

Evaluation of Drug Utilization in Myocardial Infarction at a Tertiary Care Hospital

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Received: 10-04-2022 / Revised: 15-05-2022 / Accepted: 05-06-2022

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Conflict of interest: Nil

Abstract

Background: Asian Indians have considerably higher prevalence of premature Coronary Artery Disease (CAD). Over the last four decades there has been a tenfold increase in the prevalence of CAD in urban area of India.

Materials and Methods: A prospective, observational study was carried out in ICCU for duration of two years. Patient details and demographic characteristics were recorded from the case files. The morbid condition, treatment with drugs and other supportive modalities were recorded. The outcome of treatment was also noted. Present study aimed to focus on the trends in the WHO drug utilization core indicators.

Results: Out of 600 cases most affected were males of 51-60 years with mortality rate of 9.17%. Most common co-morbid condition of hypertension (61.50%). Mean hospital stay was 1.35 ± 1.17 days. Average no of drug per prescription of 9.37 ± 3.01 . Generic drugs were 61.05% and essential drugs up to 90.02%. Cost per case ₹ 1023.05 and injections accounted for 97.32%.

Conclusions: Current study reflects myocardial infarction affects frequently amongst males of 51-60 years with hypertension; lower mortality and morbidity rate observed with utilising majority of medication being generic drugs and from essential medicine list. Cost of treatment was of modest amount of about thousand rupees; which makes even economically backward class to get adequate treatment.

Keywords: Myocardial infarction, Drug utilization, Essential medicine list, Rationality

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Introduction

The development of drug utilization as a research area made it possible to study drug prescribing and drug usage in a scientific and formal manner. Drug utilization among

outpatient is frequently monitored in many countries but the studies on inpatient are rare and incomplete. Also studies of drug utilization in myocardial infarction and

hypertension are available but recent studies on this is scarce. Studies of drug utilization available with regards to cardiovascular system have shown varying pattern of drug utilization in different institutions.

Asian Indians have considerably higher prevalence of premature Coronary Artery Disease (CAD). Over the last four decades there has been a tenfold increase in the prevalence of CAD in urban area of India. Current study illustrates trends in utilization of drug classes and individual drugs in the treatment of acute myocardial infarction.

Materials and Methods:

This was a prospective, observational, follow up study, conducted over a period of 566 days from 21-11-2018 to 7-6-2020` by Department of Pharmacology in association with Department of Medicine at Intensive cardiac care unit of a tertiary care teaching hospital. Study was conducted after taking approval from institutional ethics committee. Ethical committee approval no: **Ref. No. IEC/Certi/150/09/2018** dated 20-11-2018.

The protocol and case record form of the study was developed after discussions with teaching staff members of the Pharmacology department and Medicine department of our institute.

Primary objective:

To identify drug prescribing pattern among patients suffering from acute myocardial infarction

admitted to intensive cardiac care unit of our tertiary care teaching hospital using WHO drug use indicators.

Secondary objectives:

To observe

1. Type of acute myocardial infarction most frequently treated.
2. Demographic pattern of patients with acute myocardial infarction.

3. Outcome of each patient of acute myocardial infarction.

Inclusion criteria

1. Patients admitted in Intensive cardiac care unit of tertiary care teaching hospital.
2. Patients of either sex will be included.
3. Patients treated with drugs for Myocardial infarction.
4. All the patients already receiving drugs for Myocardial infarction before the study

Exclusion criteria

1. Incomplete data entry case records were excluded from the study.
2. Unwilling patients.

Sample size:

WHO recommendation on sample size is that there should be at least 600 encounters in a cross-sectional survey describing current treatment practices. [1],[2]

Data collection

This data was recorded in a previously prepared case record form. Data was collected from patients satisfying the above mentioned inclusion and exclusion criteria. Written informed consent was taken from every patient. Demographic details like: name, age, sex, diagnosis, ongoing treatment was recorded from patient's case file. This data was recorded in a previously prepared case record form.

Data was analysed under following headings:

Demographic characteristics of patients. Distribution of outcome correlating with age, gender, associated comorbidities. Average number of drugs per encounter with prescribing frequency. Percentage of drugs prescribed by generic name and from essential drug list. Percentage distribution of route of drug. Percentage of encounters with

prescriptions of antibiotics and injections. Distribution of drugs according to ATC System and DDD per 100 bed-days.

Statistics:

Recorded data was analysed by Microsoft Office Excel for Mac 2019 and using descriptive statistics. Wherever necessary, the results were depicted in the form of percentages and graphs.

Results:

Age-Gender distribution:

Males were 495 (83%) and females were 105 (17%) in the study with maximum cases in males were between 51 to 60 years accounting for 185 cases (30.83%), whereas in females were between 40 to 50 years

accounting for 40 cases (6.67%). Mean age of patients in current study was 55.68 ± 9.48 years. In this study out of 600 cases 593 cases were of STEMI and 7 were NSTEMI.

Distribution of outcome post-treatment in myocardial infarction in current study:

Recovery rate among male patient was maximum between 51-60 years amounting 169 (28.17%) whereas in females it was between 40-50 years amounting 35 (5.83%). Death rate among males was maximum between 51-60 years in males amounting 16 (2.67%) when compared to females which was 6 (1.00%) between 61-70 years.

Distribution of co-morbidities associated with myocardial infarction patients in current study.

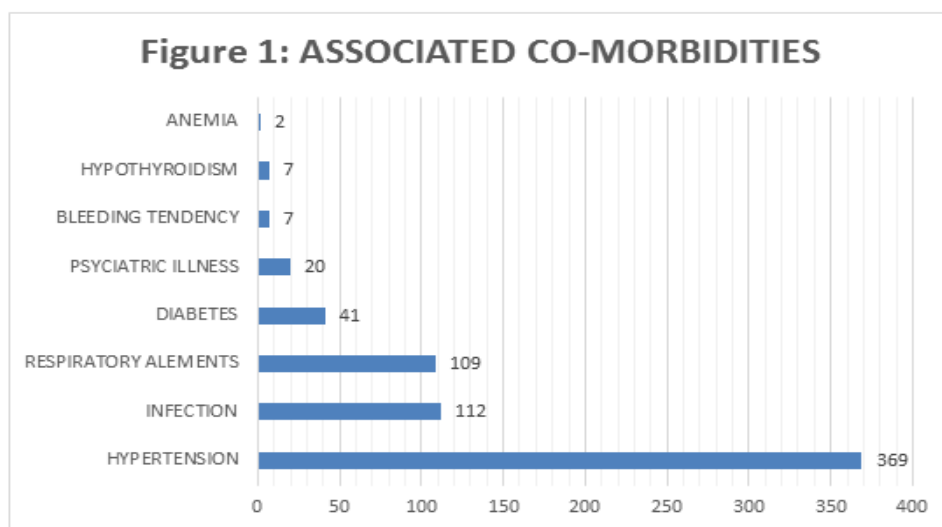


Figure 1: Associated co-morbidities

Drug utilization parameters:

Mean hospital stay in current study was 1.35 ± 1.17 days. Maximum number of drugs prescribed per patient was 18 in 6 patients (1%). Minimum number of drugs prescribed per patient was 1 in 2 patients (0.33%). Most frequently 11 drugs were prescribed in 84 patients (14%). Around 9.37 drugs were prescribed per patient in the study (Mean \pm SD: 9.37 ± 3.01)

Table 1: Drug utilization parameters

Generic drugs	61%
Branded drugs	39%
Drugs from essential medicine list	90%

FDC	1%
Single ingredient drugs	99%
Percentage of encounter with an antibiotic	1.99%

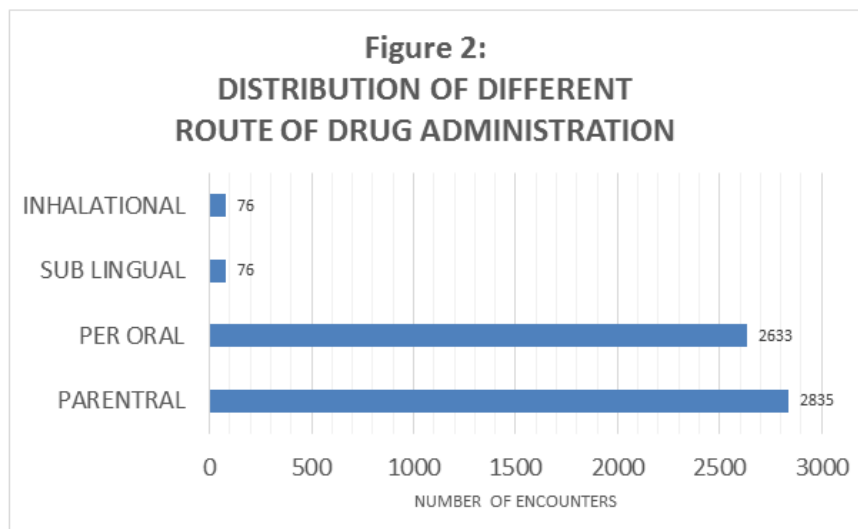


Figure 2: Distribution of different route of drug administration

Table 2: Distribution of drugs according to ATC System [2]

ATC SYSTEM MAIN GROUPS	DRUG NAMES	ATC CODE	NO. OF PRESCRIPTION	NO. OF PRESCRIPTION (%)
BLOOD AND BLOOD FORMING AGENTS (B)	CLOPIDOGREL	B01AC04	509	84.83
	STREPTOKINASE	B01AD01	428	71.33
CARDIOVASCULAR DRUGS (C)	ASPIRIN	C10BX08	517	86.17
	ATORVASTATIN	C10AA05	509	84.83
	METOPROLOL	C07AB02	369	61.50
	ENALAPRIL	C09AA02	214	35.67
	FUROSEMIDE	C03CA01	104	17.33
	NORADRENALINE	C01CA03	79	13.17
	ISOSORBIDE DINITRATE	C01DA08	76	12.67
	GLYCERYL TRINITRATE	C01DA02	51	8.50
	DOBUTAMINE	C01CA07	51	8.50
	AMIODARONE	C01BD01	46	7.67
	NICORANDIL	C01DX16	38	6.33
	DOPAMINE	C01CA04	20	3.33
	SPIRONOLACTONE	C03DA01	2	0.33
	CLONIDINE	C02AC01	2	0.33
VERAPAMINE	C08DA01	2	0.33	

ATC SYSTEM MAIN GROUPS	DRUG NAMES	ATC CODE	NO. OF PRESCRIPTION	NO. OF PRESCRIPTION (%)
NERVOUS SYSTEM (N)	ALPRAZOLAM	N05BA12	164	27.33
	TRAMADOL	N02AX02	16	2.67
	MIDAZOLAM	N05CD08	8	1.33
VARIOUS (V)	OXYGEN	V03AN01	72	12.00
No ATC Code	LMWH	-	544	90.67
	HYDROCORTISONE	-	76	12.67
	MAGNESIUM SULPHATE	-	3	0.50

Summary of cost of individual drugs using generic drug price list provided by expert committee, Gujarat Medical Services Corporation Limited [3] and CIMS Current Index of Medical Specialities [4]:

Average of ₹ 1,023.05 costed for a single case, generic drugs costed ₹6,08,647.84

(99.16%), drugs with trade name costed ₹ 5134.84 (0.84%), drug cost spent on antibiotics ₹ 23,235.95 (3.78%) and percentage of drug cost spent on injection ₹5,98,789.39 (97.32%)

Table 3: DDD per 100 bed-days

DRUG NAMES	DDD per 100 bed days
AMIODARONE	78.01
CLOPIDOGREL	33.93
SPIRONOLACTONE	13.45
ASPIRIN	12.05
PHENIRAMINE	8.84
METFORMIN	6.87
ATORVASTATIN	2.156448
METOPROLOL	1.215645
AMLODIPINE	1.131078
DOBUTAMINE	1.057082

Discussion:

Different studies on drug utilization have revealed wide geographical differences in use of same groups of drugs. Drug utilization study addresses the relationship between the recommended therapeutic practice and actual clinical practice. Despite the advances in detection, treatment and management of acute coronary syndrome, it continues to be a significant contributor to the mortality and morbidity attributed to cardiovascular

diseases, even in developing countries. [5] Prompt and early detection of cardiovascular emergencies and immediately initiation of therapy are therefore necessary for reduction in mortality and morbidity a due to cardiovascular emergencies. [6] Drug utilization among out patient is frequently monitored in many countries but the studies on inpatients are rare and incomplete.

With urbanization in developing world especially India, the prevalence and risk

factors for IHD is increasing rapidly and majority of the global burden of IHD is now occurring in low and middle income countries like India. [7]

Mean age of patients in current study was 55.68 ± 9.48 years and most affected age group was 51-60 years; these values were similar to that from contemporary studies. [8-10]

In current study males were affected more than females which corresponds to current epidemiological data and published studies. [11,12] Mortality rate in current study was 9.17% which was comparable with 9.76% of Vakade et al., 2016. [13]

Most common co-morbid conditions associated with myocardial infarction was hypertension (61.50%) which was higher than that found in Prabhakaran et al., 2008 (44.4%) [6]; Christian et al., 2014 (44.7%) [14]; Vakade et al., 2016 (42.24%) [13]; Lakshmi et al., 2017 (22.4%) [15]. Average number of drug per prescription was 9.37 ± 3.01 ; higher than WHO prescribed indicator of 1.6 ± 1.8 which can be attributed to associated co-morbid conditions with myocardial infarction. [16] Mean hospital stay in current study was 1.35 ± 1.17 days; which was lower than that found in Nagabhushan et al., 2015 (4.79 ± 1.9 days) [17]; Vakade et al., 2016 (5.75 days) [13] and Christian et al., 2014 (4.42 ± 1.9 days) [14].

Generic drugs were prescribed up to 61.05% in current study which was lower than WHO prescribed 100% [16]; but higher than Lakshmi et al., 2017 (37.29%) [15]; Nagabhushan et al., 2015 (52.9%) [17] and Christian et al., 2014 (19.5%) [14]. Drugs from essential drug list [18] were prescribed up to 90.02% in current study which was lower than WHO prescribed 100% [16]; but higher than Lakshmi et al., 2017 (50.84%) [15]; Nagabhushan et al., 2015 (75.1%) [17]. Fixed drug combinations were prescribed as low as 1% in current study

which was much lower than 60% found in Ramesh et al., 2015 [19]. Cost per case was ₹ 1023.05 in current study which was lower than that found in Christian et al., 2014. [14] Amongst all the drug cost, streptokinase accounted for 56.91%.

Percentage of encounters with an injection prescribed in current study was 50.44% which was higher than WHO prescribed 13.4-24.1%; [16] but lower than 100% found in Nagabhushan et al., 2015. [17] Antibiotics were prescribed up to 1.99% in current study which was much lower than WHO prescribed 20.0-26.8%. [16] Most prescribed antibiotics in current study were ceftriaxone 42 (0.75%) and augmentin 21 (0.46%). Major drugs prescribed for myocardial infarction in current study were Aspirin 517 (86.17%), Clopidogrel 509 (84.83%), Atorvastatin 509 (84.83%), Streptokinase 428 (71.33%), Enoxaparin 544 (90.66%).

Most prescribed antihypertensive drugs in current study were metoprolol 369 (61.50%), enalapril 214 (35.67%) and furosemide 104 (17.33%). Other non-cardiac medication prescribed were Pantoprazole, which was prescribed in 556 (92.67%); ondansetron in 499 (83.31%) and alprazolam was prescribed in 164 (27.33%). Tramadol was prescribed in 16 (2.67%) for pain management in current study which was not according to Grade 1 recommendation of ACC/AHA guidelines; which recommend morphine for pain management. [20,21]

Conclusion:

Current study reflects myocardial infarction affects frequently amongst males of 51-60 years with hypertension; lower mortality and morbidity rate can be observed with utilising majority of medication being generic drugs and in essential medicine list to achieve cost-effective treatment.

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