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Original Research Article

Status of dyslipidemia management with statins, in in-patients with known coronary artery disease confirmed by angiographic findings

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Abstract

To determine the status of dyslipidemia management with statins in in-patients with known Coronary Artery Disease (CAD) confirmed by angiographic findings. This study has been conducted in a corporate cardiac centre at Visakhapatnam, Andhra Pradesh. This study is a retrospective analysis of data collected from the electronic medical records in terms of age, sex, CAD status, associated risk factors, statin usage, and lipid parameters. Among a sample of 92 known CAD in-patients, 81.5% achieved LDL-C goal of <100 mg/dl as recommended by Third Report of the National Cholesterol Education Program (NCEP) Adult Treatment Panel III [ATP III] for CAD and CAD risk equivalents. Success rates among males and females are 79.7% and 85% respectively. 78.2% of 69 patients on Atorvastatin, 85% of 20 patients on Rosuvastatin and 100% of 3 patients on Simvastatin achieved LDL-C goal. If the target LDL-C level is kept at <70 mg/dl as defined as optional goal for very high risk CAD and CAD risk equivalents, the success rate is only 31.5%. The Success rates for achieving LDL-C goals (<100mg/dl) is satisfactory in this facility. But the major concern in this study is even with desired LDL-C levels 61% of these in-patients suffered with a recurrent CAD leaving an opportunity to reconsider the target LDL-C to still lower levels (<70 mg/dl) which is mentioned just as an optional for very high risk candidates in NCEP ATP-III guidelines. Further larger, prospective, randomized controlled clinical trials and multi-centric Indian trials involving both in-patients and out-patients have to be conducted to find the success rates, CAD recurrence rates and to fix new target levels of LDL-C and the best statin that suits Indian scenario.

Keywords: Coronary artery disease, Lipid management, Statins.

1. Introduction

Coronary artery disease (CAD) or coronary heart disease (CHD) is the leading cause of death worldwide. Indians are 4 times more susceptible than the Americans[1]; in fact Indians have the highest mortality rates amongst all ethnic groups studied so far. Out of many risk factors [2], Triglyceride is an important independent risk factor for CAD and is especially important in Indians because of high prevalence of Hypertriglyceridemia in this population. Many of the components of Lipid parameters like a low HDL, high LDL act as individual risk factors for the development of CAD. Some components like high LDL have also shown to increase recurrence of cardiovascular events[3] in a known CAD patient. 3-Hydroxy-3-methylglutaryl coenzyme-A reductase inhibitors (statins) are extremely effective at reducing low density lipoprotein (LDL) cholesterol[4] and have been demonstrated to reduce mortality and the risk of major cardiovascular events in a number of large primary[5,6] and secondary prevention[7-9] studies. The major trials for secondary prevention of CAD with statins were the Scandinavian Simvastatin Survival Study (4S)[7,10], Cholesterol and Recurrent Events (CARE) Study[8], and the Long-Term Intervention with Pravastatin in Ischemic Disease (LIPID) Study[11,12].

All three showed reductions in recurrent myocardial infarction and coronary death, coronary artery procedures, and stroke. Two of them also proved reduction in total mortality with statin therapy. Thus, secondary prevention trials provide strong evidence for the benefit of cholesterol-lowering therapy in persons with established CAD. LDL lowering has been shown to produce marked benefit regardless of gender, age, and the presence of diabetes, smoking, and hypertension. Furthermore, in CAD patients, LDL lowering decreases stroke rates [13], improves angina and myocardial perfusion and decreases the need for subsequent revascularization.

Though there are many studies proving the relation between Cholesterol levels and CAD and the protectiveness of Statins, only limited studies are available on the actual dyslipidemia management status in India especially at secondary prevention level. In view of all the above facts this study is conducted to know the actual status of dyslipidemia management in known CAD patients. The success rates for achieving target LDL-C have been calculated keeping the target at <100 mg/dl (recommended target) as well as at<70 mg/dl (optional target), as the sample here is a very high risk CAD or CAD risk equivalent (as these patients came with a recurrent CAD).This study deals with the target levels of LDL-C in high risk and very high risk CAD and CAD risk equivalents only.

2. Materials and methods

The patient data is retrieved from the Discharge summary module of Wipro HIRePS-HIS. Microsoft Office Excel 2007 is used for data representation, percentage calculation and graphical depiction. SPSS version 16 is used for statistical analysis. The CAD confirmation was done by Coronary Angiogram (CAG) and serum lipid levels had been determined on fasting samples using Biokit Quantexanalyzer.

2.1 Design and conduct

After taking approval from the Central Ethics Committee, Apollo hospitals, Visakhapatnam, this retrospective study is conducted on the in-patients of cardiology department belonging to a single consultant cardiologist. The data for the patients who got admitted in the last 6 months (from 1stFeb 2011 to 31st July 2011) is collected. The total number of admissions was 509. The necessary data like age, sex, risk factors like Hypertension (HTN), Diabetes Mellitus (DM), CAD status, lipid parameters, treatment that was being taken are charted out. The collected data (509 case sheets) are filtered for known CAD patients confirmed by Coronary Angiogram (CAG) and who were on statins for not less than 3 months. Hypothyroidism patients and those who had familial hyperlipidemia are excluded from the study. The patient data with incomplete information are discarded. Out of 509, only 92 patients fulfil the desired criteria and hence considered for the study.

3. Results

The data collected is presented as Mean ± S.D and Chi square test applied wherever applicable. The mean age of the sample (n=92) is 61.48 ± 10.37. The males and females in the sample are 82% and 18% respectively. Of the total sample 73% of the patients have HTN, 77% have DM and 42% have both HTN and DM. Patients with on-treatment Hypertriglyceridemia (Triglycerides: 200-499 mg/dl) are 7.6%. Patients on Atorvastatin, Rosuvastatin and Simvastatin are 75%, 21.7% and 3.3 % respectively (Table-I).

Table I: Patient Demographics

Variable	Number	Percentage of Total sample (n=92)
Total Sample (n)	92	100%
Age (in years)	61.48±10.37	
Sex		
Males	76	82.6%
Females	16	17.4%
HTN	68	74%
DM	48	52%
Both HTN and DM	39	42.4%
On-treatment Hypertriglyceridemia	7	7.6%
Statin usage		
Atorvastatin	69	75%
Rosuvastatin	20	21.74%
Simvastatin	3	3.26%

About 61% of the admissions(n=92)are due to a recurrent CAD, of which, 32% have Single vessel disease (SVD), 21% each for Double (DVD) and Triple vessel disease (TVD) and remaining have mild CAD (11%), Occluded graft (2%), and Clinical presentations like Acute coronary syndrome (6%) and Unstable angina (7%)(Fig.1). The other reasons for admission are Chest pain (Non-cardiac) (14%), Permanent pacemaker implantation (2%), Shortness of breath (LV dysfunction, COPD) (9%), CVA (1%)and others (LBA, Fractures, Gastritis, Weakness) (9%)(Table-II).

Among the in-patients with known CAD (n=92), the success rate for achieving LDL-C goals (<100mg/dl) is 81.5% with a mean LDL-C of 80.9±19.59 (mg/dl). The success rates among males and females are 79.7% and 85% respectively (Table-III). 78.2% of 69 patients on Atorvastatin, 85% of 20 patients on Rosuvastatin and 100% of 3 patients on Simvastatin achieved LDL-C goal (Table-IV).

Many (61%)of these patients fulfill the very high risk criteria as many of them had a recurrent CAD (reason for their admission/readmission) and if the target LDL-C is

kept at <70 mg/dl, as defined as Optional goal for very high risk CAD and CAD risk equivalents (according to updated ATP-III), the success rate is only 31.5 %.

The primary target of therapy LDL-C<100 mg/dl is achieved in 4 out of 7 patients with high triglycerides (200-499 mg/dl) whereas the secondary target of therapy in hypertriglyceridemia, the Non-HDL cholesterol (The sum of VLDL+LDL cholesterol, calculated routinely as total cholesterol minus HDL cholesterol) <130 mg/dl is achieved in only 2 out of 7 patients.

Table II: Reasons for Admission/Readmission

Diagnosis	Number	% of Total sample (n=92)
Recurrent CAD (Mild CAD + Occluded graft + SVD + DVD + TVD + ACS + USA)	56	61%
Mild CAD	6	7%
Occluded graft	1	1%
SVD	18	20%
DVD	12	13%
TVD	12	13%
ACS (CAG not done)	3	3%
USA (CAG not done)	4	4%
Recurrent CAD for which revascularisation (PTCA) done	38	41%
Elective revascularisation of old lesion (confirmed earlier by CAG)	4	4%
Chest pain (but normal coronaries or patent stents on CAG/nonspecific)	13	14%
Permanent Pacemaker Implantation	2	2%
Shortness of breath due to LV Dysfunction/COPD	8	9%
CVA	1	1%
Others (fractures, LBA, Gastritis, Weakness)	8	9%

Table III: Success rates for achieving LDL-C goals (<100mg/dl) among males and females

	Mean LDL-C levels	Number achieving target	Number not achieving target	% Achieving target
Males	81.13±19.87	60	16	79.7
Females	76.75±14.21	14	2	85%
Total	80.9±19.59	74	18	81.5%

Table IV: Success rates for achieving LDL-C goals (<100mg/dl) among Statin groups

	Mean LDL-C levels	Number achieving target	Number not achieving target	% Achieving target
Atorvastatin group	81.57±19.98	54	15	78.2
Rosuvastatin group	80.6±19.49	17	3	85%
Simvastatin group	67.67±3.5	3	0	100%
Total	80.9±19.59	74	18	81.5%

4. Discussion

The National Cholesterol Education Program (NCEP) Adult Treatment Panel-III (ATP-III) guidelines[14], published in 2001, recommend a primary target level of LDC-C <100 mg/dl for high risk CHD and CHD Risk Equivalent (10-year risk for CHD >20%). Since the inception of these guidelines there is a considerable improvement in success rates [15,16] of target LDL-C level achievement over the past few years compared to earlier data where the success rates were unsatisfactory in different parts of the world. Though the success rate is satisfactory in this facility, the study here is limited to in-patients only; hence the results cannot be attributed to all CAD patients. Further larger, prospective, multi-centric trails involving both in-patients as well as out-patients have to be conducted to draw a conclusion on achievement rates and CAD recurrence rates. The results such derived can be attributed to the entire country.

The results of some major studies like Heart Protection Study (HPS)[17], Prospective Study of Pravastatin in the Elderly at Risk (PROSPER)[18], Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial-Lipid-Lowering Trial (ALLHAT-LLT)[19], Anglo-Scandinavian Cardiac Outcomes Trial-Lipid-Lowering Arm (ASCOT-LLA)[20] and Pravastatin or Atorvastatin Evaluation and Infection - Thrombolysis in Myocardial Infarction 22 (PROVE IT–TIMI 22) trial conducted since the publication of ATP-III, appeared to have important implications, particularly for high-risk patients. The updated ATP III NCEP guidelines published in the July 12, 2004 issue of Circulation, endorsed by the National Heart, Lung, and Blood Institute, the American College of Cardiology, and the American Heart Association, gave recommendations by considering the results of the above trials. One of the major recommendations for modifications to footnote the ATP III treatment algorithm is, in high-risk persons, the recommended LDL-C goal is <100 mg/dl, but when risk is very high, an LDL-C goal of <70 mg/dl is a therapeutic option, i.e., a reasonable clinical strategy, on the basis of available clinical trial evidence. This therapeutic option extends also to patients at very high risk who have a baseline LDL-C <100 mg/dl.

The European Society of Cardiology (ESC) and the European Atherosclerosis Society (EAS) writing committee states that for patients at very high risk of cardiovascular disease, LDL-C levels should be lowered to less than 70 mg/dl, a target that is not optional, as it is in the NCEP guidelines. There are several studies, opinions and discussions during the past decade over the target level of LDC-C <70 mg/dl to make it a definitive recommendation. Indian clinical management guidelines for CAD for National programme for Diabetes, CVDs and Stroke (NPDCS) designed as per the requirement of Indian Public Health Standards (IPHS) and National Rural Health

Mission (NRHM) has not reached any consensus on target LDL-C levels specific for Indian High risk CAD patients but refer to ATP-III recommendations for dyslipidemia management.

In the present study though the LDL-C levels are within the target range (<100 m/dl, as per ATP-III), many of these in-patients had recurrent CAD (Fig.1) requiring revascularisation. This leads to an opportunity to reconsider the target levels. Recent clinical trials have also recommended for re-examination of this goal [21]. Prospective, case control studies have to be carried out for fixing up the new target levels of LDL-C in patients with CAD.

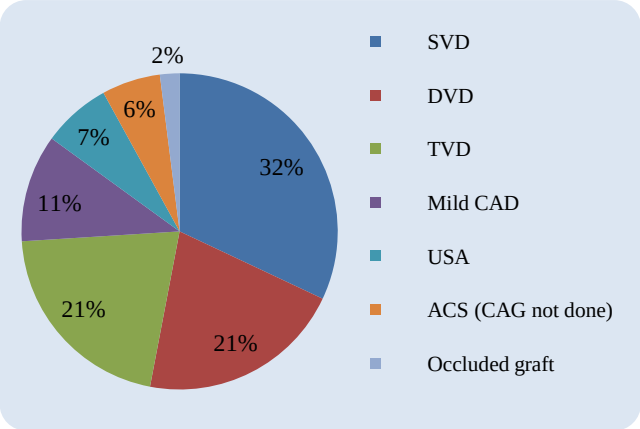

Figure 1: Type of CAD recurrence [number=56 (61%)]

There is no significant difference found between achievement rates among the three statin groups, Atorvastatin, Rosuvastatin and Simvastatin in this study. More comparative, prospective, cost effective studies are needed to look for the best Statin that meets the needs of Indian population. More importantly, there should be emphasis on therapeutic lifestyle changes [22,23] along with pharmacological management of dyslipidemia in National program for prevention of CAD.

5. Conclusion

The dyslipidemia management in in-patients with known CAD of this cardiac care facility is satisfactory (81.5%). Large multi-centric trials have to be conducted throughout India on in-patients as well as out-patients to frame target LDL-C levels to all CAD patients in the country. It is also necessary to reconsider the target levels of lipid parameters to more lower values as many of the patients whose LDL-C levels were within the desired levels got admitted for recurrent CAD requiring revascularization. Prospective studies in this field would draw conclusions on the optimal levels of the target lipid parameters and also the best statin that suits Indian scenario.

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