Original Article

A prospective study of prescription pattern in patients with coronary artery disease in a tertiary care centre

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Abstract

Introduction: Coronary Artery Disease (CAD) is an increasingly common disorder. Apart from being one of the leading causes of morbidity and mortality, it exerts a significant burden on health care expenditure .It represents a rapidly growing therapeutic challenge for health care providers. **Aims and Objectives:** Evaluation of prescription pattern in patients with coronary artery disease in a tertiary care centre. **Materials and Methods:** This prospective, observational study of prescription pattern in patients with coronary artery disease was conducted in the Department of Cardiology, Kannur Medical College, Anjarakandy. Study period was from November 2014 to January 2015 during which 200 patients, who fulfilled the inclusion and exclusion criteria were taken into study. **Results:** With 61% of patients being male, most of the patients were in age group 41-70 year s (76.5%).Most commonly prescribed drugs were antiplatelets (99%), antihyperlipidemic drugs (92%), antihypertensives (56%), anticoagulants (61.5%), diuretics (61%) and bronchodilators (17%). **Conclusion:** Polypharmacy was evident with 8.4 drugs per prescription. Improvement in prescription pattern could be achieved by reducing the number of drugs per prescription.

Keywords: coronary artery disease.

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INTRODUCTION

Coronary Artery Disease (CAD) is the most common type of heart disease and is the leading cause of death.[1] Each year, approximately 3.8 million men and 3.4 million women die from CAD.[2] Due to this increasing incidence across the world ,CAD has been described as an epidemic.[3] In addition to its mortality burden, CAD is a leading cause of morbidity and loss of quality of life. This makes CAD a major public health problem which exerts heavy economic costs. Approximately one million working years were lost because of CAD mortality, with a total cost of €11.7 billion. An additional 90 million working days were lost because of CAD morbidity.[4] CAD is a result of plaque build up in coronary arteries, a condition called atherosclerosis, which leads to blockages. The arteries, which start out smooth and elastic, become narrow and rigid, restricting blood flow to the heart. The heart becomes starved of oxygen and the vital nutrients it needs to pump properly. This may eventually result in a portion of heart being suddenly deprived of its blood leading to death of that area of heart tissue resulting in a chest pain or heart attack. Treatment of coronary artery disease is aimed at controlling symptoms and slowing or stopping the progression of disease. The method of treatment is based on many factors determined by symptoms, physical examination, and diagnostic testing. The recognition of the importance of optimal medical therapy (OMT) is transforming patient management, both in patients undergoing coronary revascularization and in patients treated conservatively. Optimal medical therapy remains the cornerstone of management in all patients with CAD because it is logical, relatively inexpensive, and undeniably effective in improving long-term outcomes. The challenge is to implement these measures in all patients with CAD. The goals of medical management of coronary disease are to

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modify the natural history of disease and to improve the symptoms of angina. The treatment for CAD involves the use of various categories of drugs. Of these three classes of medication are essential to therapy: antiplatelet agents ,lipid lowering agents, and antihypertensives. An antiplatelet drug is a member of a class of pharmaceuticals that decrease platelet aggregation and inhibit thrombus formation. Aspirin is the first-line antiplatelet agent except in patients who have recently had a myocardial infarction or undergone stent placement, in which case clopidogrel is recommended. Statins have demonstrated clear benefits in morbidity and mortality in the secondary prevention of coronary artery disease. Blood pressure therapy for patients with coronary artery disease should start with beta blockers and angiotensin-converting enzyme inhibitors. If these medications are not tolerated, calcium channel blockers or angiotensin receptor blockers are acceptable alternatives. Anginal symptoms of coronary artery disease can be treated with beta blockers, calcium channel blockers, nitrates, or any combination of these. Familiarity with these medications and with the evidence supporting their use is essential to reducing morbidity and mortality in patients with coronary artery disease. A prescription is an instruction from a prescriber to a dispenser. Globally, the prescription pattern and the prescription errors have indicated the need to establish proper system of recording and analyzing therapy before writing a prescription in order to promote rational drug therapy. Irrational prescribing of drugs is a major health concern globally. A major health epidemic like CAD with multiple drug therapy definitely requires a framework for rational prescription which can be beneficial for patient management and health care budget.For avoidance of polypharmacy, drug interactions and contraindications, there is obvious need for interventional measures or strategies to improve rational prescribing. This study is an attempt to provide feedbacks for steps towards rational prescription.

MATERIAL AND METHODS

This prospective, observational study of prescription pattern in patients with coronary artery disease was conducted in the Department of Cardiology, Kannur Medical College, Anjarakandy. Study period was from November 2014 to January 2015 during which 200 patients who fulfilled the inclusion and exclusion criteria were taken into study.

Inclusion Criteria Patients included in the study were:

1. Patient who attended Cardiology OPD ,were diagnosed with CAD and who provided written informed consent

Exclusion Criteria

Patients with below criteria were excluded from study:

1. Acute MI or unstable angina pectoris within last 3 months
2. Primary valvular disease
3. High grade arrhythmias
4. Renal patients on dialysis
5. Neurological illness
6. Any active neoplastic diseases
7. Previous cardiac surgery
8. Coronary lesions suitable for revascularisation

The data was collected using specifically designed proforma which included demographic details (name, age, sex), drugs (name of the drug, dosage form, dose, route of administration, frequency), principal diagnosis and co-morbid conditions. All patients included in the study were considered for analysis. Prescription of different classes of drugs as well as individual drugs was analyzed and presented as percentage. The average number of drugs per prescription was determined.

RESULTS

200 patients were included in the study of which 122 (61%) were male patients and 78 (39%) were female patients. The incidence of CAD was more common in male compared to female. Age wise distribution is shown in (Fig. 1).

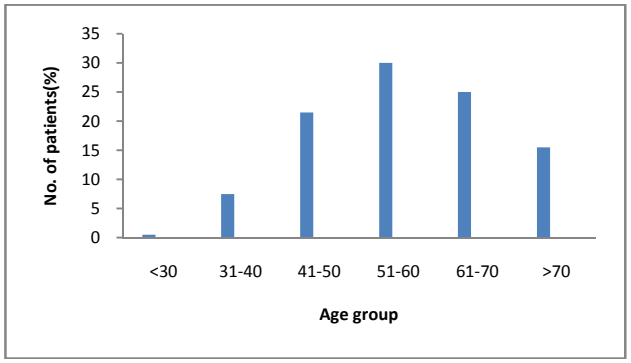

Figure 1: Age wise distribution of patients

Table 1: Distribution of co morbid conditions

Co morbidities	No. of patients(n=200)	Percentage(%)
Hypertension	65	32.5
Diabetes	36	18
Others(CKD,COPD,Thyroid disorder)	22	11
Hypertension + Diabetes	28	14
Hypertension + Others	11	5.5
Diabetes + Others	17	8.5
Hypertension + Diabetes + Others	8	4

Most common co-morbid conditions were hypertension and diabetes mellitus (Table 1).

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Table 2: Distribution of drug categories prescribed

Drugs	No. of patients(n=200)	Percentage(%)
Antiplatelets	198	99
Antihyperlipidemic	194	92
Nitrates	60	30
Antihypertensive	112	56
Diuretics	122	61
Anticoagulants	133	66.5
Bronchodilators	34	17

Various categories of drugs are prescribed for treatment of coronary artery disease including antiplatelet drugs, antihyperlipidemic agents ,anticoagulants, anti-anginal drugs, antihypertensives, diuretics and bronchodilators,

Table 3: Distribution of Antiplatelet drug prescribed

Drug	No. of study patients(n=198)	Percentage (%)
Aspirin + Clopidogrel	190	95.9
Aspirin	6	3.03
Clopidogrel	4	2.02

The anti-platelet drugs which reduce the cardiovascular mortality and non- fatal myocardial infarction in coronary artery disease were prescribed in 99% of patients. (Table 3). Combination of aspirin and clopidogrel was the most prescribed antiplatelet agent.

Table 4: Distribution of Anticoagulants prescribed

Drug	No. of patients(n=133)	Percentage
Heparin	106	79.6
Enoxaparin sodium	10	7.5
Dalteparin sodium	7	5.2

Heparin was the most commonly prescribed anticoagulant drug. (Table 4). Anticoagulants were prescribed in the form of injections given either by IV or SC route of administration.

Table 5: Distribution of Antihyperlipidemic drugs prescribed

Drug	No. of patients(n=194)	Percentage (%)
Atorvastatin	120	61.8
Rosuvastatin	40	20.6
Fenofibrate	4	2.06
Atorvastatin + Fenofibrate	20	10.3
Rosuvastatin + Fenofibrate	10	5.1

Atorvastatin was the most common prescribed Antihyperlipidemic drug

Table 6: Distribution of Antihypertensives prescribed

Drug	No. of patients(n=112)	Percentage (%)
Beta blockers	42	37.5
ACEI	26	23.2
ARB	20	17.8
CCB	4	3.5
Beta blockers + ACEI	13	11.6
Beta blockers + ARB	7	6.2

Table 7: Distribution of Diuretics prescribed

Drug	No. of patients(n=122)	Percentage (%)
Frusemide	45	36.8
Torsemide	30	24.5
Spiranolactone	25	20.4
Amiloride	12	9.8
Hydrochlorthiazide	10	8.1

Table 8: Distribution of Other drugs prescribed

Drug	No. of patients(n=200)	Percentage (%)
Nitrates	110	55
Nicorandil	27	13.5
Ivabradine	36	18
Amiodarone	52	26
Bronchodialators	34	17
Antibiotics	102	51
Pantoprazole	192	96
Laxative	112	56
OHA/insulin	89	44.5
Thyroxine sodium	5	2.5

The average number of drugs per patient (prescription) was determined and found to be 8.4 (Total number of drugs prescribed 1680).

DISCUSSION

CAD is markedly more common in men than in women. There is a marked difference in CAD risk between sexes.[5,6,7,8,9,10] Among middle-aged people, CAD is 2 to 5 times more common in men than in women, and this sex ratio varies between populations.[9] In both sexes, the risk of CAD increases markedly with age.[5] In this study ,CAD was seen more commonly in males(61%) and age above 40 years.(fig.1) Similar trend was seen by Kamath A *et al.*[11], and study by Tasneem Sandozi and Fouzia Nausheen.[12] The drug prescription rates of various categories for CAD like antithrombotic agents, antihypertensives and lipid lowering drugs are 99%,56%, and 97% respectively. (Table 2)They show a similar trend as other studies except for a higher antihyperlipidaemic usage.[13] Antiplatelet therapy is an important component of CAD management because platelet aggregation at atherothrombotic plaque sites can produce clinically significant thrombosis and resultant MI.[14]The most common antiplatelet agents used are aspirin and clopidogrel. Aspirin inhibits cyclooxygenase 1 and 2, reducing prostaglandin and thromboxane-A production and preventing platelet aggregation.[14] Clopidogrel inhibits adenosine diphosphate receptors, thereby preventing platelet aggregation. Both agents irreversibly inhibit platelet activation.[14] The benefit of aspirin in the secondary prevention of CAD is well defined by numerous studies and is reflected in international guidelines.[15] In the Antithrombotic Trialists Collaboration Study, researchers demonstrated that patients with a history of MI who were treated with aspirin for a mean of

27 months had fewer nonfatal MIs, strokes, and vascular deaths.[15] Aspirin is associated with an increased risk of hemorrhagic events.[16] Data on adverse effects associated with aspirin therapy from long-term prevention trials involving patients with stable CAD are limited.[16] A study shows, one major hemorrhage occurred for every 111 patients with CAD who took aspirin for a mean of 33.3 months.[17] In a study conducted by Tasneem Sandozi and Fouzia Nausheen[12] the drug utilization of various antiplatelet drugs were as aspirin alone (25.71%), aspirin and clopidogrel (60.00%), whereas in the present study, the prescription rate of Aspirin alone was 3% and combination of aspirin and clopidogrel (95.9%). The present study the combination of aspirin and clopidogrel were prescribed in more number of patients compared to previous study. (table 3) Tasneem Sandozi and Fouzia Nausheen[12] in their study showed drug prescription rates for Unfractionated heparin (55.71%), Low molecular weight heparin (20.00%). In another study by Banerjee S., *et al*,[18] unfractionated heparin was used in 36.8% of the patients and low molecular weight heparin in 25.2% . In the present study, the prescription rate of unfractionated heparin (79.6%) and low molecular weight heparin (12.7%). (Table 4)The results of this study were in consistence with previous studies. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends lowering blood pressure to 140/90 mm Hg or less for patients with CAD; however, the American Heart Association recommends a goal of 130/80 mm Hg or less, just as for patients with diabetes or chronic kidney disease.[19,20] Beta blockers are first-line antihypertensive agents for patients with CAD[21]; if tolerated, beta blockers are also indicated for patients who do not have hypertension . These drugs block and β_1 and β_2 adrenergic receptors, causing a decrease in heart rate, an increase in diastolic filling time, and a decrease in cardiac contractility. This negative inotropic and chronotropic effect decreases myocardial oxygen demand.[19] Cardioselective beta blockers, or those that affect only β_1 receptors, are preferred to minimize adverse effects, especially the bronchoconstriction that can be caused by $beta_2$ antagonism.[22,23] In one meta-analysis that evaluated beta-blocker therapy in patients with CAD, investigators found a 23 percent reduction in the risk of death[24]. A recent meta-analysis with 464,000 patients confirmed that beta blockers should be first-line therapy in patients with CAD. In the first two years after MI, beta blockers can double the reduction in cardiovascular events compared with all other antihypertensive agents.[25] Some beta blockers also possess intrinsic sympathomimetic activity, which can produce an increase in sympathetic activity at rest and may not effectively lower heart rate; these drugs should be avoided.[22] Beta blockers are also beneficial for patients with anginal symptoms because they decrease cardiac oxygen demand.[26] Angiotensin-converting enzyme (ACE) inhibitors should be used in patients with CAD following MI, those who have diabetes, or those with left ventricular dysfunction. They also should be considered a treatment for hypertension in all other patients with CAD once beta-blocker therapy has been established. These agents block the conversion of angiotensin I to angiotensin II, reducing vasoconstriction and peripheral vascular resistance and decreasing blood pressure. Angiotensin receptor blockers (ARBs) are alternatives to ACE inhibitors. ARBs inhibit angiotensin II receptors, thereby decreasing vasoconstriction and the release of aldosterone. Although the likelihood of cough is somewhat lower with ARBs than with ACE inhibitors, the risk of other adverse effects is similar.[27] Calcium channel blockers (CCB) are an acceptable alternative if beta blockers are not tolerated, although beta blockers more effectively alleviate anginal symptoms and improve exercise tolerance.[26] Nitrates can be used when a patient continues to have anginal symptoms despite using a beta blocker, calcium channel blocker, or both. Nitrates relax vascular smooth muscle and primarily cause venodilation, reducing preload and decreasing myocardial oxygen demand. Nitrates do not play a role in the treatment of hypertension. Randomized trials evaluating the effects of nitrates on CAD outcomes have not been conducted. In the present study, the prescribed antihypertensives were-Beta blockers (37.5%), ACEIs (23.2%), ARB (17.8%) and rest CCB's and combinations. These results were in consistence with above recommendations. (table 6) However some previous studies as by Jorg Muntwyler, *et al*.,[13] observed high use of calcium channel blockers, whereas in the present study betablockers were found to be the preferable choice of antihypertensive prescribed more frequently. In most of the studies on usage of lipid lowering drugs, atorvastatin is the most commonly prescribed drug.[11,12,28] In our study, 97% of patients were prescribed antihyperlipidaemic drug with atorvastatin in most patients (61.8%).(Table 5)Similar trends were seen in other studies by Sreedevi K *et al*[28]., and Tasneem Sandozi and Fouzia[12] In the present study the prescription of diuretics was 61% (Table 7)whereas some previous studies as by Supratim Datta, *et al*., have shown a lesser use of diuretics.[29] In the present study, the average no. of drugs per patient is 8.4 whereas study by Tasneem sandozi *et al*., showed the average number of drugs used per patient was 9.93.[12] In other study by Sreedevi, *et al*., the average number of drugs per prescription was found to be 5.5. [28]

CONCLUSION

In this study, it was observed that coronary artery disease was more common in males and between 40 and 70 years. Hypertension and diabetes were commonly associated with coronary artery disease. The most commonly prescribed drug in coronary artery disease were anti-platelet drugs (99%) followed by antihyperlipidemics (97%), anticoagulants (66.5%) and anti-hypertensives (56%) respectively. Extensive polypharmacy (8.4 drugs per prescription) was noticed in the prescriptions. The prescribing pattern can be improved by reducing the number of drugs per prescription. The study of prescription pattern provides an important framework for necessary modifications required to to achieve patient oriented, cost effective and rational prescriptions.

REFERENCES

1. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med. 2006 Nov; 3:e442.
2. WHO. The global burden of disease: 2004 update. Available at: www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html.
3. Jones DW, Chambless LE, Folsom AR, Heiss G, Hutchinson RG, Sharrett AR, Szklo M, Taylor HA Jr. Risk factors for coronary heart disease in African Americans: the Atherosclerotic Risk in Communities Study, 1987–1997. Arch InternMed.2002; 162:2565–2571.
4. Leal J, Luengo-Fernández R, Gray A, Petersen S, Rayner M. Economic burden of cardiovascular diseases in the enlarged European Union. Eur Heart J. 2006; 27:1610-1619.
5. Castelli WP. Epidemiology of coronary heart disease: the Framingham Study.Am J Med. 1984; 76:4–12.
6. Thelle D. Women and coronary heart disease: a review with special emphasis on some risk factors. Lipid Rev. 1990; 4:33–39.
7. Thom TJ, Epstein FH, Feldman JJ, Leaverton PE, Wolz M. Total Mortality and Mortality From Heart Disease, Cancer and Stroke From 1950 to 1987 in 27 Countries. Bethesda, Md: National Institutes of Health, 1992. NIH publication 92–3088.
8. Kuhn FE, Rackley CE. Coronary artery disease in women: risk factors, evaluation, treatment, and prevention. Arch Intern Med. 1993; 153:2626–2636.
9. Njolstad I, Arnesen E, Lund-Larsen PG. Smoking, serum lipids, blood pressure, and sex differences in myocardial infarction: a 12-year follow-up of the Finnmark Study. Circulation. 1996; 93:450–456.
10. Rich-Edwards JW, Manson JAE, Hennekens CH, Buring JE. The primary prevention of coronary heart disease in women. N Engl J Med.1995; 332:1758–1766.
11. Kamath A, Shanbhag T, Shenoy S, Ramesh S. A retrospective study of the drug prescribing pattern in acute myocardial infarction. Ind J Pharmacol. 2008; 40: S60- S61
12. Tasneem S and Fouzia N. Drug utilization study in ischemic heart diseases associated with diabetes and hypertension. Int J Pharma and Bio Sci. 2010; 1(3): 1-4.
13. Jorg M, Giorgio N, Roger D, Christiane G, Felix G, Ferenc F. National survey on prescription of cardiovascular drugs among outpatients with coronary artery disease in Switzerland. Swiss Med Wkly 2003; 133: 88-92.
14. Fuster V, Badimon L, Badimon JJ, Chesebro JH. The pathogenesis of coronary artery disease and the acute coronary syndromes (1). N Engl J Med. 1992; 326(4):242–250.
15. Becker RC, Meade TW, Berger PB, et al.; American College of Chest Physicians. The primary and secondary prevention of coronary artery disease: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition). Chest. 2008; 133(6 suppl):776S–814S.
16. Berger JS, Brown DL, Becker RC. Low-dose aspirin in patients with stable cardiovascular disease: a meta-analysis. Am J Med. 2008; 121(1):43–49.
17. CAPRIE Steering Committee. A randomised, blinded, trial of clopidogrel versus aspirin in patients at risk of ischaemic events (CAPRIE). Lancet. 1996; 348(9038):1329–1339.
18. Banerjee S, Kumar V, Ramachandran P, Kamath A. Does the pharmacological management of unstable angina vary with age and gender – a descriptive study. Journal of Clinical and Diagnostic Research. 2010; 4:3150-3157.
19. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. NIH Publication No. 04-5230. August 2004.
20. Rosendorff C, Black HR, Cannon CP, et al. Treatment of hypertension in the prevention and management of ischemic heart disease: a scientific statement from the American Heart Association Council for High Blood Pressure Research and the Councils on Clinical Cardiology and Epidemiology and Prevention [published correction appears in Circulation. 2007; 116(5):e121]. Circulation. 2007; 115(21):2761–2788.
21. Brunzell JD, Davidson M, Furberg CD, et al. Lipoprotein management in patients with cardiometabolic risk: consensus conference report from the American Diabetes Association and the American College of Cardiology Foundation. J Am Coll Cardiol. 2008; 51(15):1512–1524.
22. Rosendorff C, Black HR, Cannon CP, et al. Treatment of hypertension in the prevention and management of ischemic heart disease: a scientific statement from the American Heart Association Council for High Blood Pressure Research and the Councils on Clinical Cardiology and Epidemiology and Prevention [published correction appears in Circulation. 2007; 116(5):e121]. Circulation. 2007; 115(21):2761–2788.
23. Salpeter SR, Ormiston TM, Salpeter EE. Cardioselective beta-blockers in patients with reactive airway disease: a meta-analysis. Ann Intern Med. 2002; 137(9):715–725.
24. Freemantle N, Cleland J, Young P, Mason J, Harrison J. Beta blockade after myocardial infarction: systematic review and meta regression analysis. BMJ. 1999; 318(7200):1730–1737.

25. Law MR, Morris JK, Wald NJ. Use of blood pressure lowering drugs in the prevention of cardiovascular disease: meta-analysis of 147 randomised trials in the context of expectations from prospective epidemiological studies. BMJ. 2009; 338:b1665.
26. Heidenreich PA, McDonald KM, Hastie T, et al. Meta-analysis of trials comparing beta-blockers, calcium antagonists, and nitrates for stable angina. JAMA. 1999; 281(20):1927–1936.
27. Yusuf S, Sleight P, Pogue J, Bosch J, Davies R, Dagenais G; The Heart Outcomes Prevention Evaluation Study Investigators. Effects of an angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients [published corrections appear in N Engl J Med. 2000; 342(10):748, and N Engl J Med. 2000; 342(18):1376]. N Engl J Med. 2000; 342(3):145–153.
28. Sreedevi K, Rao VJ, Fareedullah MD, Vijayakumar S. A study on prescription pattern of statins in cardiovascular disease. Der Pharmacia Lettre, 2011; 3: 393-396.
29. Datta S, Sharma C. Prescribing pattern of antihypertensives in patients having comorbid ischemic heart disease: Study in a tertiary care hospital. Journal of Pharmacy Research. 2010; 3: 2142-2.

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