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THE STATUS OF LIPID PROFILE CONTROL IN CORONARY ARTERY DISEASE PATIENTS AT A TERTIARY CARE HOSPITAL

Ashish Kumar Agarwal[1], Daulat Singh Meena[2], Vijay Pathak[3], Anoop Jain[4], Rakesh Kumar Ola[5]
Department of Cardiology, S M S Medical College, Jaipur (Rajasthan)

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Corresponding author: Daulat Singh Meena
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Abstract

Background: Patients of coronary artery disease require medical treatment to optimize their lipid profile. The present analysis evaluates the lipid profile among CAD patients receiving statin therapy. To study THE STATUS OF LIPID PROFILE CONTROL IN CORONARY ARTERY DISEASE PATIENTS AT A TERTIARY CARE HOSPITAL

Methods: Our study included 1016 patients with documented CAD by coronary angiography in Department of cardiology SMS medical college and associated group of hospitals. Patients treated with statin therapy for at least 3 months were included. We compared data relating to demographic parameters and other cardiovascular risk factors.

Results: In a total of 1016 patients (730 males and 286 females), (mean age 57.2 ± 8.8 years).

Complete lipid profiles of 1016 patients were recorded. Regarding the CAD patients with complete lipid profiles, 72% had lag in lipid profile control as against the current guidelines in at least one of the three main lipid parameters: low-density lipoprotein cholesterol (LDLc), high-density lipoprotein cholesterol (HDLc) and/or triglycerides. LDLc was not within target levels in 64.2% of these high risk patients; HDLc was abnormal in 35%, and triglycerides were elevated in 25% despite monthly follow up at the opd.

Conclusion: Most of the patients treated with statins, especially those with a high cardiovascular risk, do not meet recommended lipid targets and/or have a high frequency of abnormal HDLc and TG levels. The results of this study show that significant differences exist between the recommendations in the guidelines and clinical practice, as well as highlighting the need for a more intensive and integrated management of dyslipidemia in high-risk patients.

Keywords: Lipid profile, CAD, Lipoprotein

Introduction

Cardio Vascular Disease (CVD) has become the most important cause of morbidity and mortality worldwide [1]. The National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III issued an evidence based set of guidelines on cholesterol management.[2,3] Patients at higher coronary heart disease (CHD) risk have low LDL-C goals and require more aggressive lipid-modifying therapy to achieve these goals than patients at lower CHD risk yields greater relative benefits in reducing the risk of CHD events compared with such treatment in patients at lower CHD risk[4]. Despite of awareness of the importance of appropriately managing patients with dyslipidemia, evaluations of current practice reveal that only about 40% to 75% of all patients with dyslipidemia achieve goal LDL-C levels [5-8]. The likelihood of goal attainment is inversely associated with cardiovascular (CV) risk[6, 9].

National Cholesterol Education Program (NCEP) guidelines prepared by Adult Treatment Panel III provide clinicians with recommendations for the clinical management of abnormal blood cholesterol to reduce the risk of cardiovascular events.

Many clinical trials have shown that treatment aimed at reducing LDLc, especially statins, effectively reduces the risk of cardiovascular disease in patients with a high risk of suffering vascular disease, in particular myocardial infarction[10-12]. However, even with appropriate levels of LDLc, there is a high residual risk of atherothrombotic complications related to low HDLc and high TG.

According to the recommendations of the United States National Cholesterol Education Program (NCEP-ATP III), drug treatment should be started to correct these lipid disorders, especially in high risk cases[13]. Epidemiological studies have shown that a 1% reduction in HDLc values leads to a 2% to 3% increase in the risk of CAD. Those studies agreed that low HDLc levels represent an independent risk factor for CAD[14-15].

The United Kingdom Prospective Diabetes Study (UKPDS) showed that an increase in HDLc of 4 mg/dL is associated with a 15% decrease in the number of cardiovascular events[16].

However, there is very little information on persistent dyslipidemia in patients treated with statins.

With this regard in this study an attempt has been made to find the prevalence of optimized treated lipid profile in CAD patients.

Aims and Objective

TO STUDY THE STATUS OF LIPID PROFILE CONTROL IN CORONARY ARTERY DISEASE PATIENTS AT A TERTIARY CARE HOSPITAL

Material and Methods.

Study Site

Department of Cardiology, SMS Medical College and Associated Hospital, Jaipur, Rajasthan, India.

Study Type

Single centre Hospital based observational Study.

Study Duration

From May 2015 to December 2016.

Study Patients

Adult patients attending opd of Department of cardiology with diagnosis of ischaemic heart disease documented by coronary angiography. Patients are eligible for study inclusion if they had been on statin therapy for three or more months at the time of assessment (all CAD patients), and provided written informed consent.

Exclusion Criteria

1. Patients of Liver insufficiency, Renal insufficiency, known renal disorders such as CKD, Nephrotic syndrome were also excluded from the study.
2. Other exclusion criteria are contraindication to statins,systemic illness.

Methodology

Patients of CAD who had been treated with statins for at least 3 months at the time of medical visit were included.The data requested in the case report form were obtained from the clinical examination or a review of patient's medical records. The data were recorded in a single medical visit.

Documented Parameters

The following parameters were documented during the medical visit: sex, age, weight, height, and waist circumference.

Lipid parameters were taken from the most recent lipid analysis performed during the last 6 months and when the patient had been under treatment with statins for at least 3 months. The following parameters were collected: TC, LDLc, HDLc and TG; in addition, other risk factors were documented.

Patients were defined as diabetic if they had been previously diagnosed, or if they were being treated with antidiabetic drugs and/or insulin.

Metabolic syndrome was defined in accordance with the definition of the International Diabetes Federation. Waist circumference was measured in a standing position, at the midpoint between the iliac crest and the last rib on the mid-axillary line (cut-off values: 90 cm for men and 80 cm for women).

Patients were defined as hypertensive if they had been previously diagnosed, were under anti-hypertensive treatment, or had a blood pressure >=140/90 mmHg.

Current smokers were those who smoked at that time or had given up smoking within the last year, and ex-smokers were those who had given up smoking over 1 year earlier.

Statistical Methods

The categorical variables were presented as absolute values and percentages, the continuous variables as means (standard deviation). The catagorical variables were compared using Chi square test. A multivariate regression analysis was performed to detect predictors of abnormal LDLc, HDLc and TG values. The odds ratio (OR) was adjusted for age, tobacco smoking, body mass index 25 (obesity), waist circumference >90 cm in men and >80 cm in women, hypertension, DM, cerebrovascular disease, peripheral arteriopathy, blood pressure 140/90 mmHg. All the statistical analyses were two-tailed and significance was set at $P < .05$. Analysis was carried out with the SPSS 17 (SPSS Inc., Chicago, IL), trial version software.

Results

Patient Characteristics and Level of Risk

Demographic data of the studied patients (Table 1)

The baseline characteristics are shown in Table 1. Of the 1016 patients, 730 were male (71.8%) and 286 were female (28.2%) and the mean age was 57.2 ± 8.8 years. There were 201 current smokers(19.8%),180 patients of type 2 DM (17.7%),280 patients of HTN(27.6%),100 patients of metabolic syndrome(9.8%),38 patients of hypothyroidism(3.7%),17 patients of peripheral artery disease(1.6%),10 patients of CVA(0.9%).

Table 1: Demographic and baseline clinical data of study subjects

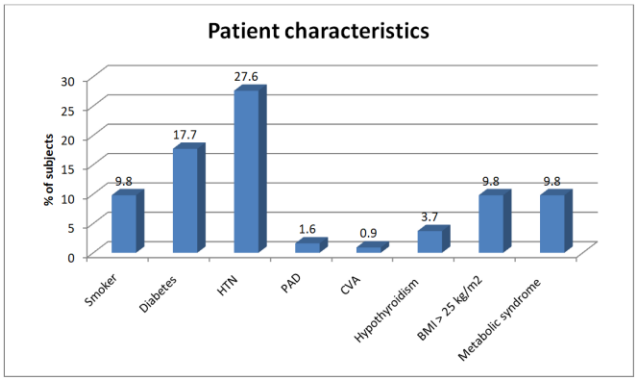
Age (years) (mean ± SD)	57.2 ± 8.8
Sex Female (N, %)	286 (28.2%)
Male (N, %)	730 (71.8%)
Smoker (N, %)	201 (19.8%)
Diabetes (N, %)	180 (17.7%)
HTN (N, %)	280 (27.6%)
PAD (N, %)	17(1.6%)
CVA (N, %)	10 (0.9%)
Hypothyroidism (N, %)	38 (3.7%)
BMI (mean ± SD) (kg/m^2)	22.28 ± 1.93
BMI > 25 (kg/m^2) (N, %)	100 (9.8%)
WC (mean ± SD) (cm)	86.25 ± 5.54
Metabolic syndrome (N, %)	100 (9.8%)

P value <0.05 was considered significant.

Percentage of patients receiving baseline treatment with different types of statins

Table 2:

Dose (mg)	Atorvastatin	Rosuvastatin
10	496 (48.8%)	49(4.8%)
20	326 (32.1%)	8(0.8%)
40	137(13.5%)	-
Grand Total	**959**(94.4%)	**57**(5.6%)



Total no of patients on atorvastatin were 959(94.4%),out of which 496 were on atorvastatin 10 mg(48.8%),326 on atorvastatin 20 mg (32.1%),137 on atorvastatin 40 mg(13.5%).

Total no of patients on rosuvastatin were 57(5.6%) ,out of which 49 patients on rosuvastatin 10 mg(4.8%),8 on rosuvastatin 20 mg(0.8%).

Table 3: Average lipid profile of studied cases

Lipid profile	Mean ± SD (mg/dl)
TC	201.94 ± 27.85
LDL	93.67 ± 24.96
HDL	46.06 ± 5.03
TG	121.59 ± 51.81

Table 4: Deranged lipid profile of studied cases

Lipid profile	Normal	Abnormal (*raised/# reduced)
TC*	480 (45.5%)	536 (54.5%)
LDL*	364 (35.8%)	652 (64.2%)
HDL#	672 (65%)	344 (35%)
TG*	762 (75%)	254 (25%)

Above table shows that total no of patients with raised total cholesterol were 536(54.5%), total no of patients with raised LDL cholesterol were 652 (64.2%), total no of patients with raised HDL cholesterol were 344 (35%), total no of patients with raised triglyceride were 254 (25%).

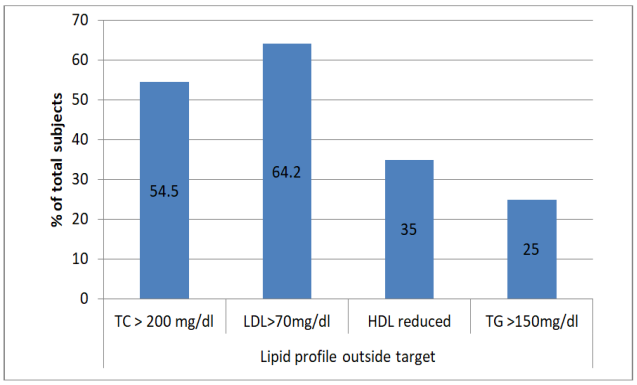


Table 5: Deranged lipid profile in relation to different dosage of statins

Drug	Atorvastatin (N=959)				Rosuvastatin (N=57)		
Dose	**10 mg (N=496)**	**20 mg (N=326)**	**40 mg (N=137)**	**P value**	**10 mg (N=49)**	**20 mg (N=8)**	**P value**
LDL>70 mg/dl	386	187	42	<0.001	35	2	0.031
TC > 200 mg/dl	334	121	40	<0.001	35	6	0.829
HDL raised	207	90	30	<0.001	**17**	**0**	**0.002**
TG >150 mg/dl	94	97	56	<0.001	7	**0**	**0.575**

Total no of patients on atorvastatin were 959 and on rosuvastatin were 57.

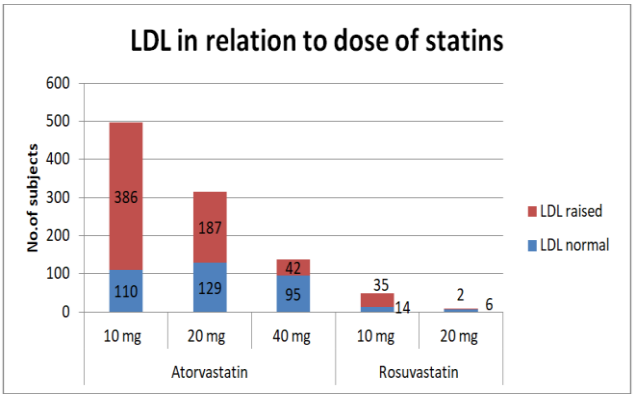


Table 6: Multiple logistic regression analysis to identify independent predictors for Dyslipidemia

Variables	Raised LDL		Raised TC		Low HDL		Raised TG	
	OR (95%CL)	**P value**	**OR (95%CL)**	P value	**OR (95%CL)**	P value	**OR (95%CL)**	P value
Age>70 years	2.079 (.881- 4.906)	.095	1.844 (.454-4.629)	.845	1.624 (.682-3.868)	.274	1.316 (.437-2.727)	.007
Higher dose of statin	.126 (.096-.165)	**.000**	.024 (.003-.207)	.001	.044 (.006-.237)	.000	0.401 (.157-.698)	.001
Smoker	1.080 (.713-1.636)	.717	.955 (.362-2.519)	.925	1.458 (.861-2.471)	.161	1.204 (.839-1.727)	.314
DM	2.293(.974-3.495)	**.159**	.569 (.101-3.193)	.522	2.586 (1.286-5.198)	.008	1.596 (.865-2.573)	.138
HTN	1.889 (1.17-3.049)	**.009**	1.319 (.610-1.920)	.335	2.572 (.652-3.927)	.223	.893 (.592-1.347)	.590
Hypothyroid	2.540 (.751-8.593)	.134	--	.997	.191 (.037-.981)	.047	1.394 (.648-3.002)	.395
BMI>25kg/m^2 (obesity)	2.317 (.083-3.068)	.321	2.185 (.483-3.238)	.999	1.630 (.058-6.888)	.705	1.481 (.174-2.630)	.720
WC (>90cm in male, >80cm in female)	1.646 (.592-4.580)	.340	3.702 (.586-3.375)	.164	1.110 (.235-2.349)	.195	2.572 (.664-5.232)	.185

Predictors of Lipid Abnormalities

The multivariate analysis identified several variables that were independently associated with abnormal lipid levels (Table 6).

Treatment with high doses of statins was associated with a greater control of LDLc levels and low HDLc values. DM was associated with a worse control of HDLc.

Discussion

The results of this extensive study show that, despite treatment with statins, only 28% patients achieve normal lipid values, or those recommended by current clinical practice guidelines.[13-14]

Furthermore, the large majority of high risk patients continue to have one or more of the parameters of dyslipidemia abnormal. Although many cross-sectional epidemiological studies have analyzed the prevalence of dyslipidemia in populations with different levels of cardiovascular risk,[17,18,19-21] this study analyse the characteristics of a large cohort of patients with cardiovascular risk treated with statins.

Furthermore, previous studies usually focused on LDLc, without performing a more complete analysis of the patients' lipid profile. In addition to observing that a high proportion of patients do not meet target levels of LDLc, a significant proportion of cases are seen to have low HDLc and high TG. This was seen both when LDLc levels were under control and when they were not, which highlights the importance of trying to improve patients' overall lipid profile, particularly in high-risk cases.

While most studies into dyslipidemia have centered on LDLc in accordance with the recommendations of the NCEP ATP III,[22] our study takes a wider perspective and also considers HDLc, TG, and TC values.

Our study results show that dyslipidemia was present in 72% of patients. LDL was raised in 64.2 % of total no of patients on statins,HDL was abnormal in 35 % of total no of patients,Triglyceride raised in 25% patients.

In our study, the low dose of statin, equivalent to atorvastatin at 10 mg/day, was the most commonly used. This factor undoubtedly affects the results. Of the 1016 total no of patients 48.8% of patients were on atorvastatin 10 mg,32.1% of patients on atorvastatin 20 mg,13.5% on atorvastatin 40 mg.

Our study also shows that patients on higher dosages of atorvastatin that is 40 mg had better control of LDL,TC,HDL,Triglyceride than patients on atorvastatin 10 mg($p < 0.001$).Only 5.6% of patients were on rosuvastatin out of which patients on rosuvastatin 20 had better control of LDL than rosuvastatin 10 mg (p value<0.05).

These results are supported by many studies such as DYSIS study, Spain by Gonjalez et al .DYSIS is a multinational cross-sectional study carried out in Canada and Europe (n = 22,063). In Spain, 3710 patients treated with statin therapy for at least 3 months were included. Complete lipid profiles of 3617 patients were recorded. Regarding the high cardiovascular risk patients with complete lipid profiles (n = 2273), 78.9% had a disorder in at least one of the three main lipid parameters: low-density lipoprotein cholesterol (LDLc), high-density lipoprotein cholesterol (HDLc) and/or triglycerides. LDLc was not within target levels in 61.4% of these high risk patients; HDLc was abnormal in 25.3%, and triglycerides were elevated in 37.8%. Overall, LDLc was outside the target range in 63.1%, and 20.7% (n = 668) of those treated with statins were normal for all parameters.

In another study SG Goodman, A Langer, NR Bastien, et al; on behalf of the DYSIS Canadian Investigators. Prevalence of dyslipidemia in statin-treated patients in Canada: Results of the DYSlipidemia International Study (DYSIS). Can J Cardiol 2010 The results of the present observational study suggest that almost one-half of the high-risk Canadian patients with cardiovascular disease, diabetes or an estimated 10-year coronary artery disease risk of 20% or greater did not reach the LDL-C target recommended by Canadian guidelines.

In another study Eur J Prev Cardiol. 2012 Persistent lipid abnormalities in statin-treated patients and predictors of LDL-cholesterol goal achievement in clinical practice in Europe and Canada by Gitt AK et al Overall, 48.2% of patients did not achieve the therapeutic goal for LDL-cholesterol, either as a single lipid anomaly or associated with low HDL-cholesterol, elevated triglycerides, or both. Lack of goal achievement was more prevalent among low-risk patients (55.8%) than high-risk patients (46.8%). Serum LDL-cholesterol levels were lower in high-risk patients. Predictors associated with LDL-cholesterol goal achievement were higher statin dose (odds ratio (OR): 0.35), specialist treatment (OR: 0.74), or combined lipid-lowering therapy (OR: 0.80).

Limitations

Limitations in this study are:

1. Compliance of the patients, to their lifestyle apart from regularity in medicine intake could not be ensured properly. Reason could be large number of patients following in OPD every month and hence due to overwhelming number visiting week after week compliance and lifestyle modification couldn't be ensured.

2. We don't know how frequently lipid profile was repeated for evaluation of results and subsequently dosages corrected.

So best we can increase dosages of medical treatment alone rather then maximizing lifestyle modification.

Conclusion

Most of the patients treated with statins , especially those with a high cardiovascular risk, do not meet recommended lipid targets and/or have a high frequency of abnormal HDLc and TG levels. The results of this study show that significant differences exist between the recommendations in the guidelines and clinical practice, as well as highlighting the need for a more intensive and integrated management of dyslipidemia in high-risk patients. In particular, in secondary prevention and in diabetic patients, therapy should not focus solely on meeting the targets for TC and LDLc, but also achieving the right levels of TG and HDLc to reduce the risk as much as possible.

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