Efficacy of statin therapy on achieving target goal of LDL among Iraqi patients

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ABSTRACT

Dietary and statin treatment planning are central to the management of dyslipidemia. The treatment's efficacy is determined by how well it achieves the level of low-density lipoprotein (LDL)- target goal established by European guidelines for that reason the target (LDL) in patients receiving different types and doses of statin therapy were evaluated in this prospective, cross-sectional study was conducted on patients recruited from Al Karama Teaching Hospital, Kut, Iraq to assess the levels of serum LDL in addition to data collected directly from the patients included demographic characteristics, BMI, and types, doses, and duration of statins used which showed that target goal (optimal) was achieved in 82.4% in patients taking statin. The LDL-target goal was achieved in 85.4% of patients taking statin with moderate risk, in 82.6% with high risk, and 80.6 % with very high risk which indicate that the targeted LDL levels were achieved in good proportion in patients with high and moderate risk of dyslipidemia with a less extent proportion in patients with very high-risk of dyslipidemia. It was also demonstrated that the LDL target levels were achieved more efficiently with a higher dose of statins.

Keywords: cardiovascular diseases, dyslipidemia, statin target goal

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INTRODUCTION

Expert guidelines and recommendations are often the basis for a physician's implementation of a particular course of action in a therapeutic setting. Since the advent of evidence-based medicine (EBM), doctors have been more open to making "evidence-based" judgments. In the field of lipid-lowering medicine, this is also true. Coronary heart disease (CHD) and other metabolic and chronic health problems may be avoided if hypercholesterolemia is treated[1]. Statin usage is on the rise throughout Europe, with a 31% yearly increase in prevalence, according to earlier research[2].

For every 1.0 mmol/l decrease in LDL-cholesterol, statin medication has been shown to lower the risk of major coronary events, coronary revascularization, and stroke over a five-year period by 21%. Statins have been found to decrease mortality and the requirement for coronary artery bypass grafting or angioplasty in patients with coronary artery disease. Higher dosages of statins have been shown in previous trials to halt the advancement of atherosclerosis and even produce regression, so lowering the risk of cardiovascular disease and even dementia[3]. Other statins including rosuvastatin, have anti-platelet action in addition to their lipid-lowering effects[4].

For the corresponding targets, different "target goals" are defined in most guidelines according to the levels of risk, to guide the lipid management in different groups and to minimize the risk of cardiovascular events on a scientific basis. The achieved statin target goal in present study as all selected patients had complicated with cardiovascular diseases or other diseases (HT, DM, HF, CKD) was low density Lipoprotein-C <100 mg/dl for patients with moderate and high risk and low-density Lipoprotein-C <70 mg/dl for patients with very high risk according European guideline[5].

The aim of the current study is to evaluate the target level of LDL in patients receiving different types and doses of statin therapy.

METHODOLOGY

A prospective, cross-sectional study was conducted in Al Karama Teaching Hospital- Kut, Iraq. This study included 250 patients taking statin with mean age of 54.3±6.8 years was selected after eligibility to inclusion criteria which include patients of age ranged between 40-69 years, patients taking statin therapy for treatment or prevention of cardiovascular diseases for a duration of statin intake of ≥3 months and exclusion criteria that include patients taking other lipid lowering agent alone or in combination with statin and patient suffered from cancer.

Sampling and data collection

A convenient sample of patients taking statin presented to outpatient's clinics in Al Karama Teaching Hospital- Kut, Iraq. The data was collected from the patients directly and filled in a prepared questionnaire that included the followings:

1. Demographic characteristics of patients taking statin: Age and gender.

2. BMI of patients taking statin.

3. Serum LDL levels.

4. Statins characteristics: Types of statins used, statin doses and duration of statin use.

The investigations of the patients taking statin were implemented in the Laboratory of Al Karama Teaching Hospital. The statin taken by the selected patients was within different doses.

The approval was taken from Research Ethical Committee in Kut University College-Iraq. An oral informed consent was taken from all participants that enrolled in the current study.

RESULTS and DISCUSSION

Distribution of BMI according to statin targeting were illustrated in table 1 which revealed that there were non-significant differences were observed between patients taking statin with achieved target and patients not achieved target regarding BMI (p=0.3). The demographic characteristic of all patients subjected to the present research were illustrated in table 1 that showed the age and gender distribution. Non-significant differences were observed between patients taking statin with achieved target and patients not achieved target regarding their age (p=0.1). A significant association was observed between female patients taking statin and not achieving statin target (p=0.01). Results illustrated in Table 2 showed that the mean± SD of LDL was 74.7±22.9 mg/dl; 7.6 % of them had high LDL and the rest showed normal LDL levels.

Table 1. Distribution of BMI and demographic characteristics according to statin targeting

Variable	No.	%	Statin targeting				P
			Achieved		Not achieved		
			No.	%	No.	%	
BMI							
Normal	61	24.4	52	85.2	9	14.8	
Overweight	99	39.6	84	84.8	15	15.2	0.3*
Obese	90	36.0	70	77.8	20	22.2	
Age groups							
40-49 years	41	14.1	30	73.2	11	26.8	
50-59 years	99	33.2	81	81.8	18	18.2	0.1*
60-69 years	110	44.5	95	86.4	15	13.6	
Gender							
Male	168	67.2	147	87.5	21	12.5	0.01**
Female	82	32.8	59	72	23	28	

*Fishers exact test, **Chi-square test.

Table 2. Levels of LDL in patients subjected to the study

Variable	No.	%
LDL mean±SD (74.7±22.9 mg/dl)		
Normal	231	92.4
High	19	7.6
Total	250	100.0

Table 3 showed that the statin target goal (optimal LDL-C) was achieved in 82.4% of patients taking statin and not achieved in 17.6% of them and it was achieved in 85.4% of patients taking statin with moderate risk and in 82.6% of patients with high risk, while 80.6% of patients with very high risk was achieved the target goal of statin.

Table 3. Statin target of patients taking statin

Variable	No.	%
Statin target goal (optimal LDL-C)		
Achieved	206	82.4
Not achieved	44	17.6
Total	250	100.0
Statin target goal (moderate risk)		
Achieved	41	85.4
Not achieved	7	14.6
Total	48	100.0
Statin target goal (high risk)		
Achieved	90	82.6
Not achieved	19	17.4
Total	109	100.0
Statin target goal (very high risk)		
Achieved	75	80.6
Not achieved	18	19.4
Total	93	100.0

Table 4 showed the statin used among patients and the distribution of their characteristics which revealed that Atrovastatin used in 58.4% and Rosuvastatin in 41.6 % of patients subjected to the current study. The statin doses were 20 mg (53.2%) and 40 mg (46.8%). Durations of taking statins were 3- 6 months (29.6 %), 7-12 months (12 %) and more than 12 months (58.4%). The results revealed that there were non-significant differences between patients taking statin with achieved target and patients not achieved target regarding types of statin (p=0.4) and duration of statin use (p=0.07). A significant association was observed between low dose statin and not achieving statin target (p<0.01).

Table 4. Distribution of statin characteristics according to statin targeting

| Variable | No. | % | Statin targeting | | | | P |
| | | | Achieved | | Not achieved | | |
			No.	%	No.	%	
Types of statins							
Atrovastatin	146	58.4	123	83.1	23	16.9	0.4*
Rosuvastatin	104	41.6	83	81.9	21	18.1	
Statin doses							
20 mg	133	53.2	105	78.9	28	21.1	<0.01**
40 mg	117	46.8	101	86.3	16	13.7	
Duration of statin use							
3-6 months	74	29.6	55	74.3	19	25.7	0.07**
7- 12 months	30	12	26	86.7	4	13.3	
More than 12 months	146	58.4	123	84.2	23	15.8	

* Fishers exact test, **Chi-square test.

When it comes to the secondary prevention of cardiovascular illnesses, the primary objective of most doctors is to either bring low density lipoproteins-C under control or reduce their levels. In order to accomplish this objective, an intensive regimen of statin medication is used, and in certain cases, a combined therapy is required[6,7]. Statin treatment, on the other hand, could not accomplish this objective without the cooperation of patients, who needed to adopt a healthier way of life by making adjustments to their diet and level of physical activity[8,9].

In the present study, the majority of patients on statins with moderate and high risk attained the ideal LDL-C 100 objective, but a smaller percentage of patients with extremely high risk did not. Our patients did not achieve the very low (70m /dl) target goal recommended for the very high-risk population, which may be attributable to the fact that this goal requires a high dose and potency of statin, a healthy lifestyle, and good therapy adherence. These outcomes exceed those seen in research conducted by Jimmy et al., who reported that only 83 out of 183 individuals with dyslipidemia reached their statin target objective[10].

Current results exceed those obtained from research conducted by Arca et al., on adults with dyslipidemia who were given statins[11]. Our study's outcomes may have been better than previous studies' not because of better patient or statin management of dyslipidemia, but because of the intensive course of statin medication employed, the kind and amount of statins used, patient adherence, and physicians' prescribing habits. We found that patients at very high risk achieved the statin target goal (LDL-C 70 mg/dl), while patients at moderate and high risk achieved the statin target goal (LDL-C 100 mg/dl) in a cross-sectional retrospective study conducted in the United States by Jones et al[12]. Despite these works, the proportion of patients with extremely high-risk dyslipidemia who achieved statin target goal (70 mg/dl LDL-C) in a Greek trial by Xanthopoulou et al. was lower than in our research[13]. The proportion of extremely high-risk patients that achieved statin optimum target (70 mg/dl LDL-C) in the current investigation is lower than that in the Vintila et al. study in Romania[14].

Farhan et al. did research on 200 obese and overweight individuals with dyslipidemia in Iraq and found that rigorous treatment with statin significantly reduced blood LDL-C, HDL-C, and cholesterol[15]. For individuals with dyslipidemia, our research is the first to address the statin aim objective. The lack of a unified understanding of what constitutes dyslipidemia is a significant challenge to researchers in the Middle East who are trying to determine the optimal statin target aim. Furthermore, there are no specific lipid recommendations for treating dyslipidemia. The majority of nations in the Middle East follow lipid recommendations derived from sources outside the region[16].

Our findings were better than those observed in the Dyslipidemia International Study, which included patients with dyslipidemia from Europe and China who were treated with statins according to EAS/ESC criteria for very-high CV risk[17]. Prescription of statins as secondary therapy without focusing on target goal, combined with a lack of subsequent monitoring of lipid levels in patients, the possibility of side effects (muscle side effects), poor education about the safety of statins, and low adherence, may explain why our study's goal of achieving LDL-C levels of 100 mg/dl was not met. The risk of ischemic heart disease attacks is reduced by 60% and the risk of stroke is reduced by 17%, according to a meta-analysis research conducted by Law et al in the UK[18].

Results obtained in the current work revealed that female patients on statins were more likely to fail in reach their statin goal (p=0.001), which may be attributable to factors such as non-adherence to therapy, poor dietary habits, and the presence of several comorbid conditions. This conclusion is in line with the findings of the Chinese trial conducted by Li et al., which found that

extremely high risk patients were reaching the objective aim of treatment with statins (LDL-C 70 mg/dl)[19]. Women are more prone to acquire dyslipidemia than males, and they also have worse compliance and adherence to statin medication, according to research conducted in Saudi Arabia and published in 1966 by Alnouri et al.[20].

A higher statin dosage was associated with meeting the objective in the current investigation (p<0.01). This discovery is in agreement with the findings of other literatures, such as the research by Martin et al.[21] in the United States and the study by Bittencourt[22] in Brazil, which both discovered that a high dosage of statin administered in accordance with the appropriate guidelines is beneficial in the prevention and treatment of dyslipidemia. Patients with dyslipidemia who take large doses of statins are at increased risk of diabetes mellitus of about 30% and other side effects, according to research by Wang et al. in China[23]. Other studies also demonstrated that statin therapy is effective in lowering LDL-C levels, particularly among individuals at extremely high risk, as proven by a series of studies conducted in the United States and published by Kapur et al[24].

It was concluded that the targeted LDL levels were achieved in good proportion in patients with high and moderate risk of dyslipidemia with a less extent proportion in patients with very high-risk of dyslipidemia. It was also demonstrated that the LDL target levels were achieved more efficiently with a higher dose of statins.

STATEMENT OF ETHICS

The research was carried out adhering to the Declaration of Helsinki's ethical guidelines. The procedure was conducted after obtaining verbal and analytical consent from the patients before to collecting the sample. The Research Ethical Committee in Kut University College, Wasit, Iraq, examined and approved the study protocol, subject information, and permission form. This approval was granted by a local ethics commission, as indicated by document number 454 dated 12/11/2022.

CONFLICT OF INTEREST STATEMENT

The authors declared no conflict of interest.

AUTHOR CONTRUBIONS

Design: AL-SHAMMARI AH, SHANDOOKH QJ; Aquisition of data: AL-SHAMMARI AH, Analysis of data: AL-SHAMMARI AH, Manuscript preparation: AL-SHAMMARI AH, Revision of the manuscript: SHANDOOKH QJ, Statistical analysis: AL-SHAMMARI AH, Technical and financial support: AL-SHAMMARI AH, SHANDOOKH QJ, Supervision: SHANDOOKH QJ.

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