e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(7); 1296-1308

Original Research Article

Drug Utilization Study in Coronary Artery Disease in a Tertiary Care Hospital

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Received: 18-05-2023 / Revised: 14-06-2023 / Accepted: 25-07-2023

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Conflict of interest: Nil

Abstract:

Introduction: Cardiovascular diseases (CVDs) are the number 1 cause of death globally. Ischaemic heart disease (IHD)) is a condition in which there is an insufficient supply of blood and oxygen to a portion of the myocardium; it typically occurs when there is an imbalance between myocardial oxygen demand and supply. Atherosclerotic disease of an epicardial coronary artery is the most common cause of myocardial ischemia. Studies of drug utilization aid in screening, evaluating, and propose appropriate modifications in prescription practices; this would help to make patient care rational and cost-effective. The study of prescription and drug utilization recognizes the difficulties associated and provides feedback to the prescriber about the rational use of drugs. Therefore, the current study is planned to evaluate the utilization pattern of drugs in coronary artery disease.

Methods: It is a Prospective observational study done in the Department of Pharmacology and Department of Medicine in a Tertiary Care Hospital with a sample size of 279 patients between 30 to 80 years admitted to the Medicine Department for Coronary Artery Disease. The study analyzed the drug utilization pattern in coronary artery disease patients as per WHO prescribing indicators. The data collected was filled in a master chart, and was subjected to statistical analysis using SPSS 25 software. Results were expressed as a range, mean, and standard deviations. Institutional ethics committee approval was obtained. Informed consent was taken from every patient.

Result: The maximum number of patients was in the age group of 51 – 60 years with a mean of 59.22 years and an SD of 10.72. 35.8% were female and 64.2% were male. The male-to-female ratio is 1.79:1. Maximum patients, 34.77% were suffering from anterior wall myocardial infarction. 15.77% of the patients suffered from inferior wall myocardial infarction. The co-morbidities study reported that 86.37% of the cases suffered from Hypertension, 35.12% of patients suffered from Diabetes Mellitus and 5.01% reported Dyslipidemia. The average number of drugs per encounter is 5.29% which is to evaluate the degree of polypharmacy. The average number of Generic drugs prescribed is 80.25%. The percentage of encounters with an antibiotic prescribed is 0.67%. The percentage of encounters with an injection prescribed is 19.16%. The percentage of drugs prescribed from an essential drug list (EDL) is 56.73%.

Conclusion: The present study concludes that the prescribing pattern was rational and it followed the standard treatment guidelines. By optimizing the prescribing pattern with the application of the outcomes of the present study, prescribers will be able to improve patient management.

Keywords: CVDs, EDL.

Introduction

Non-communicable diseases (NCDs) account for 41 million annual deaths every year, equivalent to 71% of all deaths globally. Cardiovascular diseases(CVDs) are the number 1 cause of death globally: more people die annually from CVDs than from any other cause. An estimated 17.9 million deaths worldwide were associated to CVDs in 2016, representing 31% of all worldwide mortality. Of these deaths, 85% are due to heart attack and stroke. [1] According to the Indian Council of Medical Research Institute (ICMR) report entitled "India: Health of the Nation's States", the Contribution of Non-Communicable Diseases (NCDs) to total death in the Country was 61.8% in 2016, as compared to 37.9% in 1990. [2]

In 2016, the estimated prevalence of CVDs in India was estimated to be 54.5 million. One in four deaths in India is now because of CVDs with ischemic heart disease and stroke responsible for >80% of this burden. [3] In India, studies have reported increasing Coronary artery Disease prevalence over the last 60 years, from 1% to 9%-10% in urban populations and <1% to 4%- 6% in rural populations. [4]

A type of illness known as cardiovascular disease (CVD) affects the heart or blood arteries. Coronary Artery Diseases (CAD), including angina and myocardial infarction, are a component of cardiovascular disease (commonly certified as a heart attack) [5]

Ischaemic Heart Disease (IHD)) is a condition in where there is an insufficient blood and oxygen to a portion of the myocardium; it typically occurs when there is an imbalance between myocardial oxygen demand and supply. Atherosclerotic disease of an epicardial coronary artery is the most common cause of myocardial ischemia. [6]

The risk factors for ischemic heart disease include dyslipidemia, tobacco use, smoking, hypertensive and /or diabetic patients, obesity, physical sedentariness, low fruit and vegetable intake, and stress. Drugs play important role in promoting the health of patients who are seeking treatment for various ailments, however, to get these desired effects drugs should be safe and efficacious. Drugs must be utilized judiciously. [7]

Drug utilization research was defined by WHO in 1977 as the marketing, distribution, prescription, and drug abuse in community with special emphasis on the resulting medical, social and economic consequences. [8]

Studies of drug utilization aid in screening, evaluating, and proposing appropriate modifications in prescription practices; this would help to make patient care rational and cost-effective. [9] Rational drug prescribing is defined as patients receiving medications appropriate to their clinical needs, in dosages that are appropriate for each body., for an adequate short period, and at the low price to them and their community. [10

Today, inappropriate drug use is a concern that is supported by several international research studies that aim to identify safe and effective drug usage. Studies on drug utilization patterns is an effective tool to be used in the evaluation of the healthcare system. [11]

The study of prescription and drug utilization recognizes the difficulties associated and provides feedback to the prescriber about the rational use of drugs. Therefore, the current study is planned to evaluate the utilization pattern of drugs in coronary artery disease. These investigations, which have significant medical, social, and economic relevance, are expanding globally in many healthcare settings. Medication utilization research is useful for managing drug-specific issues and assessing the suitability of drug therapy. [12]

Aim & Objective

Aim

To study the utilization and drug prescription pattern of cardiovascular disease as per WHO in a tertiary care hospital

Objective

To study and analyze drug utilization pattern in coronary artery disease patients as per WHO prescribing indicators.

1) To study the utilization of drugs prescribed in coronary artery disease patients admitted in the Medicine Department.

2) To analyze demographic data and co-morbidities of coronary artery disease and to monitor duration of stay in hospital.

Methodology

Study Type / Design: Prospective observational study

Study Settings: The study was done in the Department of Pharmacology and Department of Medicine in a Tertiary Care Hospital

Duration of Study: From August 2020 to December 2022

Study Population:

Sample Size: 279

Eligibility Criteria:

Inclusion Criteria:

Patients Between 30 To 80 Years Admitted To The Medicine Department For Coronary Artery Disease Will Be Noted In The Case Record Form.

Exclusion Criteria:

- Pregnant patients.

- Patients with other terminal illnesses.
- Patients who do not give consent.
- Patients undergoing discharge against medical advice (DAMA)

Methodology

It was a prospective, observational study conducted over 2 years in patients admitted for the treatment of coronary artery disease in the Medicine Department of a Tertiary Care Hospital. The prescriptions were audited and analyzed by category. The patients were chosen according to inclusion and exclusion criteria. Informed consent was taken from every patient. Details of the patient according to the criteria for analysis listed below were noted in the Case Record form. Duration of hospital stay was noted from the register maintained for admitted patients.

Source of Data

 Patient's medication profile.
 Physicians prescribing records.
 Nursing Report

Criteria for Analyzing

 WHO Prescribing Indicators.
 The demographic data.
 Diagnosis.
 Treatment given.
 Duration of stay in hospital.
 Co-morbidities associated with Coronary Artery Disease

WHO Prescribing Indicators [13]:

1. The average number of drugs per encounter (C)

C=B/A

B = total number of different drug products prescribed A= number of encounters

Purpose: To measure the degree of polypharmacy

2. Percentage of drugs prescribed by generic name (E)

E=D/Bx10

D= Number of drugs prescribed by generic name B= Total number of drugs prescribed

Purpose: to measure the tendency to prescribe by generic name

3. Percentage of encounters with an antibiotic prescribed (G)

G= F/A x100

F= Number of patients with one or more antibiotics prescribed.

A= Total number of encounters

Purpose: To assess the prescribing frequency of antibiotics in Coronary artery disease

4. Percentage of encounters with an injection prescribed (I)

I=H/A x100

H= Total number of patients who received one or more injections

A= Total number of encounters

Purpose: To measure the overall level of use of these commonly over used and costly forms of drug therapy.

5. Percentage of drugs prescribed from essential drugs list formulary (K)

K= J/Bx100

J=number of products prescribed from national list of essential medicines list or formulary [14,15]

B= total number of drugs prescribed

Purpose: To measure the degree to which practices conform to a national drug policy, as indicated by prescribing from the national essential drugs list or formulary for the type of facility surveyed.

All the parameters were recorded in an excel sheet for evaluation of data.

Statistical Analysis

The data entry form for 279 patients' was designed with all details of patients, medication, and diagnostic methods. The data collected was filled in a master chart, and was subjected to statistical analysis using SPSS 25 software. Results were expressed as a range, mean, and standard deviations. Prescription analysis was performed with the help of medical records. 'P' value < 0.05 was considered to be significant.

Results & Observations

The present study was conducted in the Department of Pharmacology and Department of Medicine in a Tertiary Care Hospital. 279 patients were chosen according to inclusion and exclusion criteria. Informed consent was taken from every patient. The patients were assessed based on criteria for analysis such as WHO Prescribing Indicators, demographic data, Diagnosis, treatment given, Duration of stay in hospital & Co-morbidities associated with Coronary Artery Disease to assess the drug utilization pattern in cases with coronary artery disease.

All the data was recorded in a well-organized excel sheet and the analysis was done using SPPU – 25 software the results was drafted in tabular form with mean, frequency, percentage, and p-value. The comparison of present study with WHO optimal value was done using Z- test.

Demographic Study

Patients between 30 to 80 years admitted to the Medicine Department for Coronary Artery Disease were analyzed.

Table 1: Age distribution study

Age in years	Frequency (n)	Percentage (%)
<= 40	14	5.0
41-50	49	17.6
51-60	94	33.7
61-70	83	29.7
71-80	39	13.9
Total	**279**	**100.0**
Mean	**59.22**	
SD	**10.72**	

Table 1 represents the age distribution in 279 patients. In the study, it is observed that the maximum number of patients were in the age group of 51 – 60 years with a mean of 59.22 years and SD of 10.72.

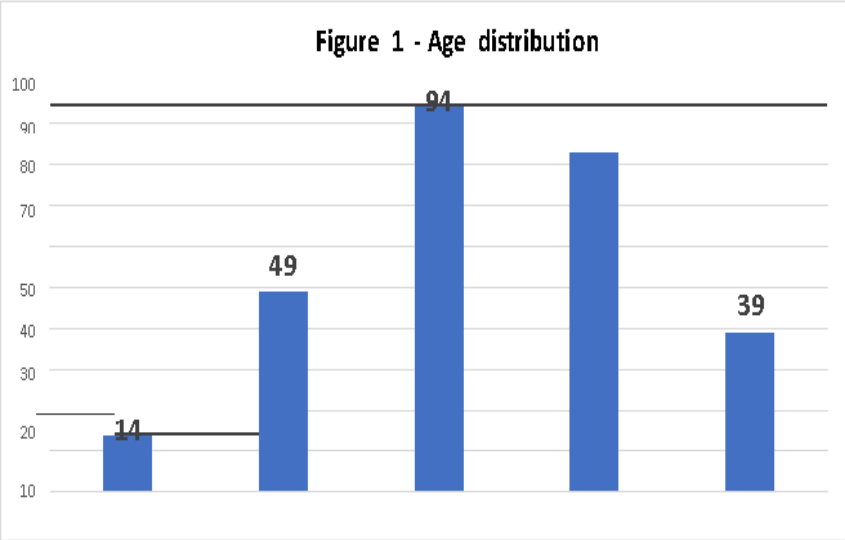

Figure 1: Age distribution

Table 2: Gender Distribution

Sex	Frequency (n)	Percentage (%)
Female	100	35.8
Male	179	64.2
Total	**279**	**100.0**

Table 2 represents the gender distribution in 279 cases in which 35.8 % were female and 64.2 % were male.

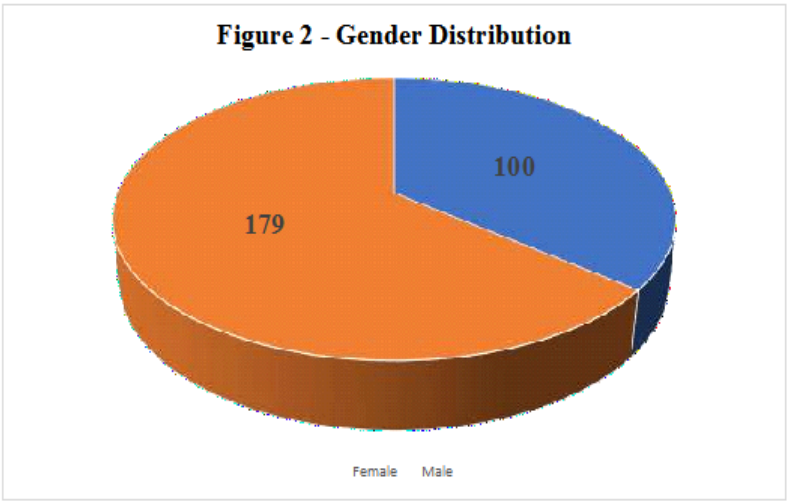

Figure 2: Gender distribution

Diagnosis Distribution

Table 3: Diagnosis distribution

Diagnosis	Frequency (n)	Percentage (%)
Anterior wall myocardial infarction	97	34.77
Inferior wall myocardial infarction	44	15.77
Unstable angina	34	12.19
Acute myocardial infarction	32	11.47
Stable angina	25	8.96
Anterior inferior wall myocardial infarction	23	8.24
Lateral wall myocardial infarction	14	5.02
Exertional angina	10	3.58
Total	**279**	**100.00**

Table 3 represents the diagnostic study in 279 cases in which a maximum of patients 34.77 %were suffering from anterior wall myocardial infarction. 15.77 % of patients suffered from inferior wall myocardial infarction.

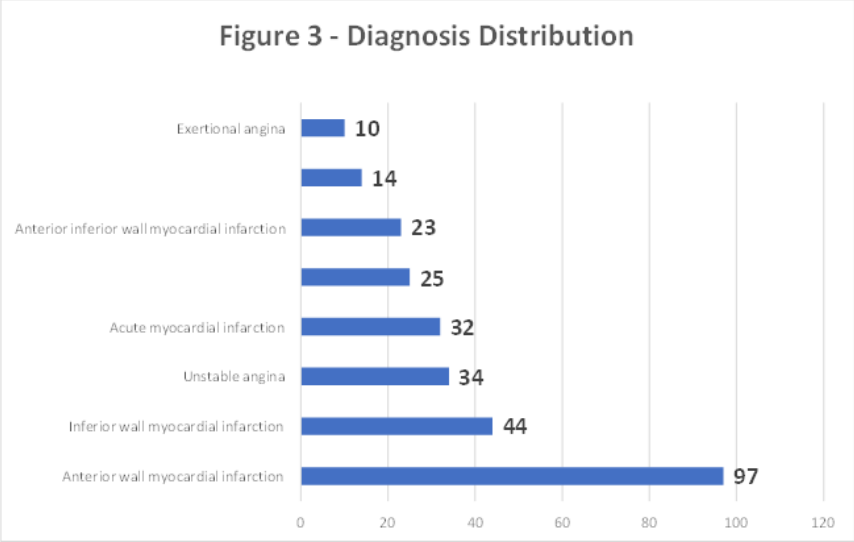

Figure 3: Diagnosis distribution

Comorbidities

Table 4: Comorbidities

Comorbidities	Frequency (n)	Percentage (%)
Hypertension	241	86.37
Diabetes Mellitus	98	35.12
Dyslipidaemia	14	5.01
Diabetes Mellitus + Hypertension	90	32.25

Table 4 represents the co-morbidities present in the patients. From the results, it was observedthat 86.37 % of cases suffered from hypertension which is a very common co-morbidity seen in many studies. 35.12 % of patients suffered from diabetes Mellitus and 5.01 % reported dyslipidaemia. 90 out of 279 which is 32.25% of patients had both Hypertension and Diabetesmellitus.

WHO Prescribing Indicators

WHO has described 5 prescribing indicators to study the drug utilization pattern. The fiveindicators are

- The average number of drugs per encounter (C)
- Percentage of drugs prescribed by generic name (E)
- Percentage of encounters with an antibiotic prescribed (G)
- Percentage of encounters with an injection prescribed
- Percentage of drugs prescribed from essential drugs list formular.

Table 5: Average number of drugs per encounter (C)

Prescribing Indicators assessed	Total Drug Encountered	Average percentage
Average no of drugs per encounter	2228	5.13 %

Table 5 represents an average number of drugs per encounter to evaluate the degree of polypharmacy. It was calculated by dividing the total number of different drug products prescribed by the number of encounters surveyed. Combinations of drugs prescribed for one health problem were counted as one. In the present study, Average number of drugs per encounter (C) is 5.13 %

The average number of drugs per encounter (C) = total number of different drug products prescribed(B)/ number of encounters (A)
Total number of different drug products prescribed(B) = 41
Number of encounters (A) = 2228 / 279 = 7.98
Therefore, the Average number of drugs per encounter (C) = 41 / 7.98 = 5.13 %.

Table 6: Percentage of drugs prescribed by generic name (E)

Prescribing Indicators assessed	Total Drug Encountered	Average percentage (%)
Percentage of drugs prescribed by generic name (E)	1178	80.25 %

Table 6 represents the percentage of drugs prescribed by generic name to evaluate the prevalence of prescribing by generic name. It was calculated by dividing the number of drugs prescribed by generic name by the total number of drugs prescribed, multiplied by 100. In thepresent study, the percentage of drugs prescribed by generic name is 80.25 %.

E=D/Bx100

D= Number of drugs prescribed by generic nameB= total number of drugs prescribed.

Table 7: Percentage of Branded Drug & Generic Drug

Prescribing Indicators assessed	Total Drug Encountered	Average percentage (%)
Percentage of drugs prescribedby generic name (E)	1788	80.25
Percentage of drugs prescribed by Brand name (E)	440	19.75
Total	2228	100

Table 7 represents the percentage of branded & generic drugs prescribed in which it wasobserved that 80.25 % of generic drugs were prescribed & 19.74 were branded drugs.

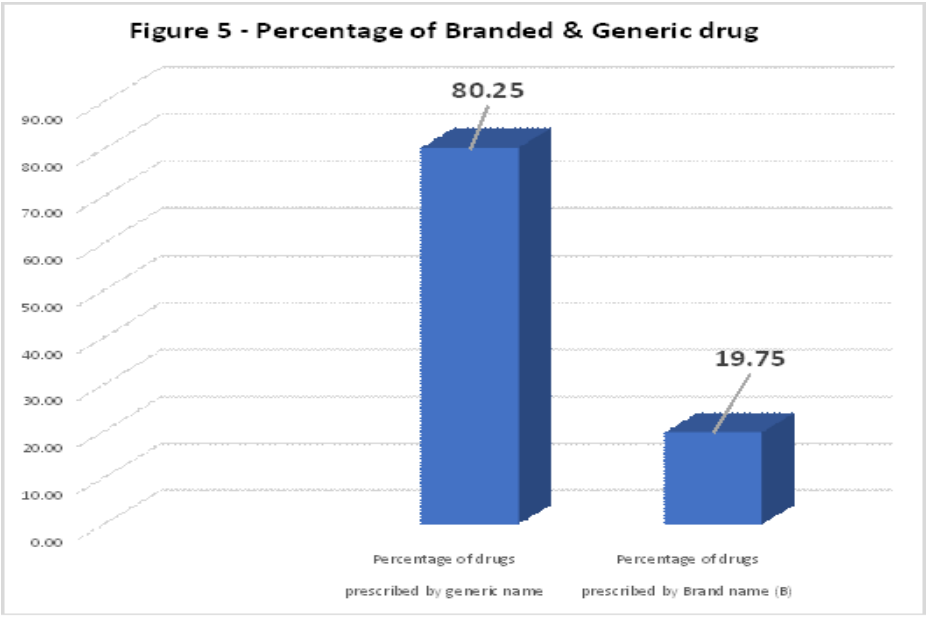

Figure 5: Percentage of branded & generic drug

Table 8: Percentage of encounters with an antibiotic prescribed (G)

Prescribing Indicators assessed	Total Drug Encountered	Average percentage
Percentage of encounters with anantibiotic prescribed (G)	15	0.67%

Table 8 represents the Percentage of encounters in which an antibiotic was prescribed and wascalculated to measure the overall use of commonly overused and costly forms of drug therapy. It was calculated by dividing the number of patient encounters in which an antibiotic was prescribed by the total number of encounters surveyed, multiplied by 100. In the present study,the percentage of encounters with antibiotics prescribed is 0.67 %.

G= F/A x100

F= Number of patients with one or more antibiotics prescribed

A= total number of encounters

Table 9: Percentage of encounters with an injection prescribed (I)

Prescribing Indicators assessed	Total Drug Encountered	Average percentage
Percentage of encounters withan injection prescribed (I)	427	19.16%

Table 8 represents the percentage of encounters with an injection prescribed and was calculatedto measure the overall level of use of commonly overused and costly forms of drug therapy. Itwas calculated by dividing the number of patient encounters in which an injection was prescribedby the total number of encounters surveyed, multiplied by 100. In the present study, 19.16 % ofinjectables were encountered in the prescription.

I=H/A x100

H = Total number of patients who received one or more injections

A= total number of encounters

Table 9: Percentage of drugs prescribed from essential drugs list formulary (K)

Prescribing Indicators assessed	Total Drug Encountered	Average percentage
Percentage of drugs prescribedfrom essential drugs list formulary (K)	1264	56. 73 %

The percentage of drugs prescribed from an essential drug list (EDL) is to measure the degree towhich practices conform to a national drug policy, as indicated by prescribing from the nationalessential drugs list or formulary for the type of facility surveyed. The percentage is calculated by dividing the number of products prescribed which are in the essential drug list by the total number of drugs prescribed, multiplied by 100. In the present study percentage of drugs prescribed from the essential drugs list formulary is 56.73 %

K= J/Bx100

J=Number of products prescribed from the national list of essential medicines listor formulary

B= Total number of drugs prescribed

Table 10 Duration of hospital stay of patients

No of days	No of patients	Percentage
0 -4 days	153	54.84
5 - 10 days	126	45.16
Total	279	100

Table 10 represents the duration of hospital stay of patients in which it was observed that 54.84 % of patients stayed for 0 -4 days & 45.16 % of patients were admitted to the hospital for 5 –10 days.

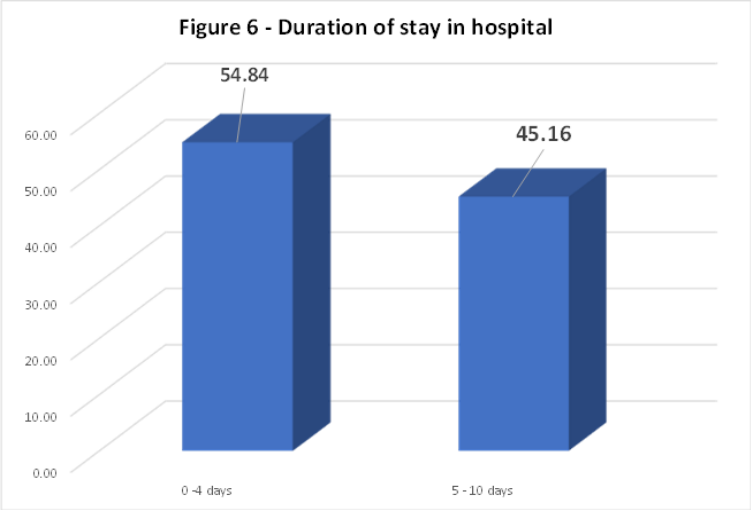

Figure 6: Duration of stay in hospital

Table 11: Comparison of the present study with WHO drug prescribing Indicators

Prescribing Indicators assessed	Number in present study	WHO optimalvalue	P - value
Average no of drugs per encounters	5.13	1.6 -1.8	0.008
Percentage of drugs prescribed by generic name (E)	80.25%	100.00%	< 0.001
Percentage of encounters with an antibiotic prescribed (G)	0.67%	20 -26.8 %	< 0.001
Percentage of encounters with an injection prescribed (I)	19.16%	13.4 - 24.1%	0.229
Percentage of drugs prescribed from essential drugs list formulary (K)	56. 73 %	100	< 0.001

Table 11 represents the comparison of the present study with WHO drug prescribing Indicators in which it was observed that the average number of drugs prescribed per encounter was 5.13 and wasstatistically significant as compared to the WHO optimal value with p–value – 0.008.

The percentage of drugs prescribed by generic name was 80.25 % and was statistically significant ascompared to the WHO optimal value with p-value < 0.001.

The percentage of encounters with antibiotics prescribed was 0.67 % and was statistically significant as compared to the WHO optimal value with a p-value < 0.001.

The percentage of encounters with an injection prescribed was 19.16 % and was statistically insignificant as compared to the WHO optimal value with a p-value < 0.229.

The percentage of drugs prescribed from the essential drug list formulary is 57.73 % and was statistically significant as compared to the WHO optimal value with a p-value < 0.001.

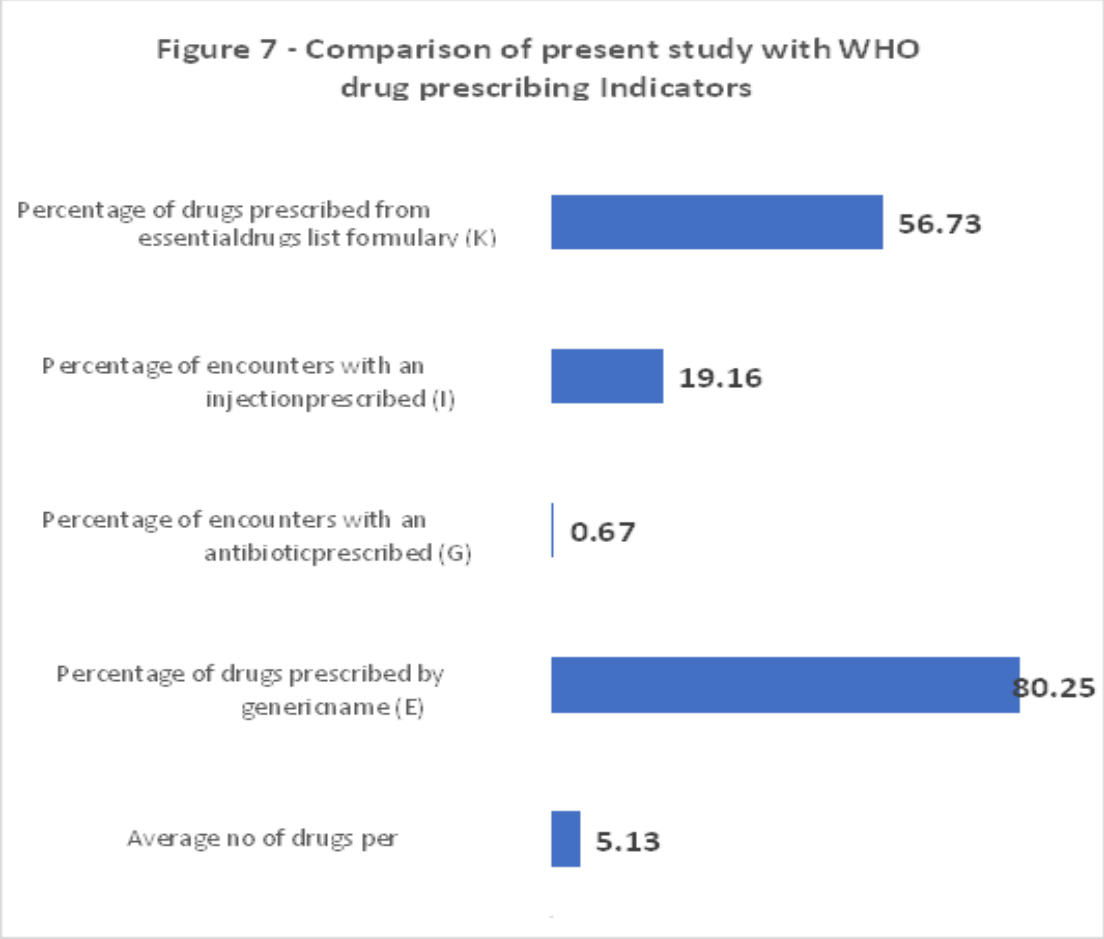

Figure 7: Comparison of present study with WHO drug prescribing indicators

Table 12: Percentage of Drugs prescribed

Drugs prescribed	Frequency (n)	Percentage (%)
Aspirin	253	90.7
Atorvastatin	251	90.0
Clopidogrel	246	88.2
Heparin	188	67.4
Nicorandil	181	65.2
Metoprolol	162	58.1
Ivabradine	133	47.7
Amlodipine	112	40.1
Inj. streptokinase 1.5 IU in 1000 cc NS over 45 min	106	38.0
Alprazolam	84	30.1
Trimetazidine	69	24.7
Ticagrelor	62	22.2
Furosemide	40	14.3
Frusemide + spironolactone	40	14.3
Insulin	39	14.0
Liquid paraffin	36	12.9
Enoxaparin	26	9.3
Spironolactone	20	7.2
Glimepiride + metformin	19	6.8
Tenegliptin and metformin	19	6.8
Nitroglycerin	18	6.5
Ceftriaxone	15	5.4
Chlorthalidone and telmisartan	15	5.4

Telmisartan	13	4.7
Inj. Biphasic isophane insulin	13	4.7
Tab.isosorbide dinitrate	11	3.9
Metformin	10	3.6
Magnesium	8	2.9
Nifedipine	8	2.9
Rosuvastatin	8	2.9
Telmisartan and metoprolol	7	2.5
Teneligliptin	6	2.2
Telmisartan + amlodipine	2	.7
Propranolol	1	0.4
Clonazepam	1	0.4
Telmisartan & hydrochlorothiazide	1	0.4
Ranolazine	1	0.4
Aldosterone	1	0.4
Ramipril	1	0.4
Prazosin hydrochloride	1	0.4
Prasugrel	1	0.4

Table 12 represents the percentage of drugs prescribed and some of the maximum drugs prescribed are Aspirin 90.70 %, Atorvastatin 90.0 %, Clopidogrel 88.2 %, Heparin 67.4 %, Nicorandil 65.2 %, Metoprolol 58.1 %.

Discussion

In our study, 279 cases were analyzed according to the inclusion and exclusion criteria and it is found that a maximum number of patients were in the age group of 51-60 years which is followed by 61-70 years and the mean age group is 59.22 years with the standard deviation (SD) of 10.72 which is similar to the study conducted by Tittu George Zachariah [16] et al. Oneof the distinctive obstacles to the optimal management of CAD in India has been identified as the early age at CAD start.[96]

In our study, it was observed that majority of the patients admitted were male with 64.2% thanfemale with 35.8%. The male-to-female ratio is 1.79 :1. These observations are similar to thoseof Saranya [17] et al (males 74% females, 26%). Many studies have mentioned that cardiovascular emergencies were more common in males than females.

In the present diagnostic study in 279 cases in which a maximum of patients 34.77 % were suffering from anterior wall myocardial infarction followed by 15.77 % of patients suffered from inferior wall myocardial infarction. In a similar study conducted by Saranya [17] et al the most common diagnoses were found to be ST-elevation MI (STEMI) including ACS- Anteriorwall myocardial infarction (36.8%) and ACS-Inferior wall myocardial infarction (32.8%).

Co-morbidities that are commonly associated CAD being hypertension and diabetes which wasfound in our study. The percentage of patients having hypertension were 86.37% followed by diabetes with 35.8% and dyslipidemia with 5.01% and 32.25% of patients had both Hypertension and Diabetes mellitus. Similar results were observed in the study conducted by George [18] et al which reported that 65 % of cases suffered from hypertension and 43% of cases had DM.

In India, the prevalence of hypertension has increased over the past 30 years among urban andrural populations by around 30 and 10 times, respectively. [19] By 2030, it is anticipated that India would contribute to more than one-fifth of the world's total diabetic population. Whenunder control, key modifiable risk factors like hypertension and diabetes mellitus can considerably lower CVD morbidity and death.

In the present study, it is observed that polypharmacy was there with the average number of drugs per encounter is 5.13 % which is significantly higher than the 1.6 – 1.8 which is WHO suggested value for the same. The finding from our study is similar to Chaudhary [20] et al. (4.9%), and Veeramani V [21] et al (5.0 %). As polypharmacy increases the risk of drug-to-drug interactions, prescribing errors, and higher therapy costs, it is ideal to keep the average numberof drugs lower. However, in cardiovascular diseases multiple drug therapy may be justifiedbecause there is multiple co-morbidities which exist and to reduce the complications associatedwith it which overall will reduce mortality and mobidity of the patient.

In the present study, the average number of Generic drugs prescribed is 80.25 % and 19.74 % were branded drugs which evaluates the prevalence of prescribing by generic name by the hospital. It is comparatively less to the WHO suggested value of 100%. A similar study conductedby Neha Raval [22] et al reported > 80% of drugs were prescribed by generic

name which is similarto our results. Many other studies have reported less percentage of generic drugs. Though 80.25% from our study is a good number, doctors still needs to be sensitized about prescribing drugs with generic names to attain 100% prescription with generic names as it cheaper than brand names andreduces the cost of treatment to the patients.

In this study, the percentage of encounters with an antibiotic prescribed is 0.67 % with most common group of antibiotics prescribed was Ceftriaxone which was similar to a study done byNagabushan et al. The study conducted by Jagannath Kolwalkar et al reported the percentage of encounters with an antibiotic prescribed 1.57 % which is more as compared to the present study findings. WHO value of use of antibiotic is 20 -26.6 % which is way more that the percentage obtained from the present study. As there is no finding of any co-existing infection in majority of the patients, the use of antibiotic in our study is low.

In the present study, the percentage of encounters with an injection prescribed is 19.16 %. A similar study conducted by Jagannath Kolwalkar et al reported 5.10 % of encounters withan injection which is very low compared to the present study. The percentage of injections prescribed from our study is 19.16 which are very much within the statistical limits given by WHO which is 13.4 – 24.1%.

In the present study, the percentage of drugs prescribed from a National List of Essential Medicine (NLEM) is 56.73 % which is significantly less as compared to the ideal WHO standard value of 100%. Similarly, Saranya [17] et al study reported 64.94 % of drugs prescribedfrom an essential drug list which is more than as compared to the percentage from the present study.

It is said that this drug list is created taking into account comparative cost-effectiveness, public health importance and evidence of the drug's efficacy and safety.

In our study the percentage of drugs prescribed from NLEM is low and that maybe because oflack of awareness of the essential drug list. This brings a need of sensitization of the same to the prescribers to enhance the treatment in the best interest of the patients.

Duration of hospital stay varied from patient to patient and the conditions associated with them and treatment administered. In this study 54.84 % of patients stayed for 0 -4 days & 45.16 % of patients were admitted to the hospital for 5 – 10 days. Multiple co-morbidities and polypharmacy and the adverse reaction of the drugs significantly increases the duration of hospital stay.

The treatment of CAD includes drug classes such as anticoagulants, antiplatelet, antianginal drugs, ACE inhibitors, calcium channel blockers, diuretics, angiotensin II receptor blocker etc.countries which are financially developed have strategies which are effective screening, evaluation and management of CAD but in India these strategies are not established fully. Many randomized controlled trials gave the guidelines based on the evidence obtained from the trials showed that statins, beta blockers and ACE inhibitors can be used in all symptomaticor asymptomatic patients with angina or myocardial infarction, stroke and death. It has been concluded that use of these agents together can reduce the long-term risk and mortality [16]

In our study, the commonly prescribed drugs were aspirin (90.70%) among the antiplatelet agents, atorvastatin (90.0%) for the hypolipidemic, Clopidogrel (88.2%) among the platelet inhibitors, Heparin (67.4%) among the anticoagulant, Nicorandil (65.2%) among the potassiumchannel activator, metoprolol (58.1%) among the beta blockers. Similar results were seen in Tittu George Zachariah [16] et al where the commonly prescribed drugs were isosorbide mononitrate, aspirin, metoprolol, amlodipine and atorvastatin.

Efficacy, safety, indication, and cost are four factors that should be taken into consideration while prescribing medication. When there are more similar medications, then the preference should be given to the pharmaceutical agents which are produced by trustworthy industrial facilities using GLP (Good Laboratory Practice) and GMP (Good Medical Practice) and are listed on the Preferred Medication List because they have undergone extensive research and have the best pharmacokinetics (that should be made by every doctor).

Thus, the Drug Utilization pattern and the trends in our study were mostly in line with WHO prescribing values. However, there were some variations, and the reasons are justified above. By regularly conducting seminars and workshop more sensitizations can be done regarding rational prescription.

The present study concludes that by optimizing the prescribing pattern with the application ofthe outcomes of the present study, prescribers will be able to improve patient management.

Summary

The present study was prospective observational study was conducted in the Department of Pharmacology and Department of Medicine in a Tertiary Care Hospital. Total number of 279 cases between 30 to 80 years admitted in the Medicine Department for Coronary Artery Disease was noted based on the inclusion and exclusion criteria.

Results obtained in the present study are as under

- The maximum number of patients was in the

age group of 51 – 60 years with a mean of 59.22 years and an SD of 10.72.

- In the gender distribution study of 279 cases in which 35.8 % were female and 64.2 % were male. The male-to-female ratio is 1.79:1.
- In the diagnostic study maximum of patients, 34.77 % were suffering from anterior wall myocardial infarction. 15.77 % of patients suffered from inferior wall myocardial infarction.
- The co-morbidities study reported that 86.37 % of cases suffered from Hypertension, 35.12 % of patients suffered from Diabetes Mellitus and 5.01 % reported Dyslipidemia.
- The average number of drugs per encounter is 5.29 % which is to evaluate the degree of polypharmacy.
- The average number of Generic drugs prescribed is 80.25 % and 19.74 % were branded drugs.
- The percentage of encounters with an antibiotic prescribed is 0.67 %
- The percentage of encounters with an injection prescribed is 19.16 %
- The percentage of drugs prescribed from an essential drug list (EDL) is 56.73 %.
- In the present study, 54.84 % of patients stayed for 0 -4 days & 45.16 % of patients were admitted to the hospital for 5 – 10 days.
- In the present study, the maximum drugs prescribed are Aspirin 90.70 %, Atorvastatin 90.0 %, Clopidogrel 88.2 %, Heparin 67.4 %, Nicorandil 65.2 %, Metoprolol 58.1 %.

To summarize the results, the WHO prescribing indicators, demographic data, co-morbidities,and duration of stay in the hospital were studied, and according to the findings of the present study the average no of drugs encountered per patient is high, the maximum no of the generic drug is prescribed, use of antibiotics is less, administration by injection is within the range & the utilization of drugs from essential drugs list formulary should be increased. The duration of stay was from 1 – 10 days depending on the condition of the patient. Hypertension & diabetes Miletus are the common co-morbidities. Maximum patients were diagnosed with anterior wall myocardial infarction & Antiplatelet agents, hypolipidemic drugs were mostly used.

Conclusion

The study concludes that coronary artery disease is one of the major diseases in India. The observation suggests that prescribers to consider factors of polypharmacy use of generic drugs,and use of drugs from the essential drug list before writing any prescription.

DUSs are effective methods for determining the role of drugs in improving awareness of drug utilized which will benefit society in the form of rational and cost-effective drug prescription. Though there were some limitations in our study like the sample size and the study being doneat one tertiary hospital, it is still an effective study to show that doctors can still be made awareabout the WHO prescribing indicators. Regular seminars and workshop will increase the knowledge regarding rational prescription.

The present study concludes that the prescribing pattern was rational, and it followed the standard treatment guidelines. By optimizing the prescribing pattern with the application of theoutcomes of the present study, prescribers will be able to improve patient management.

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