profile, it was observed that male (n=368) 59.84% were more in number than female 40.16%. The sex distribution is depicted in figure 1. The mean age for presentation was respectively 55.24±14.27 years for male and 51.81±15.9 years for female.
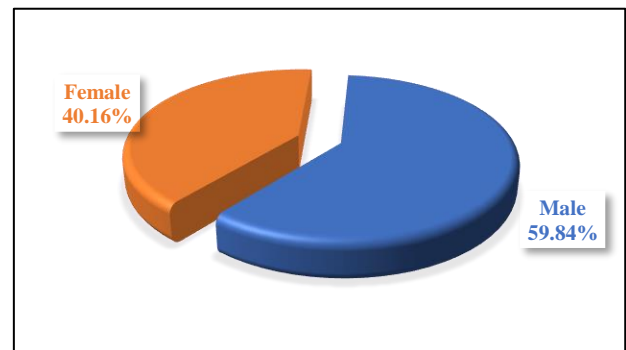

Figure 1: Gender wise distribution of enrolled patients.

The common categories of clinical diagnoses are depicted in Figure 2. The most common diagnosis was Ischemic heart disease that comprises 68.29% (n=420) (with or without co-morbidities) including post myocardial infarction (MI), unstable angina, chronic stable angina cases, followed by hypertension cases (n=205, 33.33%), diabetes (n=158, 25.69%). Cases diagnosed as cardiomyopathy (n=142, 23.09%), heart failure (n=85, 13.82%), arrhythmia (n=67, 10.89%), respiratory disease (n=59, 9.59%), Heart block/pacemaker implanted cases (n=38, 6.18%), valvular heart diseases (n=36, 5.85%), and rheumatic heart disease (n=22, 3.58%) were followed by.

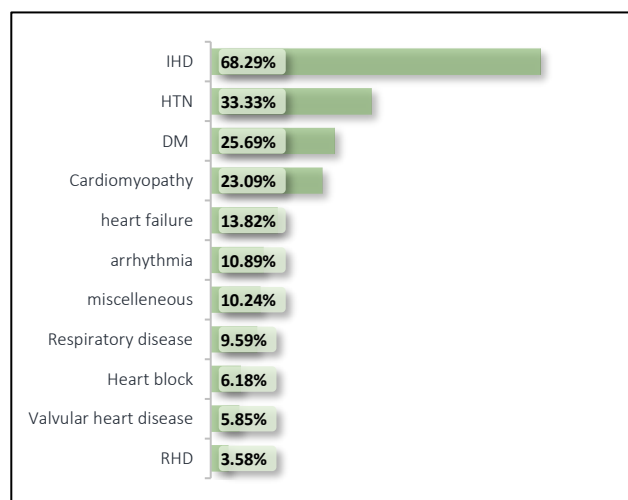Other miscellaneous cases constituted another 10.24% (n=63).

Figure 2: Common categories of clinical diagnoses.

Table 1: WHO prescribing indicators and values.

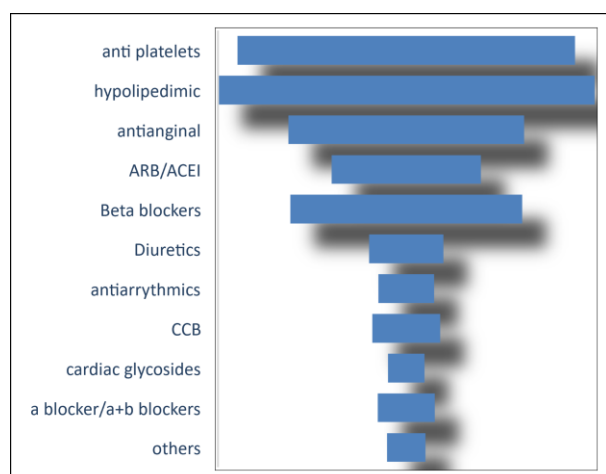| WHO prescribing indicators	Value
Average no of prescribed drugs per encounter	4.32±2.7 (3.73±1.1 for cardiovascular drugs)
% of drugs prescribed in generic name	60.98
% of encounters with an antibiotic prescribed	4.11
% of encounters with an injection prescribed	2.92
% of drugs from EDL	75.89

Figure 3: Percentage of different classes of cardiovascular drugs prescribed.

Total number of these drugs encountered 2659 of which cardiovascular drugs were 2294. 86.46% of total drugs were cardiovascular drugs. Data recorded as per WHO core prescribing indicators.

Table 2: Percentage of different classes of non-cardiovascular drugs prescribed.

Class of drugs	% of total prescription
Antiulcer	58.54
Antidiabetic	25.43
Antibiotic	4.11
Laxatives	4.32
Analgesics	8.72
Thyroid drugs	3.52
Others	11.28

Table 3: Categories of different cardiovascular drugs prescribed.

Cardiovascular drug groups	Drugs	% Of prescription
Antiplatelets	Aspirin	71.14
	Clopidogrel	
	Ticagrelor	
Hypolipedimics	Atorvastatin	78.25
	Rosuvastatin	
ACE I/ARBs	Ramipril	31.3
	Losartan	
	Olmesartan	
	Telmisartan	
Beta blockers	Metoprolol	47.56
	Atenolol	
	Propranolol	
Alpha/α β blockers	Carvedilol	10.94
	Prazocin	
Diuretics	Furosemide	16.65
	Hydrochlorthiazide	
	Torsemide	
	Spironolactone	
CCB	Amlodipine	13.69
Antianginals	Nitroglycerine	48.21
	Isosorbide dinitrate	
	Isosorbide mononitrate	
	Ranolazine	
	Ivabradine	
	Nicorandil	
Antiarrhythmics	Verapamil	9.63
	Amiodarone	
Cardiac glycosides	Digoxin	7.5
Other CV drugs		7.19

Average no of the prescribed drugs per patient was 4.32±2.7 (3.73±1.1 for cardiovascular drugs per

prescription). 60.98% of drugs were prescribed in generics. Percentage encounters with an injectable prescribed was (2.92%). Percentage encounters with an antibiotic prescribed was (4.11%), fixed-dose combinations (FDCs) were 11.8%. 75.89% of drugs were from Essential Drug List (EDL). Table 1 depicts WHO core prescription indicators.

Of the different cardiovascular drugs, utilization of hypolipidemics (78.25%) topped the list, just ahead of anti-platelets (71.14% of total prescriptions). Whereas percentages of prescription of Beta blockers 47.56%, ACE inhibitors (ACE-I) and ARBs 31.3%, diuretics 16.65%, antiarrhythmics 9.63% etc. are noted. Use of antianginals was documented by nearly 50%. Figure 3 graphically depicts the individual percentage of cardiovascular drugs which is also shown in table 3.

Off the different non cardiovascular drugs prescribed antidiabetics (25.43% of prescriptions), antibiotics (4.11%), analgesics (8.72%), antiemetics etc. are documented. A sizable percentage of prescription (58.54%) drugs are antiulcer drugs co-prescribed with others. Table 2 depicts the percentages of prescriptions of non-cardiovascular drugs.

Aspirin, clopidogrel were the main anti-platelets used (>90%), atorvastatin predominated among hypolipidemics (93.7%), ramipril in ACE I (51.81%), telmisartan in ARBs (57.23%), metoprolol in beta blockers (68.07%), hydrochlorothiazide (55.22%) were some of the main drugs of their groups (highlighted with shading). Of all antianginal drugs, ranolazine (39.71%) topped, followed by nicorandil (27.7%), nitrates and ivabradine. Verapamil (most common) followed by amiodarone and propranolol were used as antiarrhythmics (9.63% of all prescription). Digoxin was the principle cardiac glycosides.

We had basically 2 groups of patients. IHD group (with documented or not documented coronary artery occlusion) 68.29% and non IHD group comprising mostly hypertensive population and other cardiovascular morbidity. Obviously, the drug prescription pattern was different between these groups.

In the IHD group, the most common comorbidity was HTN, followed by diabetes. Cardiomyopathy and arrhythmia were also associated comorbidity with many CAD cases. Aspirin (99.2%) and clopidogrel (95.7%) and statins (98.3%) were the most frequently prescribed in this group. 1.8% of total prescriptions were of ticagrelor, with no eptifibatide or other newer anti-platelets prescribed. The utilization of other evidence-based treatments in CAD like beta blockers (nearly 65%), ACEI/ARBs (nearly 70%) among CAD/IHD group. Antianginals were prescribed nearly 80% with newer anti-anginal agents (nicorandil, ranolazine and trimetazidine) to 28.8% patients. Diabetics with CAD were prescribed only nearly 80% ACEI/ARBS and 60% Beta blockers.

Among non IHD group, the most commonly used cardiovascular drug was CCBs (amlodipine 13.69% of total), with diuretics, ACE inhibitors, beta blockers following as HTN was the most common disease. Cardiac glycoside use was optimal (7.5%) compared to the prevalence of cardiomyopathy, valvular heart disease with Heart failure (nearly 11%).

One observation was that newer drugs (though not that new) like 3rd gen beta-blockers, newer antihypertensives, anti-platelets etc. were minimally used owing to non-availability as government supply and concern over patient affordability. Ivabradine, a magic alternate to beta blockers, was minimally prescribed (less than 5 percent of prescriptions).

As previously told, nearly 60% prescriptions contain an antiulcer, either a PPI or antacids.

The majority of the drugs were prescribed as single drug products (88.2%), however 11.8% were prescribed in the form of fixed dose combination (FDC). In this study, the majority of the drugs were prescribed by generic name (60.98%). In this study, 75.89% drugs were prescribed from National Essential Drug list (NLEM 2015), whereas only 24.11% accounted for non-essential drugs.

DISCUSSION

In our study mean age for presentation was respectively 55.24±14.27 years for male and 51.81±15.79 years for female which was comparable to other studies done by Veeramani et al, Mugada et al.[6,7] Prevalence among male 59.84% were more in number than female 40.16%, which was comparable to other studies that say that cardiovascular emergencies were more common in males than females.[7-10]

The average number of drugs per prescription was documented 4.32±1.7 (3.73±1.1 for cardiovascular drugs), which is lower or comparable to mean values of many studies like 5 (Veeramani et al), 4.17 by (Mugada et al), 3.4 (Yadav p et al).[6,7,11] The WHO standard or ideal value for the average number of drugs per prescription is 1.6-1.8.[12] Cardiovascular diseases many times require urgent and aggressive treatment that results in polypharmacy. Also, the geriatric age group and its associated comorbidities increase the average drug usage per prescription which may be justified.

In our study, the percentage of drugs prescribed by generic names was 60.98% compared to 2.33% (Veeramani et al), 6.2% (Yadav p et al), and 72.8% (Mugada et al).[6,11,7] WHO standard being 100%, doctors must be sensitized about prescribing drugs with their generic names to minimize the cost burden on the patients as well as adverse reactions due to brand name related confusion.[12]

In the present study, drugs prescribed from the national list of essential medicines (NLEM) 2015 was 75.89%.[13]

Adherence to EDL is desirable as EDL is prepared with regard to public health relevance, evidence on efficacy and safety of the drugs, and comparative cost-effectiveness. Contemporary studies document different percentages, 89.27% (Veeramani et al), 82.2% (Yadav et al, and 89.5% (Mugada et al). [1,6,11,7]

The encounter with injectables was 2.92%. The WHO standard for the percentage of injections per encounter is 13.4-24.1.[12] Drug utilization at OPD settings justify perfectly this negligible parenteral drug use.

Our study has demonstrated 11.8% FDC prescription Though better than contemporary studies (13.21% Veeramani et al., 20.11% Yadav et al).[6,11] FDCs are found to have some advantages such as increasing patient compliance by bring about synergistic action which can reduce the dose of the individual component and adverse effects. On the other hand, the rationality of FDCs has become one of the most controversial and debatable issues in general practice.[15]

The drug prescription pattern was different between IHD and non IHD groups. In the IHD group, ACS patients are not a part of OPD population, as they require urgent admission and interventions in IPD. So, prescriptions of fibrinolytics and anticoagulants are nil. Aspirin (99.2%) and clopidogrel (95.7%) and statins (98.3%) were most common as prescribed drugs in IHD group. But use of other anti-platelets were minimal (1.8% of total prescription of ticagrelor with no eptifibatide or other newer anti-platelets). The utilization of other evidence-based treatments in CAD like beta blockers (nearly 65%), ACEI/ARBs (nearly 70%) in CAD group were optimal. Antianginals were prescribed nearly 80% with newer anti-anginal agents (nicorandil, ranolazine and trimetazidine) to 28.8% patients. Diabetics with CAD were prescribed nearly 80% ACEI/ARBS and 60% Beta blockers. Similar patterns were observed with many comparative studies.[7-9]

Among non IHD group, the most commonly used drug was CCBs, followed by diuretics, ACE inhibitors, Beta blockers. A sizable percentage of prescription (58.54%) drugs are antiulcer drugs (including PPI and antacids) better than 69.10% (Veeramani et al).[6]

In our study, the percentage of drugs prescribed by generic names was 60.98% compared to 2.33% (Veeramani et al), 6.2% (Yadav et al), and 72.8% (Mugada et al).[6,11,7] WHO standard being 100%,[12] doctors must be sensitized about prescribing drugs with their generic names to minimize the cost burden on the patients as well as adverse reactions due to brand name related confusion.

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Limitations

The positive point is that the study was undertaken for 4 months with the inclusion of more than 600 subjects with intent to categorize drug utilization according clinical diagnoses. But generalization of the data was a big issue. It may not have represented the total population. Facility wise comparison with large multicentric study would have been better. Pharmacoeconomic parameters also could be incorporated with this study.

CONCLUSION

In conclusion, this study provides an insight on the various cardiovascular disorders encountered in a cardiac outpatient setting and the spectrum of cardiovascular drug utilization in them. The over-all prescription patterns encountered in our study is optimal. However, less adherence to EDL, less generic prescriptions, use of FDC are major shortcomings we found. The data on patterns of drug utilization was largely similar to those recorded in hospital and registry-based studies in India. However, it has identified areas to further rationalize and optimize patterns of polypharmacy and evidence-based use of medications like beta-blockers, newer anticoagulants/anti-platelet agents and newer anti-anginal agents. Further, drug utilization studies with different population groups will generate more comparative data to ensure more rational and safer therapy.

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REFERENCES

1. Cardiovascular diseases (CVDs). Who.int. 2019. Available from: https://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds). Accessed on 07 July 2020.
2. How to Investigate Drug Use in Health Facilities: Selected Drug Use Indicators - EDM Research Series No. 007: Chapter 2: Core drug use indicators: Group 1: Prescribing indicators. Apps.who.int. 2019. Available from: https://apps.who.int/medicine-docs/en/d/Js2289e/3.1.html. Accessed on 07 July 2020.
3. Sharma KK, Gupta R, Agrawal A. Low use of statins and other coronary secondary prevention therapies in primary and secondary care in India. Vascular Health and Risk Management. 2009;5:1007.
4. Ajay VS, Prabhakaran D. Coronary heart disease in Indians: implications of the INTERHEART study. Indian J Med Res. 2010;132(5):561-6.
5. Roy A, Biswal SB, Patel NK, Hota PS, Rath B. Utilization trends of drugs in patients admitted with ischemic heart disease in a tertiary care teaching hospital. Int J Basic Clin Pharmacol. 2020;9:956-61.
6. Veeramani VP, Muraleedharan AP. Study on drug utilization pattern in cardiology outpatient department at tertiary care hospitals in South India: A prospective multicenter cross-sectional observational study. Int J Med Sci Public Health. 2020;9(5):321-8.
7. Vinodkumar M, Ravishankar K, Aswinichand P, Satyanarayana V, Manoj GHRR, Bharath Kumar A. Drug utilization evaluation of cardiovascular drugs in outpatient department in a tertiary care hospital: A Descriptive Observational Study. Int J Cur R. 2015;7(9):20693-7.
8. George J, Devi P, Kamath DY, Anthony N, Kunnoor NS, Sanil SS. Patterns and determinants of cardiovascular drug utilization in coronary care unit patients of a tertiary care hospital. J Cardiovasc Dis Res. 2013;4(4):214-21.
9. Kamath A, Shanbhag T, Shenoy S. A Descriptive Study of the Influence of Age and Gender on Drug Utilization in Acute Myocardial Infarction. J Clin Diagnos Res. 2010;(4):2041-6.
10. Belhekar MN, Patel TC, Singh MK, Pandit PR, Bhave KA, Redkar NN. Evaluation of prescribing pattern of drugs use in patients of coronary artery disease at a tertiary care hospital. Int J Basic Clin Pharmacol. 2020;7(9):1792.
11. Slathia I, Jadhav PR, Deb P, Verma S. Drug utilization study in Cardiology outpatient department at a tertiary care hospital. Int J Basic Clin Pharmacol. 2017;6:2276-81.
12. Isah A, Laing R, Quick J, Mabadeje A, Santoso B, Hogerzeil H et al. The Development of Reference Values for the WHO Health Facility Core Prescribing Indicators. West African Journal of Pharmacology and Drug Research. 2001;18(1).
13. National List of Essential Medicines (NLEM) 2015 – India. Apps.who.int. 2017. Available from: http://apps.who.int/medicinedocs/en/m/abstract/Js23088en/. Accessed on 07 July 2020.
14. Mayank PN, Vinson LG, Padmanabh VR. Fixed dose combinations to prescribe or not to prescribe: A dilemma of medical profession. Int J Basic Clin Pharm. 2014;3:105-13.