Original Research Article

Drug prescribing pattern in patients of myocardial infarction in a tertiary care teaching hospital of North India

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ABSTRACT

Background: The term acute myocardial infarction (MI) should be used when there is evidence of myocardial necrosis in a clinical setting consistent with acute myocardial ischemia. Aims of this study were to assess drug prescribing pattern in patients of myocardial infarction and to compare prevalence of MI according to age, gender, diet, smoker or non-smoker, alcoholic or non-alcoholic, family history of cardiovascular disease.

Methods: This observational study was conducted at department of pharmacology, in association with department of cardiology and included all patients of myocardial infarction visiting cardiology outpatient department or indoor patients and proforma was used to evaluate drug prescribing pattern.

Results: Total 200 patients of acute myocardial infarction were analysed. Incidence of MI was more common in males (76%); age group 51-60 years (28.5%); non-vegetarians (68.5%); smokers (52.5%) and reduced physical activity (70.5%). 59.5% of patients had family history of cardiovascular disease. Commonly prescribed drugs were antiplatelets (100%) followed by hypolipidemic (99.5%), proton pump inhibitors (92%), antianginal (90.5%), anticoagulants (68.5%), thrombolytics (24.5%).

Conclusions: This study provides insight towards drug prescribing pattern in MI patients. Most frequently prescribed drugs were antiplatelets followed by hypolipidemic and proton pump inhibitors. Patients had multiple risk factors and these can be reduced by lifestyle modifications.

Keywords: Myocardial infarction, Prescribing pattern, Drugs, Cardiovascular disease, Aspirin

INTRODUCTION

Cardiovascular disease (CVD) is now the most common cause of mortality accounting for approximately 16 million deaths worldwide (30%) in 2010, including nearly 40% of deaths in high-income countries and about 28% in low- and middle-income countries.1 According to World Health Statistics in 2015, of total 56 million deaths, an estimated 40 million deaths (70%) occurred due to non-communicable diseases of which cardiovascular diseases caused 17.7 million deaths (45%).2

Acute myocardial infarction (MI) is clinical syndrome that results from sudden occlusion of coronary artery which causes infarction of cardiac myocytes in region supplied by that artery.3 The area of the muscle that has either zero flow or so little flow that it cannot sustain cardiac muscle function is said to be infarcted. The term acute MI should be used when there is evidence of myocardial necrosis in a clinical setting consistent with acute myocardial ischemia.
The incidence of MI in India is 64.37/1000 people in men aged 29-69 years. Prevalence of coronary artery disease (CAD) has increased from 2% to 4% in rural India and from 3.45% to 9.45% in Urban India over last 60 years.3,5 Dyslipidaemia, smoking, hypertension, type 2 diabetes mellitus, physical inactivity, low intake of fruits and vegetables, central obesity, type A personality, family history of CAD and psychological distress are common risk factors.3,6 Insulin resistance syndrome, lipoprotein a, atherogenic dyslipidaemia phenotype and some newer emerging risk factors (homocysteine, plasminogen activator inhibitor, fibrinogen, infection, inflammation) suggest genetic susceptibility.2 Cigarette smoking causes marked inhibition of substance P induced tissue plasminogen activator release in vivo and this could provide mechanism whereby endothelial dysfunction may increase risk of atherosclerosis through decrease in acute fibrinolytic capacity.7 Elevated blood pressure is an early indicator of the epidemiologic transition. Worldwide, approximately 62% of strokes and 49% of CAD are attributable to suboptimal (>115 mmHg systolic) blood pressure, which is believed to account for more than 7 million deaths annually.1 The important complications of acute MI are arrhythmias, congestive heart failure, cardiogenic shock, mural thrombosis and thromboembolism, rupture, aneurysm, pericarditis and post MI syndrome.8 The aims of the present study were to assess drug prescribing pattern in patients of MI and to compare prevalence of MI according to age, gender, diet, smoker or non-smoker, alcoholic or non-alcoholic, family history of cardiovascular disease.

METHODS

It was prospective observational drug prescribing pattern study. The study was conducted at Department of Pharmacology, Government Medical College Jammu in association with Department of Cardiology, Superspeciality Hospital, Jammu for period of 6 months i.e. from February to July 2018. All observations were recorded in preformed proforma made to evaluate drug prescription pattern in MI patients.

Inclusion criteria

Inclusion criteria were all patients of MI visiting cardiology OPD/indoor patients during study period, patients of either sex will be included and patients of any age group will be included.

Study material used

Proforma to evaluate drug prescription pattern in MI patients.

Study was initiated after Institutional Ethics Committee approval. Demographic details of the patients, comorbid conditions, associated risk factors and drug related details such as most common drug groups, dosage form, route and frequency of administration were recorded.

Statistical analysis

Data were entered into microsoft excel (windows 7) and analysis was done. Descriptive statistics such as frequencies and percentages were calculated for categorical variables. Graphic representation is used for visual interpretation of analyzed data.

Ethical approval

The study was approved by the Institutional Ethics Committee of Government Medical College Jammu, India (vide no. I.C/2018/532).

RESULTS

During the study period, total 200 patients of acute MI visiting cardiology OPD and indoor were analysed.

Age distribution of patients

All the patients under study aged more than 30 years. Highest incidence of MI was found in age group 51-60 (57, 28.5%) and lowest incidence in age group 31-40 (9, 4.5%) and 1 patient was found of more than 90 years age (Figure 1).

Figure 1: Age wise distribution of total patients of MI.

Gender distribution of patients

Incidence of MI was more common in males (152, 76%) than females (48, 24%) among 200 analysed patients suggesting that MI is more common in males.
Diet wise distribution of patients

Dietary history showed that 63 patients (31.5%) were vegetarians and 137 patients (68.5%) were non-vegetarians indicating that MI is more prevalent in non-vegetarians.

Smoking and alcoholic wise distribution of patient

105 patients (52.5%) were smokers and 95 patients (47.5%) were non-smokers. 65 patients (32.5%) were alcoholic and 135 patients (67.5%) were non-alcoholic.

Family history of patients

119 patients (59.5%) had family history of cardiovascular disease and 81 patients (40.5%) didn’t have.

Physical activity wise distribution of patients

In our study, we found that 141 patients (70.5%) of MI don’t do daily physical activity.

Comorbidities

Hypertension (188, 94%) and diabetes mellitus (51, 25.5%) were most common associated comorbidities. Others were congestive heart failure (10, 5%), chronic obstructive pulmonary disease (8, 4%), arrhythmia, cerebrovascular accident and previous MI (Table 1).

Table 1: Comorbidities associated with MI patients.

| Comorbidities                                | No. of patients (N) | Percentage of patients (%) |
|----------------------------------------------|---------------------|---------------------------|
| Hypertension                                 | 188                 | 94                        |
| Diabetes mellitus                            | 51                  | 25.5                      |
| Congestive heart failure                     | 10                  | 5                         |
| Chronic obstructive pulmonary disease        | 8                   | 4                         |
| Arrhythmia                                   | 3                   | 1.5                       |
| Hypothyroidism                               | 3                   | 1.5                       |
| Cerebrovascular accident                     | 2                   | 1                         |
| Previous MI                                  | 1                   | 0.5                       |
| Drug induced parkinsonism                    | 1                   | 0.5                       |

Drug prescription pattern

Commonly prescribed drugs were antiplatelets (100%) followed by hypolipidemic (99.5%), proton pump inhibitors (92%), antianginal (90.5%) and anticoagulants (68.5%) (Figure 2).

Among anti-platelet drugs, combination of aspirin and clopidogrel were given to 168 (84%) patients, 9 patients received combination of aspirin and ticagrelor and 3 patients were given combination of aspirin and prasugrel (Table 2).

Table 2: Antiplatelet drugs given to MI patients.

| Antiplatelet drug        | No. of patients (N) | Percentage of patients (%) |
|--------------------------|---------------------|---------------------------|
| Aspirin and clopidogrel  | 168                 | 84                        |
| Aspirin and ticagrelor   | 9                   | 4.5                       |
| Aspirin and prasugrel    | 3                   | 1.5                       |
| Aspirin                  | 8                   | 4                         |
| Clopidogrel              | 12                  | 6                         |

Isosorbide dinitrate (147, 73.5%) and glyceryl trinitrate (35, 17.5%) were commonly prescribed antianginal drugs. Newer antianginal drugs such as nicorandil, ranolazine and trimetazidine were also prescribed (Table 3). About 49 patients (24.5%) were given thrombolytics. 47 patients were thrombolysed with streptokinase and 2 patients with reteplase. Majority were not thrombolysed due to late presentation (Table 3).

Among proton pump inhibitors (PPIs), pantoprazole (134, 67%) was most commonly prescribed. Other PPIs given were rabeprazole, omeprazole and esomeprazole. Atorvastatin (182, 91%) and rosuvastatin (17, 8.5%) were hypolipidemic drugs prescribed (Table 3).

Enoxaparin (135, 67.5%) and fondaparinux (2, 1%) were anticoagulants prescribed. Among angiotensin converting enzyme (ACE) inhibitors, ramipril (136, 68%) was most commonly prescribed.
Table 3: Other cardiovascular drugs prescribed to MI patients.

| Class and name of drug       | No. of patients (N) | Percentage of patients (%) |
|------------------------------|---------------------|----------------------------|
| Thrombolytics                |                     |                            |
| Streptokinase                | 47                  | 23.5                       |
| Retepase                     | 2                   | 1                          |
| Anti-anginal                 |                     |                            |
| Isosorbide dinitrate         | 147                 | 73.5                       |
| Glyceryl trinitrate          | 35                  | 17.5                       |
| Nicorandil                   | 26                  | 13                         |
| Ranolazine                   | 12                  | 6                          |
| Trimetazidine                | 1                   | 0.5                        |
| Anti-coagulants              |                     |                            |
| Enoxaparin                   | 135                 | 67.5                       |
| Fondaparinux                 | 2                   | 1                          |
| Hypolipidemics               |                     |                            |
| Atorvastatin                 | 182                 | 91                         |
| Rosuvastatin                 | 17                  | 8.5                        |
| Anti-arrythmics              |                     |                            |
| Diltiazem                    | 3                   | 1.5                        |
| Atropine                     | 4                   | 2                          |
| Ace inhibitor                |                     |                            |
| Ramipril                     | 136                 | 68                         |
| Angiotensin receptor blockers|                     |                            |
| Telmisartan                  | 30                  | 15                         |
| Olmesartan                   | 5                   | 2.5                        |
| Losartan                     | 1                   | 0.5                        |
| Calcium channel blockers     |                     |                            |
| Amlodipine                   | 23                  | 11.5                       |
| Cilnidipine                  | 1                   | 0.5                        |
| Beta-blockers                |                     |                            |
| Metoprolol                   | 93                  | 46.5                       |
| Carvedilol                   | 7                   | 3.5                        |
| Nebivolol                    | 1                   | 0.5                        |
| Labetalol                    | 1                   | 0.5                        |
| Diuretics                    |                     |                            |
| Torsemide                    | 21                  | 10.5                       |
| Furosemide                   | 19                  | 9.5                        |
| Eplerenone                   | 2                   | 1                          |
| Chlorothalidone              | 1                   | 0.5                        |
| Inotropic agents             |                     |                            |
| Dobutamine                   | 6                   | 3                          |
| Dopamine                     | 2                   | 1                          |
| Digoxin                      | 1                   | 0.5                        |
| Adrenergic drug              |                     |                            |
| Noradrenaline                | 6                   | 3                          |

Table 4: Other drugs given to MI patients.

| Name of drug              | No. of patients (N) | Percentage of patients (%) |
|---------------------------|---------------------|----------------------------|
| Opioids                   |                     |                            |
| Morphine                  | 4                   | 2                          |
| Paracetamol               | 8                   | 4                          |
| NSAIDS                    |                     |                            |
| Pantoprazole              | 134                 | 67                         |
| Rabeprazole               | 27                  | 13.5                       |
| Esomeprazole              | 16                  | 8                          |
| Omeprazole                | 3                   | 1.5                        |
| H2 blocker                |                     |                            |
| Ranitidine                | 2                   | 1                          |
| Anti-emetics              |                     |                            |
| Ondansetron               | 6                   | 3                          |
| Domperidone               | 4                   | 2                          |
| Benzodiazepines           |                     |                            |
| Alprazolam                | 42                  | 21                         |
| Clonazepam                | 12                  | 6                          |
| Bronchodilators           |                     |                            |
| Budesonide                | 25                  | 12.5                       |
| Ipratropium bromide       | 34                  | 17                         |
| Salbutamol                | 11                  | 5.5                        |
| Theophylline              | 4                   | 2                          |

Continued.
Telmisartan (30, 15%) was most commonly prescribed angiotensin receptor blocker (ARB). Other ARBs prescribed were olmesartan and losartan (Table 3).

Metoprolol (93, 46.5%), carvedilol (7, 3.5%), nebivolol (1, 0.5%) and labetalol (1, 0.5%) were beta blockers prescribed. Among calcium channel blockers, amlodipine (23, 11.5%) and cilnidipine (1, 0.5%) were prescribed. 7 patients were given anti arrythmias including diltiazem and atropine (Table 3).

Torasemide (21, 10.5%) was most common diuretic used followed by furosemide (19, 9.5%), eplerenone (2, 1%) and chlorthalidone (1, 0.5%). Dobutamine, dopamine and digoxin were inotropic agents given to 9 patients (Table 3).

Morphine was given to 4 patients. 18% patients were given antimicrobials of which ceftriaxone (26, 13.5%) was most common. Benzodiazepines such as alprazolam and clonazepam were given to 27% patients. Among bronchodilator, budesonide (25, 12.5%), ipratropium bromide (34, 17%) and salbutamol (11, 5.5%) were used. Insulin (36, 18%) was most common hypoglycemic used in diabetics and oral hypoglycemics used were metformin (11, 5.5%) and glimepiride (9, 4.5%) (Table 4).

**DISCUSSION**

In this study, total 200 patients were included and their sociodemographic characteristics, risk factors, drug therapy and complications were studied and analyzed. Important risk factors were age, gender, physical inactivity, dietary characteristics, smoking, alcohol intake, family history of cardiovascular disease, hypertension and diabetes.

In our study, most common age group was of 51-60 years (28.5%) which is similar to another study by Chaudhari et al in which 26% patients were of age group 51-60 years and also similar to study by Deshmukh et al (36%).

More commonly, female patients were of age more than 50 years (17%). This increased incidence of MI may be because of loss of cardioprotective effect of estrogen after menopause.

Hypertension (94%) and diabetes (25.5%) were commonly associated comorbidities in our study. This is in accordance to study by George et al and Vakade et al.

In our study 31.5% patients were vegetarian and 68.5% patients were non-vegetarian. This is similar to study by Ramesh et al in which 26.67% patients were vegetarians and 73.33% were non-vegetarians but contradictory to study by Deshmukh et al where 60% of cases were strictly vegetarians and 40% were mixed diet

| Adverse in-hospital event | No. of patients (N) | Percentage of patients (%) |
|---------------------------|---------------------|-----------------------------|
| Cardiogenic shock         | 6                   | 3                           |
| Heart block               | 4                   | 2                           |
| Left ventricular failure  | 4                   | 2                           |
| Bradycardia               | 2                   | 1                           |
| Tachycardia               | 1                   | 0.5                         |
| Hypersensitivity to streptokinase | 1 | 0.5                      |
consumers.\textsuperscript{10,17} Smoking (52.5%), physical inactivity (70.5%) and positive family history (59.5%) were major risk factors similar to study by Ramesh et al.\textsuperscript{17}

In study by Nagabushan et al, commonly prescribed drugs were anti-platelets (78.4%) followed by hypolipidemic (73.5%).\textsuperscript{18} Similar results were found in our study. Aspirin and clopidogrel combination were given to 84% patients. This is in accordance to association of physician’s recommendation.\textsuperscript{19} In another study by Tanna et al, similar observations were made.\textsuperscript{20}

In our study, ACE inhibitors (68%) were prescribed more frequently than beta-blockers (51%) and CCBs (12%). This is similar to other studies.\textsuperscript{14,16} ACE inhibitors protect against fibrosis and cardiac re-modelling. Atorvastatin was prescribed to 91% patients and rosuvastatin to 8.5% patients. This is in accordance to other studies.\textsuperscript{9,14,17,21} Dopamine and dobutamine were two common inotropic agents used for congestive heart failure similar to study by Kumar et al.\textsuperscript{22}

Cardiogenic shock, left ventricular failure and arrythmias were most common complications responsible for increased morbidity and mortality in accordance with other studies.\textsuperscript{11}

CONCLUSION

This study provides insight towards drug prescribing pattern and risk factors in MI patients. Predominance of male gender, age more than 50 years, history of smoking, sedentary lifestyle and polypharmacy were observed. Patients had multiple risk factors and people should be aware of them. Patients were prescribed prophylactic pharmacotherapy for prevention of further ischemic events along with advice for life style modifications. Most frequently prescribed drugs were antiplatelets followed by hypolipidemic, proton pump inhibitors, angiotensin converting enzyme inhibitors and beta blockers.

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