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TRENDS IN THE USE OF GUIDELINE RECOMMENDED MEDICATIONS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION IN AN INDIAN POPULATION

Introduction

Cardiovascular disease is one of the leading causes of death in India, not only in rural areas, but also in urban areas. In the world burden of sickness study, associate calculable CVD death rate of 272 per hundred thousand population in India is ascertained, which is higher than the world average of 235 per 100,000 population.¹ Years of life lost because of CVD in India increased by 59%, from 23.2 million (1990) to 37 million (2010). The progression of the epidemic is characterized by the reversal of socioeconomic gradients such as - tobacco use, low fruit and vegetable intake which have become more prevalent among those from lower socioeconomic backgrounds. In addition, people from lower socioeconomic backgrounds often have

limited access to healthcare, resulting in poorer outcome. In comparison with the people of European ancestry, CVD affects Indians at least a decade earlier and in their most productive life years. Compared to CVD death in Western populations of twenty-three before the age of seventy years, in India, it is fifty-two. In addition, case fatality attributable to CVD in low-income countries, like India, appears to be much higher than in middle- and high-income countries.

Myocardial infarction or acute myocardial infarction (AMI) is common presentation of coronary artery disease. It is commonly called as heart attack. According to WHO (World health organization) 12.2% of worldwide deaths were from ischemic heart disease. The most common symptom is pain or discomfort which can travel into the shoulder, arm, back, neck, or jaw. Often it is in the centre or left side of the chest & lasts for more than few minutes, without prompt treatment, this can lead to damage to the affected part of the heart. More than 10 million cases per year in India are reported. Onset of symptoms in MI is usually gradual, over several minutes, and rarely instantaneous. Chest pain is the most common symptom of acute MI and is described as sensation of tightness, pressure, or squeezing. Radiating pain in upper abdomen may mimic heartburn. The most outstanding risk factors for MI are older age, actively smoking, high pressure level, DM, and total cholesterol and HDL levels. Many risk factors of myocardial infarction are shared with coronary artery disease, the primary cause of myocardial infarction.

Myocardial infarction requires immediate medical attention. Treatment aims to preserve the maximum amount of cardiac muscle as possible, and to prevent further complications. Treatment depends on whether or not the infarct could be a STEMI or NSTEMI. Treatment typically aims to unblock blood vessels, scale back blood clot enlargement, scale back



ischemia, and modify risk factors with the aim of preventing future MIs. In addition, the treatment for myocardial infarctions with ECG proof of ST elevation (STEMI) is PCI, though it is ideally conducted within 1–3 days for NSTEMI.

Patients who have had an acute coronary syndrome (ACS) are at increased risk of recurrent cardiovascular events like poor oxygen supply to the heart which eventually leads to death. However, high-risk patients who may derive the greatest benefit from guideline-recommended therapies are often undertreated. Drugs are the bedrock of treatment and prevention of cardiovascular diseases. Factors like low utilization rates of evidence-based medicine, high drug cost and prolonged duration of therapy affect the rational usage of cardiovascular drugs. Multiple large-scale clinical trials have shown that the effectiveness of many cardiac medication treatments, such as combination antiplatelet therapy, β -Blockers, Angiotensin-converting enzyme inhibitors (ACEI), and statins, significantly reduce mortality of patients with AMI. These types of beneficial therapies have been widely incorporated into international and national guidelines. In India, some previous studies have documented the use of ACCA/AHA guideline-recommended medications for AMI and ACS patients. The extent to which these medications are used has changed overtime and whether such changes are associated with improved clinical outcomes is still unknown.

The study of prescribing pattern is a component of medical audit that does monitoring and evaluation of the prescribers as well as recommends necessary modifications to achieve rational and cost-effective medical care. Irrational prescribing of drugs is of common occurrence in clinical practice, important reasons being lack of knowledge

about drugs, unethical drug promotions and irrational prescribing habits of clinicians. Inappropriate prescribing habits lead to ineffective and unsafe treatment, prolongation of illness, distress and unnecessary economic burden to the patient. Erroneous prescriptions are recognized even in the tertiary care hospital. For our study, we selected many cardiac medications together with aspirin, clopidogrel, β -Blockers, ACEI/ARB and statins, that were suggested for both acute ST-segment (STEMI) and non-ST-segment elevation MI (NSTEMI) patients in order to analyse the temporal trends, factors associated with early use of these medications and their impacts on these patients in an Indian population.

Objective

The objective was to study the temporal trends used in the prescription following guidelines recommended in the treatment of ACS/AMI in an Indian population at a tertiary care hospital in South India.

Methods

This study was a retrospective observational study carried out in a 340-bed multispecialty hospital in South India over a period of 6 months (September 2018-march 2019). From the medical record department, data including inpatient prescriptions, medication charts, medication history charts, admission and discharge record book of respective departments physician and nurse notes, lab data, in-patient initial assessment form, ECG chart and discharge chart was obtained. All patients aged greater than 18 who were admitted in ER and inpatient department with both newly diagnosed and pre-existing MI were included and their charts were studied. Main causes of myocardial infarction are age, hereditary, lifestyle, stress, obesity, diabetes, alcohol consumption, etc.



Pediatric population, pregnant women, undiagnosed patients and those with incomplete case record sheets were excluded from the study. The patient information was collected in a predefined data collection form. Alternatively, these case charts were analyzed. The ACC/AHA prescription guidelines for cardiovascular disease, tertiary resources, Micromedex, Medscape and reference articles were used as tools to review the prescription and case charts. Since the data in our study was collected from the Medical Records Department, we could not get written informed consent for included participants. To protect patient privacy, the patient records were anonymized prior to analysis. IRB approval was obtained prior to start of the study. The data was analyzed and the results were expressed as counts and percentage in graphical and tabular form.

Results

This study had provided a picture of

Table 2: The age distribution in the study population

Patient Age	No. of females	No. of males	Total number	Percentage
30-39	3	3	6	4
40-49	8	5	13	8.7
50-59	11	20	31	20.7
60-69	16	29	45	30
70-79	8	30	38	25.3
80-89	9	5	14	9.3
90-99	1	2	3	2
Total	56	94	150	----

cardiovascular drug prescribing patterns. Along with medication other methods followed for treatment of MI are percutaneous coronary intervention and CABG (Coronary artery bypass grafting). The overall study data are represented in table 01.

Table 1: The various characteristics in the study

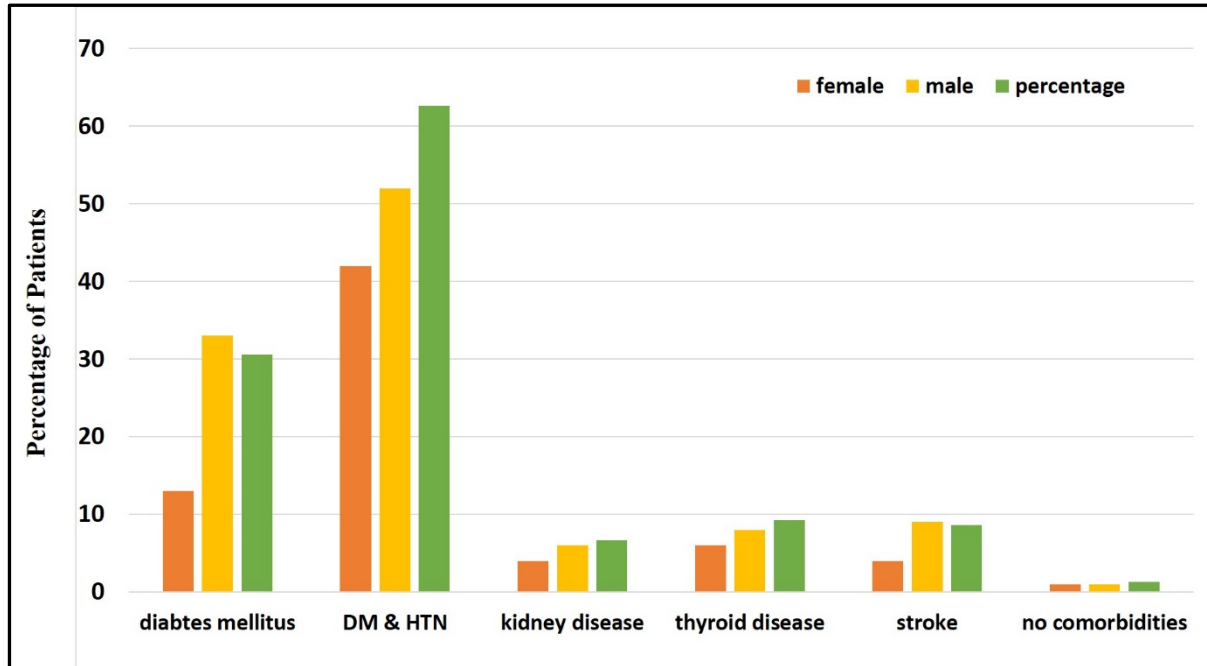
Characteristics	Numbers
Total no. of patient's prescriptions analysed	150
Total no. of drugs prescribed	1200
Average number of drugs per prescription	8
No. of prescriptions complied with the guidelines	148

Patient characteristics

The study comprised of 150 patients from varying age groups. 56 (37%) were female and 94 (63%) were male. On observation, the most affected age group for both genders was 60-69, whereas the least affected age group was 90-99. The pattern of patient age distribution of the study populations is shown in Table 2.



Figure 1: Distribution of comorbidities in the study population



Comorbidities

It was observed in the sample that some patients had comorbidities which most likely predisposed them to cardiovascular disease. These included Diabetes Mellitus, Thyroid Disease, Kidney disease, Combination of Hypertension and Diabetes Mellitus to mention but a few. Out of 150 patients, 94 patients from the sample suffered from both diabetes mellitus and hypertension. A majority of patients suffered from diabetes mellitus (30.6%), whereas 8.6% patients had a past history of CVA, followed by kidney disease (6.66%), and thyroid disease (9.3%). Of all these 150 patients, only 1.3% had no comorbidities (Figure 01).

Drug therapy in MI patients

In all of the 150 patients observed, it was found that none of them were on monotherapy, rather they were prescribed with combination drug therapy after being diagnosed with MI.

Use of guideline recommended medications

The AHA/ACCA guidelines recommend the use of dual antiplatelet therapy, beta blockers, Angiotensin Converting Enzyme Inhibitors, Angiotensin Receptor blockers and Statins. In this study, the drugs were used as shown in table 3.



Table 3: The commonly prescribed drugs used during the study period

Drug Class	No. of patients	Percentage
Antiplatelet drugs		
Aspirin	145	96.6
Clopidogrel	124	82.6
Ticagrelor	28	18.6
Lipid lowering drugs		
Atorvastatin	134	89.3
Rosuvastatin	4	2.6
Diuretics		
Torsemide	5	3.3
Furosemide	65	43.3
Spironolactone	8	5.3
Anticoagulants		
Heparin	131	87.3
Warfarin	5	3.3
Enoxaparin	12	8
Dabigatran	4	2.6
Ceftriaxone	44	29.3
Nitrates		
Isosorbide mononitrate	2	1.3
Isosorbide dinitrate	17	11.3
Nitroglycerin	9	6
Glyceryl trinitrate	13	8.6
Ranolazine	10	6.6
Anti hypertensives		
ACEI		
Ramipril	48	32
Enalapril	4	2.6
Beta blockers		

Bisoprolol	17	11.3
Metoprolol	30	20
Nebivolol	49	32.6
Carvedilol	13	8.6
ARBS		
Telmisartan	8	5.3
Losartan	7	4.6
CCBS		
Diltiazem	9	6
Cilnidipine	13	8.6
Sedatives		
Morphine	19	12.6
Fentanyl	28	18.6
Midazolam	27	18
Others		
Amiodarone	15	10
Tirofiban	7	4.6
Lignocaine	4	2.6
Modafinil	5	3.3

Frequency of route of administration

The most common route of administration was oral (63%) followed by sub cutaneous (52%), intravenous (26%) and sublingual (8%).

Discussion

Myocardial infarction is a major cause of death and disability worldwide. Coronary atherosclerosis is a chronic disease with stable and unstable periods. During unstable periods with activated inflammation in the vascular wall, patients may develop a myocardial infarction. Myocardial infarction may be a minor event in a lifelong chronic disease, it may even go undetected, but it may also be a major catastrophic event leading to sudden death or severe haemodynamic deterioration. A myocardial infarction may be the first manifestation of coronary artery disease, or it may occur, repeatedly, in patients with established disease. Currently, India leads the world with the largest number of myocardial



infarction subjects and this is expected to further rise in the coming years. The study of prescribing pattern is a component of medical audit that does monitoring and evaluation of the prescribing practice of the prescribers as well as recommends necessary modifications to achieve rational and cost-effective medical care.

Myocardial infarction is associated with complications may lead to premature death, but people with myocardial infarction can take steps to control the disease and lower the risk of complications by compliance to diet, regular exercise and medicines. In this retrospective observational study, among 150 cases of myocardial infarction, 63% males and 37% females were analysed. Considering the uncertainty of AMI patients and the various classes of drugs to be used in the treatment, the physician has to weigh the pros and cons of each and every drug before using it.

Prescribing pattern of cardiac drugs

According to the ACC/AHA guidelines¹¹, patients that are diagnosed with AMI, the treatment pattern is to use dual antiplatelet therapy with a beta blocker, ACE inhibitors, a statin and a second anticoagulant drug. In our study, antiplatelets, aspirin (96.6%) and clopidogrel (82.6%) were used, alongside beta blockers- nebivolol (32.6%), metoprolol (20%), bisoprolol (11.3%), carvedilol (8.6%), and ACEIs ramipril (32%) and enalapril (2.6%). In the cases where ACEIs were not tolerated, ARBs like telmisartan (5.3%) and losartan (4.6%) were used. Atorvastatin (89.3%) was the primary lipid lowering agent and heparin (87.3%) was the drug of choice from the anticoagulant group. For patients with ACS and reduced ejection fraction, ACEIs are recommended in order to reduce mortality and if these are not tolerated, ARBs were used instead. Statins should be added to

prevent further cardiovascular events. In our study, ACEIs are used more instead of ARBs which is what was recommended according to the guidelines.

Effects of the use of guidelines in treatment of ACS/AMI

Marlous Hall et al.⁴ showed that there has been a global decline in the rates of death following acute coronary syndrome (conditions such as heart attack or unstable angina) and this has been credited to the use of guideline-indicated treatments for management of non-ST-elevation myocardial infarction (NSTEMI). The same was observed in conclusion of this study, following the guidelines helped to reduce the rates of hospital mortality after myocardial infarction.

Conclusion

There has been a significant improvement in the management of AMI patients but they are still undertreated with guideline-recommended therapies.⁶ Nevertheless, in our study the hospital followed the guidelines in 98.6% of the cases whereas in the remaining cases the guidelines could not be followed because the patient did not respond well to the guideline recommended therapy.

Abbreviations

CVD- cardiovascular disease; **AMI-** acute myocardial infarction; **DM-** diabetes mellitus; **ACS-** acute coronary syndrome; **CVA-** cerebrovascular accident; **ACC-** american college of cardiology; **AHA-** american heart association; **PCI-** percutaneous coronary intervention; **STEMI-** ST elevation myocardial infarction; **NSTEMI-** non ST elevation myocardial infarction; **ACEIs-** angiotensin converting enzyme inhibitor; **ARBs-** angiotensin receptor blockers; **CCBs-** calcium



channel blockers.

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