

RESEARCH ARTICLE

Study of prescribing patterns of hypolipidemic agents in a tertiary care teaching hospital in North India

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ABSTRACT

Background: Lipid-lowering agents are now the cornerstone of treatment used to reduce the risk of coronary events. Since there is wide variation in selection and use of these drugs, drug utilization studies help to evaluate and analyze drug therapy from time to time. This in turn can guide physicians prescribing practices and help in minimizing adverse drug reactions. **Aims and Objectives:** To evaluate the prescribing pattern of hypolipidemic drugs in a tertiary care teaching hospital in Jammu. **Materials and Methods:** An observational study was carried out in patients attending the departments of cardiology and general medicine for 6 months. Prescription of the patients who were prescribed at least one hypolipidemic drug as monotherapy or in combination was evaluated. Hypolipidemic and other classes of drugs prescribed and the World Health Organization prescribing indicators were analyzed. Monthly cost of the hypolipidemic drugs prescribed was also determined. **Results:** Nearly, two-third (63.7%) patients with increased plasma lipids and 36.2% patients in spite of having normal lipid profile were prescribed hypolipidemic drugs as well. Hypertension with comorbid conditions (39.63%) was the most common diseases, for which hypolipidemic drugs were prescribed. The average number of drugs per prescription was 6.21 ± 1.6 . Atorvastatin was the most common hypolipidemic drug prescribed as monotherapy (59.16%), whereas atorvastatin with ramipril was the most common drugs prescribed as combination therapy (14.69%). **Conclusion:** This study depicts the widespread use of statins in various disease conditions, both as primary and secondary preventive measures. Such studies should be done to educate the physicians on good prescribing practices and on rational use of hypolipidemic drugs.

KEY WORDS: Coronary Artery Disease; Drug Utilization; Dyslipidemia; Hypolipidemic Drugs

INTRODUCTION

In India, cardiovascular diseases (CVDs) constitute one of the largest causes of morbidity and mortality. The World Health

Organization (WHO) has reported that approximately 60% of Indians will be affected by CVD and deaths due to coronary artery disease (CAD) will constitute 54.1% of all CVD deaths by 2020. Nearly, half of these deaths are likely to be among young- and middle-aged individuals (30-79 years).^[1] Dyslipidemia is one of the major risk factors for atherosclerosis and atherosclerosis-induced conditions such as CAD, ischemic cerebrovascular disease (CVA), and peripheral vascular disease. Moreover, abnormal levels of blood lipids, impaired fasting glucose, insulin resistance, elevated blood pressure, and excess abdominal obesity lead to metabolic syndrome.^[2] Risk of CAD is higher in patient with metabolic syndrome.

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Lipid-lowering agents are now the cornerstone of treatment used to reduce the risk of coronary events. Since there is wide variation in selection and use of these drugs, drug utilization studies help to evaluate and analyze drug therapy from time to time. This in turn can guide physicians prescribing practices and help in minimizing adverse drug reactions.^[3] Therefore, the present study was conducted to study the prescribing patterns of hypolipidemic agents used in patients attending the departments of medicine and cardiology in a tertiary care teaching hospital in North India (Jammu).

MATERIALS AND METHODS

After obtaining the approval of the Institutional Ethics Committee, an observational study was carried out in patients attending the outpatient department (OPD) of general medicine and cardiology at a tertiary care teaching hospital in Jammu, North India, for 6 months. The prescriptions of patients who attended the OPD were noted down after informed consent. Patients of both genders in the age group of 18 years and above, who were prescribed with at least one hypolipidemic drug as monotherapy or in combination with other agents irrespective of the clinical condition, were included in the study, based on the third report of the National Cholesterol Education Program (NCEP) - The expert panel; Adult Treatment Panel III Guidelines-2002. The risk assessment was done by analyzing the data of the patients collected in a pre-designed pro forma which included patient's demographic details, disease pattern, comorbidity, provisional diagnosis, laboratory investigation, and complete prescription. The hypolipidemic and other classes of drugs prescribed were noted down. The mean number of drugs per prescription, percentage of drugs prescribed by generic name and from essential drug list was analyzed using the WHO core drug prescribing indicators.^[4] Since, majority of the patients often required long-term or life-long therapy with hypolipidemic drugs, monthly cost of the hypolipidemic drugs was determined.

RESULTS

A total of 1827 prescriptions were screened, of which, 381 prescriptions were analyzed according to the study protocol. Males outnumbered females in the ratio of 1.35:1 (Figure 1). Males were comparatively younger than females (Mean age 53.1 vs. 62.2 years). The demographic data reveal the influence of gender and age in disease and prescribing pattern.

Morbidity pattern revealed that the majority of the patients were having one or more risk factors for CAD. Hypertension (50.91%), history of smoking (29.13%), diabetes mellitus (31.75%), and obesity (10.23%) were some of the risk factors observed among patients enrolled. Low levels of high-density lipoprotein cholesterol (HDL-C) were also observed in more than half (59.05%) of the study population

(Table 1). Baseline lipid profile revealed mean ($\pm$ SD) level of total cholesterol 211.12 ($\pm$ 27.5) mg/dl, triglycerides 159.43 ($\pm$ 45.1) mg/dl, HDL-C 40.6 ($\pm$ 15.4) mg/dl, low-density lipoprotein cholesterol (LDL-C) 108.47 ($\pm$ 33.7) mg/dl, and very LDL-C 45.91 ($\pm$ 13.9) mg/dl (Table 2). On risk assessment, it was found that 43.56% and 12.86% had borderline and high level of total cholesterol, respectively; 38.53% and 22.7% had borderline and high triglyceride levels, respectively; 63.55% males and 36.44% females had low HDL-C levels, whereas 14.96% and 5.24% had borderline and high levels of LDL-C, respectively.

Total of 1547 drug formulations were prescribed to 381 patients. The mean baseline plasma lipid profile of the patients for which the hypolipidemic drugs were prescribed has been shown in Table 2. The hypolipidemic drugs were prescribed to 63.77% patients with abnormal and 36.22% with normal lipid profiles. The hypolipidemic drugs which were prescribed for different disease conditions belonged mainly to single agents (statins, fibric acid derivatives) or to fixed dose combinations (statins with fenofibrate). On prescription analysis, it was revealed that statins were prescribed to 64.82% of the patients. Among statins, atorvastatin (91.09%) was most commonly prescribed drug, followed by rosuvastatin (8.90%). Fibric acid derivatives (fenofibrate) were the rarely prescribed drug (4.72%).

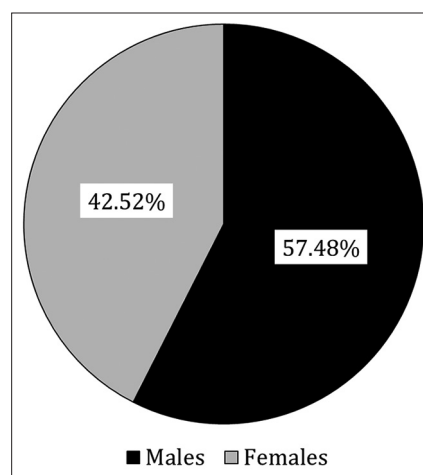


Figure 1: Gender-wise distribution of patients

Table 1: Risk factors for cardiac diseases

Risk factor	No. of patients (%)
Age	Females 83 (64.21 $\pm$ 9.51) males 172 (57.13 $\pm$ 5.12)
Smoking*	Females 6 (1.5%) males 105 (27.5%)
Hypertension**	Females 78 (20.4%) males 116 (30.4%)
Low HDL	Females <50 mg/dl 118 (30.97%) males <40 mg/dl 107 (28.08%)
Type II diabetes mellitus	Females 45 (11.8%) males 76 (19.9%)
Obesity	Females 25 (6.56%) males 14 (3.67%)
HDL: High-density lipoprotein	

Fixed dose combinations were commonly prescribed to the dyslipidemic patients suffering with comorbid conditions such as CAD and CVA (Table 3). Apart from hypolipidemic drugs, other concomitant drugs such as antiplatelets (89.2%), angiotensin converting enzyme (ACE)-inhibitors/angiotensin receptor blockers (74.6%), beta-receptor antagonist (71.7%), nitrates (65.2%), and oral hypoglycemic agents (27.8%) were prescribed. This prescription pattern clearly indicates that patient had taken more than one drug because the majority of the study population had more than one risk factors for cardiac diseases. The therapy of hypolipidemic and other drugs for cardiac diseases is often long term or sometime lifelong. The mean cost of hypolipidemic agents/prescription/day was 13.54 (± 2.30) Indian Rupees (INR) with rosuvastatin being the costlier (Table 4).

The mean number of drugs per prescription according to the WHO core drug prescribing indicator was found to be 6.21 ± 1.6 in our study. The percentage of drugs prescribed by generic name was 0%. Percentage of drugs prescribed from essential drug list was 75.21%.

DISCUSSION

In the present study, the base line study population was comparable to earlier studies done in India with an influence of gender and age in the prescription pattern.^[5] In our study,

hypolipidemic drugs were prescribed more to males (57.48%) compared to females (42.51%). This gender difference may be due to smoking, alcohol intake, and diet rich in saturated fats seen commonly in Indian males. Moreover, the males outnumbered the females in our study. The demographic data are in accordance with the study carried out in Hyderabad and Ahmedabad.^[6,7] Various studies have proved higher CAD risk in fifth to sixth decade of life. In the present study, the majority of males and females were in the age group of 40-65 years and 50-75 years, respectively, which is in accordance with the studies carried out in Ahmedabad and Mumbai.^[7,8] The majority of the patients had one or more risk factors which increase the risk of CAD event. Apart from risk factors for CAD, assessment of plasma lipids was essential to guide and monitor the treatment. Therefore, mean baseline plasma lipid levels (mg/dl) were carried out in all patients (Table 5). Risk assessment revealed that 43.56% and 12.86% patients had borderline and high level of total cholesterol, respectively; 38.58% and 21.25% patients had borderline and high levels of triglyceride, respectively; 63.55% men and 36.44% women had low HDL-C levels, whereas 14.96% and 5.24% patients had borderline and high levels of LDL-C, respectively. John *et al.* observed that the prevalence of diabetes, hypertension, and dyslipidemia was higher above the age of 45 years.^[9] It was observed that hypolipidemic drugs were prescribed to dyslipidemic as well as patients with normal lipid profile. A majority of the patients who were prescribed hypolipidemic drugs had diabetes with other comorbid conditions. This may be due to the fact that these prescriptions were analyzed at a tertiary care hospital, which was a referral center for large population. The results also revealed that hypolipidemic drugs were prescribed for these conditions, irrespective of the lipid profile of the patients. This may be the strategy for primary as well secondary preventions of cardiovascular complications which were at par with the latest NCEP guidelines.^[10]

The prescription of a single hypolipidemic drug was common, and statins (64.82%) were the most common prescribed drugs.

Table 2: Mean baseline plasma lipid levels (mg/dl)

Lipid parameters	Mean ($\pm$ SD)
Total cholesterol	211.12 (± 27.5)
Triglycerides	159.43 (± 45.1)
HDL-C	40.6 (± 15.4)
LDL-C	108.47 (± 33.7)
VLDL-C	45.91 (± 13.9)

SD: Standard deviation, HDL-C: High-density lipoprotein cholesterol, LDL-C: Low-density lipoprotein cholesterol, VLDL-C: Very low-density lipoprotein cholesterol

Table 3: Prescription pattern of hypolipidemic drugs in different clinical conditions

Hypolipidemic drugs	N (%)					Total
	Hypertension alone	Hypertension with comorbid	Diabetes alone	Diabetes with comorbid	Others	
Statins						
Atorvastatin	69 (18.11)	66 (17.32)	11 (2.88)	48 (12.59)	31 (8.13)	225 (59.16)
Rosuvastatin	3 (0.78)	1 (0.26)	0	18 (4.72)	0	22 (5.77)
Fibric acid derivatives						
Fenofibrate	0	6 (1.57)	9 (2.36)	3 (0.7)	0	18 (4.72)
Fixed dose combinations						
Atorvastatin with aspirin	0	28 (7.34)	5 (1.31)	17 (4.46)	0	50 (13.12)
Atorvastatin with fenofibrate	0	0	1 (0.26)	9 (2.36)	0	10 (2.62)
Atorvastatin with Ramipril	6 (1.57)	50 (13.12)	0	0	0	56 (14.69)

Table 4: Cost of various hypolipidemic drugs

Drug	Cost/month (INR)
	Mean±SD
Atorvastatin-10 mg	202±12.1
20 mg	380±11.4
40 mg	480.7±12.4
Mean	354.23±11.96
Rosuvastatin-10 mg	462.9±18.6
20 mg	813.6±37.7
Mean	638.25±28.15
Atorvastatin+fenofibrate (10 mg+10 mg)	346
Atorvastatin+aspirin (10 mg+75 mg)	137
Atorvastatin+ramipril (10 mg+2.5 mg)	269

SD: Standard deviation

Table 5: Clinical condition with lipid profile and prescription pattern of hypolipidemic drugs

Disease	Normal lipid profile (%)	Abnormal lipid profile (%)
Hypertension alone	25 (6.56)	53 (13.91)
Diabetes alone	7 (1.83)	19 (4.98)
Hypertension with comorbid	66 (17.32)	85 (22.30)
Diabetes with comorbid	39 (10.23)	56 (14.69)
Others	12 (3.14)	19 (4.98)
Total	149 (39.08)	232 (60.86)

Among statins, atorvastatin (91.09%) was most commonly prescribed followed by rosuvastatin (8.90%). Several studies have shown that statins were the first line lipid-lowering drugs used for primary as well as secondary preventions of CAD.^[11,12] The non-lipid-lowering (pleiotropic) effects of statin therapy include anti-inflammatory actions, property to reverse endothelial dysfunction, by decreasing LDL oxidation and increasing nitric oxide bioavailability, enhancing the stability of atherosclerotic plaques and inhibiting the thrombogenic response.^[13] The combinations of atorvastatin with aspirin and ACE inhibitors (Ramipril) were prescribed mainly for diabetes with comorbid disease conditions.

In our study, prescription of concomitant drugs such as antiplatelets (89.2%), ACE-inhibitors/angiotensin receptor blockers (74.6%), beta-receptor antagonist (71.7%), nitrates (65.2%), and oral hypoglycemic agents (27.8%) can be justified as majority of the patients were suffering from two or more comorbid disease conditions. Similar prescription pattern was observed in studies carried out in North America^[14] and Mangalore.^[15]

The cost analysis revealed that the mean cost of hypolipidemic agents prescribed per day was 13.54 (±2.30) INR which was higher than the study carried out in Ahmedabad^[8] and Mangalore.^[15] The higher cost of the prescription was possibly due to prescribing the drugs by brand name (100%) suggesting greater influence of pharmaceutical companies and lack of awareness or absence of safe prescribing guidelines on prescribing habits thereby increasing the cost of therapy.^[16] The prescription of drugs by generic name could have been encouraged to make it cost-effective.

In the present study, the average number of drugs prescribed per prescription was 6.21 ± 1.6 which was comparable to studies conducted in Ahmedabad^[5] and Tamil Nadu^[17] suggesting polypharmacy. However, in certain conditions such as cardiovascular problems, the patients may require more than one drugs.^[6,17]

CONCLUSION

As this study was focused on the prescription patterns of hypolipidemic drugs, certain points can be highlighted. Hypertension with comorbid diseases was the most common condition, for which hypolipidemic drugs were prescribed. Statins, and mostly atorvastatin, is the commonly prescribed drug as monotherapy and in fixed dose combinations. This study depicts some irrational prescribing practices among clinicians and the biggest set-back in our study is zero prescription of drugs by generic name. There is need to improve utilization of drugs by generic name as well as rational prescribing practices by improving physician and patient education. Hence, such periodic studies are further required in diverse environment, social, educational, and cultural conditions so that the therapeutic guidelines could be revised accordingly to give proper care to the community.

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