

# A retrospective study of prescription pattern and cost analysis of selected drugs used in coronary artery disease and angioplasty patients

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## Abstract

Coronary Artery Disease (CAD) is a condition wherever the vascular supply to the heart is obstructed by fatty tissue, occlusion or spasm of coronary arteries. There is increasing importance of prescription pattern monitoring studies (PPMS) due to a lift in promoting of latest medicine, variations in pattern of prescribing and consumption of medication, growing concern regarding drug interactions, price of medication and pattern of prescription. The present study was planned to assess the prescription pattern and cost of selected drugs used in Coronary Artery Disease and Angioplasty patients. The drug prescription pattern was noted from cardiology department of multi specialty tertiary care hospital and cost analysis was performed for the selected drugs. The data was collected by using structured data collection form. A total of 107 prescriptions were analysed from 240 patient records. Most of the patients diagnosed with coronary artery disease were in the age group of 61-70 years (41.12 %). The cost difference between Atenolol and Metoprolol were statistically significant ( $P<0.01$ ). The most common classes of drugs prescribed were antihypertensives, antiplatelets, antianginals and antihyperlipidemics. The study results showed that the inappropriate use of drugs in CAD increases the cost of treatment and in long term this may even contribute to drug related problems. Interventions are necessary to improve rational drug use of drugs.

**Keywords:** Prescription pattern, Cost, CAD, Angioplasty.

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Received Date: 21/08/2016 Revised Date: 25/09/2016 Accepted Date: 15/10/2016

Access this article online	
Quick Response Code:	Website: <a href="http://www.statperson.com">www.statperson.com</a>
	Volume 6 Issue 4

## INTRODUCTION

Coronary heart disease (CHD), sometimes described as coronary artery disease (CAD), is a condition where the vascular supply to the heart is impeded by atherosclerosis, thrombosis or spasm of coronary arteries.<sup>1</sup> Coronary artery disease has emerged as an epidemic in India. According to the projections of National Commission and Macroeconomics and Health, Government of India, the

total no. of coronary artery disease (CAD) patients in India at the turn of the century was 30 million which could increase to more than 60 million by the year 2015.<sup>2</sup> This study attempts to analyze the prescription patterns of drugs used in the treatment coronary artery disease and angioplasty in order to ensure appropriate drug use to reduce the morbidity and mortality of the disease and reduce the unnecessary economic burden on the patient. The findings of this study are expected to provide relevant and useful feedback to physicians.<sup>3</sup> Prescription Patterns explain the extent and profile of drug use, trends, quality of drugs, and national guidelines like guidelines of American heart association. There is increasing importance of prescription pattern monitoring studies (PPMS) because of a boost in marketing of new drugs, variations in pattern of prescribing and consumption of drugs, growing concern about drug interactions, cost of drugs and pattern of prescription.<sup>4</sup> As pharmacists, we have a unique responsibility to study and communicate the price variation between brands and to better

understand the effect of prices on prescription behavior. We embarked on this study to ascertain the degree of price variation among brands of the same generic in order to understand the market and marketing dynamics of the Indian pharmaceutical market.<sup>5</sup> Physicians should be familiar with the cost of drugs used in the coronary artery disease. This can be educated through continuous medical education programs for physician and pharmacists.<sup>6</sup> The cost effective treatment is also possible through doctors prescribing the drugs in consultation with the pharmacist in the hospital.<sup>7</sup> The present study was planned to assess the prescription pattern and cost of selected drugs used in Coronary Artery Disease and Angioplasty patients.

## MATERIALS AND METHODS

The study was a Retrospective Observational Study conducted using a specifically designed study proforma. The Study was conducted in a multi specialty tertiary care hospital. The study was approved by Institutional Ethics Committee. The study was carried out for a period of one year. Total of 240 patient records were screened, 107 patient records were selected based on the following inclusion and exclusion criteria for further study.

### Inclusion Criteria

Patients with coronary artery disease and angioplasty. Both male and female having age from 20 to 95 years.

### Exclusion Criteria

Incomplete prescription and case files without diagnosis of CAD and angioplasty were excluded from the study

### Data Entry Form

A specially designed data entry format was used in this study. It consist of the following details name, age, sex, reason for admission, past medical history, past medication history, family history, social history, diagnosis and therapeutic chart containing dose, frequency, cost analysis, drug interactions and length of stay in the hospital.

### Statistical Analysis

The collected data was analyzed by using graph pad prism version 6.07. The student 't' test was used to compare the cost of therapy with confidence interval of 95%. Data have been expressed as mean  $\pm$  standard deviation (SD).

## RESULTS

### Demographic Data

CAD group patients were divided in to 7 classes as per the age group. Most of the patients were in the age group of 61-70 years. The mean age of study population was  $60.7 \pm 11.5$  Years. (Table 1) From the study population, 69.1% was male and 30.8% was female.

**Table 1: Age Wise Distribution (n=107)**

Age (Years)	No. of Patients	Percentage (%)
30-40	03	2.80 %
41-50	14	13.08 %
51-60	29	27.10 %
61-70	44	41.12 %
71-80	12	11.21 %
81-90	04	3.73 %
91-95	01	0.93 %
Mean Age		$60.7 \pm 11.5$ Years

### Pattern of Social History

In pattern of social history 13.0% patients were alcoholic, 9.34% patients were smoker, 22.4% patients were alcoholic and smoker, and 5.60% patients were tobacco users. (Table 2)

**Table 2: Pattern of Social History (n=107)**

Social History	No. of Patients	Percentage
Alcoholic	14	13.0 %
Smoker	10	9.34 %
Alcoholic and Smoker	24	22.4 %
Tobacco	6	5.60 %
Others	53	49.53 %

### Co - Morbidity Assessment

In the 107 study population, 21 (29.5%) patients with hypertension, 23 (32.3%) patients with diabetes mellitus, 3 (4.22%) patients with CCF and UTI, 6 (8.45%) patients with dyslipidemia and 4 (5.63%) patients with hypothyroidism.(Table 3)

**Table 3: Pattern of Co-Morbidities**

Clinical Conditions	No. of Patients	Percentage
Hypertension	21	29.5%
Diabetes mellitus	23	32.3%
Cardiac myopathy	01	1.40%
Congestive cardiac failure	03	4.22%
Hepatitis	01	1.40%
Mitral regurgitation	01	1.40%
Dyslipidemia	06	8.45%
Psoriasis	01	1.40%
Chronic kidney disease	02	2.81%
Sepsis	01	1.40%
Hypothyroidism	04	5.63%
Asthma	02	2.81%
Anemia	01	1.40%
Urinary tract infections	03	4.22%
Ascites	01	1.40%

### Length of Stay in Hospital

In this study population, a total of 63 patients were stayed in hospital during the study period. Six patients were stayed in the hospital for one day (9.52%) and, 12 (19.0%) patients stayed in hospital for 3 days, The

percentage of the patient stayed in the hospital for more than 5 days was 23.8%. (Table 4)

**Table 4:** Length of Stay in Hospital

Length of Stay	No. of Patients	Percentage
1 day	6	9.52%
2 days	10	15.8%
3 days	12	19.0%
4 days	11	17.4%
5 days	9	14.2%
More than 5 days	15	23.8%

### Prescription Pattern Analysis

In the study population, 175 (17.5%) drugs were antihypertensives, 152 (15.2 %) drugs were antiplatelets, 112 ( 11.2%) drugs were antianginals, 108 (10.8%) drugs were antiulcer agents, 98 (9.81%) drugs were NSAIDs, 111 (11.1 %) drugs were antihyperlipidemic agents, 55 (5.51%) drugs were anticoagulants, 44 (4.40%) drugs were benzodiazepines, 15(1.50%) drugs were antiemetics, 32 (3.20%) drugs were antibiotics, 30 (3%) drugs were antidiabetics, 28 (2.80%) drugs were sedatives and 38 (3.80%) drugs were miscellaneous.(Table 5)

**Table 5:** Prescription Pattern Analysis

Classes of Drugs	Number of Prescription	Percentage
Antihypertensives	175	17.5 %
Antiplatelets	152	15.2 %
Antiangular	112	11.2 %
Antiulcer agents	108	10.8 %
NSAIDs	98	9.81 %
Antihyperlipidemics	111	11.1 %
Anticoagulants	55	5.51 %
Benzodiazepines	44	4.40 %
Antiemetics	15	1.50 %
Antibiotics	32	3.20 %
Antidiabetics	30	3.00 %
Sedatives	28	2.80 %
Miscellaneous	38	3.80 %

### Cost Analysis of Selected Drugs

The mean cost of Atenolol once daily and twice daily was found to be  $65.10 \pm 4.85$  and  $84.42 \pm 53.9$  rupees respectively. The cost difference between Atenolol and Metoprolol were statistically significant ( $p<0.01$ ). The mean cost of Nicorandil and Ivabradine twice daily therapy was found to be  $687.6 \pm 65.99$  and  $571.5 \pm 285.80$  rupees respectively. The cost difference between Nicorandil and Ivabradine was statistically significant. ( $p<0.01$ ) The mean cost of Clopidogrel and Ticagrelor once daily was found to be  $158.1 \pm 7.559$  and  $1647 \pm 133.8$  rupees respectively. The cost difference between Clopidogrel and Ticagrelor were statistically significant ( $p<0.01$ ). (Table 6)

**Table 6:** Cost Comparison of Prescribed Drugs in CAD

Drug Name	Frequency	Cost (Rs)
Atenolol	OD	$65.10 \pm 4.852$
	BD	$84.42 \pm 53.90^*$
Metoprolol	OD	$155.9 \pm 80.27^{**}$
	BD	$333.4 \pm 168.1^*$
Nicorandil	OD	$342.6 \pm 35.49^*$
	BD	$687.6 \pm 65.99^{**}$
Ivabradine	OD	$298 \pm 149.9$
	BD	$571.5 \pm 285.8$
Clopidogrel	OD	$158.1 \pm 7.559$
	BD	$316.2 \pm 13.88$
Ticagrelor	OD	$1647 \pm 133.8^{**}$
	BD	$3254 \pm 249.0^{**}$

Rs. – Rupees, OD - Once Daily, BD - Twice Daily, \*  $P < 0.05$  \*\* $P < 0.01$

### DISCUSSION

In past few years many research studies have been performed worldwide to understand the safe and effective drug utilization indicating that irrational drug use is an universal phenomenon. India is becoming the global epicenter for various diseases like CAD and diabetes. So there is a need to curtail the risk factor as well as develop a suitable treatment pattern for these diseases.<sup>8</sup> This study aim to promote the prescription pattern and cost analysis of selected drugs used in CAD and angioplasty in cardiac patients. The study includes 107 patients with coronary artery disease and angioplasty in which 69.1% accounts for males and 30.8% accounts for females and most of the patients were in the age group of 61-70 years. A study conducted in global hospital Hyderabad concluded that 72% of CAD cases accounts for males and cases reported for females are 27% majority of patients were in the age group of 65years. The result of this study was found to be similar with above studies and indicated that males are more prone to coronary artery disease.<sup>9</sup> In this study population about 71% of patients had co morbidities and 36% of patients without co-morbidities Diabetes Mellitus 32%, hypertension 29%, and dyslipidemia 8% were commonly prevalent co morbidities in our study. The study conducted in a tertiary care hospital of Western Maharashtra results showed that 41% of patients with hypertension and 19% of patients with diabetes mellitus. It shows the given study is similar to our study<sup>10,11</sup> A study conducted in a tertiary care hospital, Bangladesh by Abdulmuhit *et al.*, also concluded that that main clinical conditions were diabetes mellitus 23% and hypertension 28% which is similar to our study.<sup>12</sup> In present study, the drug prescription rates of various classes of CAD mainly include antihypertensives 17%, antiplatelet 15%, antiangular 11%, anti ulcers 10%, and lipidemic agents 9% were given to the patients. As the current study clopidogrel was economical one compared with

Ticagrelor. Kannur Medical College study results showed that antihypertensives 56%, antiplatelets 99%, antihyperlipidemic drugs 92% were mostly given to CAD Patients.<sup>13</sup> According to the study conducted in global hospital, Hyderabad, antihyperlipidemics 95%, antiplatelets 99% and antihypertensives 64% were mostly given to the patients.<sup>9</sup> The result of the given two studies was similar to our study. In the present study  $\beta$  blockers (Atenolol) 17% were mostly prescribed to the patient. As per this study Atenolol was cost effective compared with Metoprolol. A study conducted in a cardiology outpatient department by G. Divya *et al.*, summarized that the most frequently prescribed drugs are antihypertensives,  $\beta$  blockers 28% and diuretics 24% which was similar to our study.<sup>14</sup>

## CONCLUSION

In this study prescription pattern and cost analysis of selected drugs for CAD and angioplasty in cardiac patients were determined. The most common classes of drugs prescribed were antihypertensives, antiplatelets, antianginals and antihyperlipidemics. In cost analysis, cost of selected categories such as antihypertensives, antiplatelets, and antianginals, were determined. Atenolol, Nicorantil and Ticagrelor were identified as economic drug compared with others. The study concluded that ineffectiveness of prescription pattern leads to irrational use of medicines and poor patient compliance. The study results showed that the inappropriate use of drugs in CAD increases the cost of treatment and in long term this may even contribute to drug related problems. Interventions are necessary to improve rational drug use of drugs.

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Source of Support: None Declared

Conflict of Interest: None Declared