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Investigating doctors' implementation of ACC/AHA blood cholesterol treatment recommendations at a tertiary hospital in Northern Saudi Arabia

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ABSTRACT

Background: The 2018 American College of Cardiology (ACC) and American Heart Association (AHA) updated data on blood cholesterol treatment guidelines showed a significant shift in treating atherosclerotic cardiovascular disease (ASCVD). In 2018, recommendations were adopted to increase the number of persons using statin therapy. Still, real-world observations of how treatment use has changed, especially in Saudi Arabia, have yet to be limited in the literature. Doctors' implementation of ACC/AHA 2018 recommendations regarding prescribing medications has yet to be studied in Saudi Arabia. *Aim:* To examine doctors' implementation of ACC/AHA 2018 cholesterol recommendations in managing acute atherosclerotic cardiovascular disease patients. *Results:* Almost 47% of the patients were managed according to the 2018 ACC/AHA recommendations. However, 53% of patients did not take statins. Doctors adhered to the recommendations when working with patients with myocardial issues, in contrast to other events. Of the non-adherent patients, 40% refused the treatment because of their beliefs or fear of the side effects. *Conclusion:* Our primary analysis concluded that statin recommendations were not given to more than half of the patients with acute atherosclerotic diseases; moreover, some did not receive any statin therapy.

Keywords: Statin, 2018 ACC/AHA, guidelines, blood cholesterol management.

1. INTRODUCTION

Cardiovascular disease (CVD) is still considered a significant health concern globally and locally (El-Saharty et al., 2021). Death and disabilities are the two

expected outcomes of CVDs (El-Saharty et al., 2021). In Saudi Arabia, the rate of CVDs is predicted to become more than 24 million by 2030 (Mahmood et al., 2015). Moreover, in Saudi Arabia, CVDs have caused an estimated 22% of deaths yearly (Nayebare et al., 2017; Murtaza et al., 2016). It is well known that the drug of choice for preventing and treating primary CVDs is statins, which inhibit cholesterol biosynthesis (Brault et al., 2014). Multiple studies have reported that statins showed beneficial effects by lowering lipid levels and have resulted in a clinically significant decrease in CVD deaths and disabilities (Paciaroni et al., 2007; Mora-Rodriguez et al., 2020; Koushki et al., 2021; Bubnova et al., 2021; Brugts et al., 2009).

In Saudi Arabia, risk factors such as obesity, a high-fat diet, smoking habits, and a sedentary lifestyle have increased. Thus, considerations for primary prevention using statins are needed (AlSayed et al., 2016). In addition, the high rates of dyslipidemia require therapeutic intervention and lifestyle management (Gotto, 2002; Stone et al., 2014). In 2013, the American College of Cardiology (ACC) and the American Heart Association (AHA) initiated that blood cholesterol therapeutic recommendations should start with statin regimens for patients after undergoing any CVDs or events; cardiovascular events are related to any episode that can affect the heart or heart muscles causing a defect or damage, such as the decrease in blood flow (Stone et al., 2019).

Evidence from multiple research projects has shown that physicians were very slow in following these guidelines, resulting in patients not being treated or being treated with a lower dose of statins after a CVD or an event, with only half of the CVD patients being managed correctly, i.e., according to the ACC/AHA recommendations (Tran et al., 2016). Interestingly, these guidelines advised using statins for all adult patients with atherosclerotic disorders, such as coronary diseases, or any history of cardiac problems. However, low-density lipoprotein (LDL) levels and the 2018 guidelines reinforced this therapeutic advice (Stone et al., 2019). In this study, our main aim was to examine physicians' adherence to the ACA/AHA 2018 cholesterol recommendations when managing patients with problems of atherosclerotic cardiovascular origin.

METHODS

Ethics approval

All methods of collecting the data were performed following the Declaration of Helsinki. IRB fromUmm Al-Qura University, College of Medicine, Approval No. (HAPO-02-K-012-2021-12-876).

Study design and period

This retrospective cohort analysis of patients from Al-Qurryyat General Hospital in Al-Jawf Province, in northern Saudi Arabia (1st of November 2018 to September 30, 2021). When choosing to perform a retrospective study, the common assessment usually includes the clinical outcomes, any treatment strategy, and the costs for specific indications or conditions that cannot be collected in large data sets.

Sample size

In these studies, no formula is used to calculate the sample size. Often, a sample size of 10 cases or charts per variable is required to achieve results that are both true and useful clinically. Therefore, using approximately seven or five events per variable is correct. Convenience sampling is a common means of choosing a sample. Suitable conditions are selected over a specific time point.

Inclusion/ exclusion criteria

The study was established to examine doctors' implementation of ACC/AHA 2018 cholesterol recommendations when prescribing therapy for patients with acute ASCVD. Patients were required to have at least one diagnosis for any atherosclerotic event between November 1, 2018, and September 30, 2021. Any critical atherosclerotic events were flagged, and the index date was noted. The selected patients were those aged 18 years and older at the index date who were not pregnant during the study time frame and had at least one possible diagnosis. Patients excluded included those who could not tolerate statins, those with severe heart failure, those with persistent infection or inflammation, those with renal diseases, those with tumors or liver dysfunction, and those with zero or missing information about the starting point of treatment (the baseline).

Data collection

The doctors' implementation of the recommendations was examined over one year, starting the day after the index date. The first statin prescribed after the index event was evaluated against the ACC/AHA 2018 guidelines for secondary prevention after a clinical ASCVD event. For example, patients over 75 who had started or continued treatment with a high-intensity statin after their

index event were flagged as being treated according to the recommendations. Patient demographics and characteristics, such as age, sex, comorbidities, and any earlier use of statins, were collected during the one year starting at the baseline.

Laboratory data

Data from the patient files, such as fasting lipid profiles, were gathered from the beginning of the treatment. We named the baseline Week 0 and agreed on the follow-up time points as Week 4 and Week 24. Any details on side effects of the treatments, such as muscle pain or rash, were also gathered from patient files if the patient mentioned them at any of the scheduled visits.

Statistical analysis

The baseline characteristics were presented as the means ± SD. The primary outcome of this research was acceptance of and adherence to therapeutic advice, which was expressed as a paired variable (adherent or non-adherent). Other variables, such as any ASCVD events and therapies, were included in the analysis to examine their association with therapeutic adherence. Baseline dara were expressed in univariate and multivariate analyses for regression logistics. Regression and Chi-square test was applied to compare lipid profiles and times. The significance level was 0.05. All statistical analyses were performed using SPSS (USA, 28).

3. RESULTS

Table 1, 2, 3 demonstrates the baseline. One hundred thirty-nine patients were included in the study, averaging 79 (16.4) years. Female patients comprised 39% of the sample. Diabetes mellitus and hypertension were the most common diseases. Approximately 47% of the patients were treated according to the 2018 ACC/AHA recommendations. Conversely, 30% of patients did not take any statins, and 14% of patients younger than and equal to 75 years who were not treated according to the recommendations received a moderate-intensity statin (Table 4).

Table 1 Age and gender of the patients (n = 139)

Variable	N (%)
Age in average (years)	
≤ 75	77 (55.3%)
> 75	62 (44.7%)
Female	39 (28%)
Male	100 (72%)

Table 2 Disease status for the patients (n = 139)

Variable	N (%)
Diabetes mellitus	115 (82.7%)
Hypertension	122 (87%)
Arrhythmias	33 (23.7%)
Peripheral artery disease	11 (7.9%)
Myocardial infarction	22 (15.8%)
Unstable angina pectoris	13 (9.3%)
Transient ischemic attack	11 (7.9%)

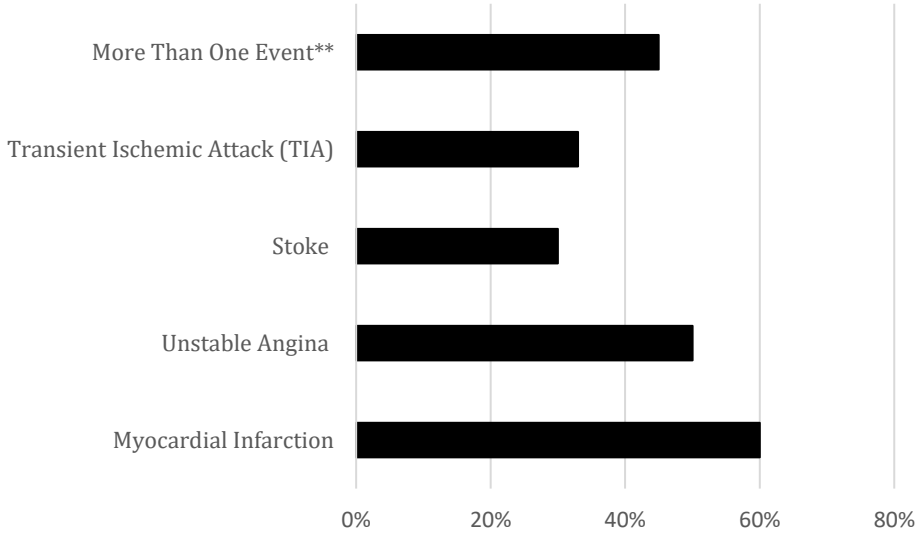
Table 3 Baseline medications for the patients (n = 139)

Variable	
Baseline medications	
Antihypertensives	120 (86.3%)
Antidiabetics	110 (79.1%)
Antihyperlipidemic	77 (55.39%)
Statins	23 (16.5%)

Table 4 Categories for statin therapy treatment after the cardiac event (n = 139).

	N (%)
Adherent to statin therapy	65 (47%)
Age is ≤75 years and on statins with high-intensity	20 (15%)
Age >75 years and on statins with high-intensity	14 (10%)
Age is >75 years and on statins with moderate intensity	31 (22%)
Non-adherent to statin therapy	74 (53%)
Age ≤ 75 years and on statins with moderate intensity	30 (14%)
Age is ≤ 75 years and on statins with low-intensity	10 (5%)
Age is ≤ 75 years, and with no statins	23 (17%)
Age > 75 years and on statins with low-intensity	5 (4%)
Age is >75 years, and with no statins	6 (13%)

The doctors were most involved in the recommendations when treating patients with myocardial infarction and unstable angina, apart from the other forms of arteriosclerosis disorder (Figure 1). Of the non-adherent patients, 40% refused because of their beliefs or the fear of the side effects; the remaining 35% were strictly physician decisions, and the rest were for unknown reasons (Figure 2).



** It could be from the same or another arteriosclerosis disorder

Figure 1 Doctors' implementation of the recommendations.

Adherent patients, after 24 weeks, showed a significant reduction in their cholesterol and triglyceride levels from the baseline. Moreover, their high-density lipoprotein (HDL) results were significantly better than the non-adherent group, as shown in (Table 5).

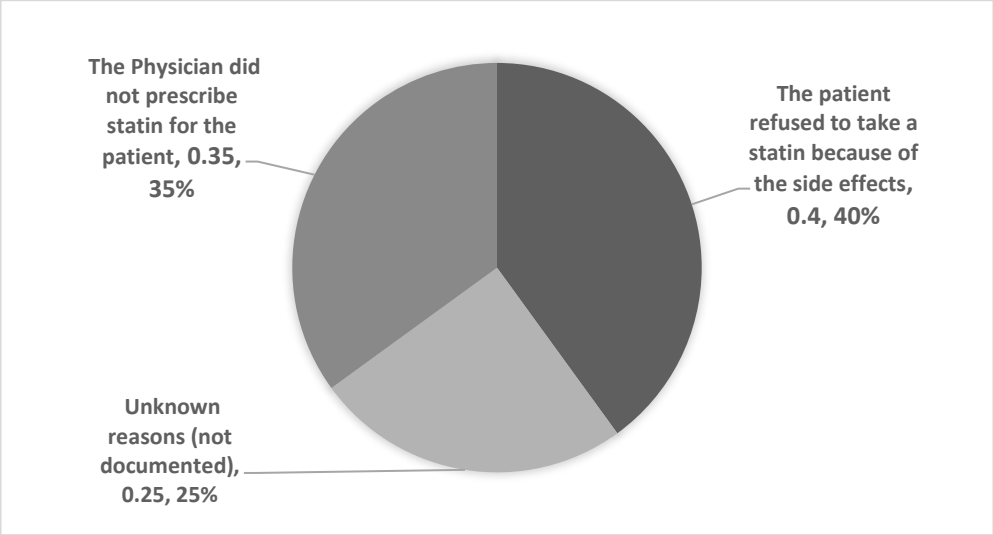


Figure 2 Summary of doctors' implementation of recommendations and causes for non-adherence.

Table 5 Lipid profile regression analysis of the non-adherent and adherent patient from baseline week 0, week four, and week 24.

	Baseline week 0		Week 4		Week 24		
	Non-Adherent	Adherent	Non-Adherent	Adherent	Non-Adherent	Adherent	p-value*
HDL (mg/dl)	50	55	49	60	44	66	0.001
Total cholesterol (mg/dl)	214	222	222	129	245	115	<0.01
Triglycerides (mg/dl)	156	166	176	133	200	122	0.003

4. DISCUSSION

The study examined doctors' implementation of the 2018 ACC/AHA recommendations regarding blood cholesterol management and prescribing patterns. These guidelines recommended the treatment of blood cholesterol as atherosclerotic disease prevention to use high-intensity statin therapy for patients younger than 75 years of age and high/moderate-intensity statin therapy for patients older than 75 years of age if no contraindications were detected. After reviewing the literature, we did not find any study performed in Saudi Arabia that investigated adherence and the follow-up of physicians to the ACC/AHA 2013 and 2018 guidelines. By examining the facts behind physicians' therapeutic plans, our study can provide the vital information needed better to understand therapeutic planning for statins and other anti-cholesterol agents.

Our findings from this study will aid the understanding of any deviation from the recommendations for statin medications in high-risk patients for cardiovascular diseases and will enhance the building of more sophisticated platforms for discussion regarding practice. One example would be patient refusal or non-adherence cases, in which adherence should be strictly enforced. This is especially so for patients who are categorized as high-risk and where recommendations for their urgent education are much needed. We found that 53% of the patients were eligible for prescribing statin therapy as per the 2018 ACC guidelines, but they did not receive the appropriate therapeutic management. Our findings were like studies performed in other countries (Ramsaran et al., 2019). Approximately 47% of the patients with acute atherosclerotic diseases received statin therapy; however, only 15% of those younger than 75 years of age and 50% of those older than 75 received the correct treatment, according to the guideline recommendations.

Our findings of this implementation rate were below previously published estimates of statins (Tran et al., 2016; Okerson et al., 2017). Investigating the exact reasons why these therapeutic decisions were made by reading the notes of the prescribing doctors can help in the future prescription of therapy to these kinds of patients. One of the most common reasons was the patients' refusal to take the medication because of side effects that could affect their lives. Regarding physicians, most of them concluded that their reason for not prescribing the exact doses or regimens per the guideline was that the patient's lipid profile seemed stable. It should be added that a few of the non-adherent patients' reasons were unknown as they were not documented in the charts or the system.

A previous study mentioned that the diversity among physicians' pharmacotherapy management of prediabetes was significant in treating and screening for diabetic prevention (Mainous et al., 2016). Following this, physicians' attitudes can positively influence the prescription of statins. Globally, the use of lipid-lowering drugs remains a controversial subject. Perhaps, consequently, statins have been under-prescribed in diseases such as stroke, transient ischemic attack Turner et al., (2016), CVDs Taylor et al., (2013), Tibrewala et al., (2018), fatty liver diseases Nelson, (2013) and other relevant CVDs. One reason for this may be because of the concern over the potentially severe side effects caused by statins and antihyperlipidemic, especially in old age (Lowestern et al., 2018). This concern over the impact of the treatment is known to be present among Saudi providers when assessing treatment targets, statin dosing, and statin-related side effects, thus influencing their adherence to the guidelines (Demasi, 2018; Gearing et al., 2006).

What are Saudi doctors' attitudes to and prescribing of lipid-lowering regimens? What and how do doctors in Saudi Arabia follow the recommendations? How well implemented are the 2018 ACC/AHA recommendations? These questions are still unanswered. Therefore, it is vital to start multiple studies around the Kingdom of Saudi Arabia to solve them. The strength of our study, as mentioned above, is that it is the first to be done in Saudi Arabia regarding adherence to the 2018 ACC guideline for blood cholesterol management. Another point to note is that it explores the reasons for non-adherence that can lead to reaching solutions that may be reflected in the therapeutic management of each patient.

Conversely, one of the main limitations is that the study focused solely on Al-Qurryyat Hospital. This was because the time for the reflection was limited. This led to the number of cases being limited to 139 patients. A multicenter study with a wide range of patients is recommended for the future. Moreover, measuring the safety and efficacy of statins and other anti-cholesterol treatments from the baseline at the beginning of the therapy and during any follow-up visits is essential.

5. CONCLUSION

In conclusion, our primary analysis found that the recommended dose of statin was not given to more than half of the patients. Moreover, some patients did not receive any statin therapy. The most common reason given by patients for their non-adherence was prompted by fear of the side effects. Therefore, physician and patient education is essential and should be emphasized.

Limitations

The sample size was small and may have influenced the accuracy of the results.

Recommendations

Increasing the sample size and making it multicenter in the future.

Aknowldgment

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Author Contribution

All Authors contributed to the literature review and writing/ manuscript preparation, writing the initial draft, data collection, formal analysis, and data presentation and data collection.

Ethical approval

IRB number Approval No. (HAPO-02-K-012-2021-12-876).

Informed consent

was not required for this study.

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This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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