Statin Therapy Experience in Saudi Arabia: Identifying Predictors of Non-Adherence, Patient Attitudes, and the Influence of Patient-Doctor Communication

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ABSTRACT

Introduction: Dyslipidaemia is a modifiable medical condition characterized by an abnormal distribution of lipids in the blood. Non-adherence significantly increases the risk of adverse cardiovascular events due to persistently elevated cholesterol levels. This study aimed to assess patients' adherence towards statin therapy and its associated predictors.

Methods: A cross-sectional online survey study was conducted in Saudi Arabia between August and September 2024 to examine patients' adherence towards statin therapy and its associated predictors. This study utilized previously developed questionnaire tool. The predictors of higher medication adherence were determined using binary logistic regression.

Results: A total of 417 patients were involved in this study. Around 58.5% of the patients were diagnosed with dyslipidaemia since more than 24 months. Around half of the patients (49.6%) reported that they practice daily exercises for less than 30 minutes. The most common comorbidity among the participating patients was hypertension (30.7%). The mean adherence score for the patients was 45.4 (SD: 10.7) out of 60; which reflects high adherence for statin therapy (75.7%). The statement that showed highest mean score was that "patients stopped taking medication based on my own judgment (not including times when I forgot to take my medication" with a mean score of 4.3 (1.1). The statement that showed the lowest mean score was that patients sometimes get annoyed that I have to keep taking medicine every day "with a mean score of 3.2 (1.4). Binary logistic regression analysis identified that there is no statistically significant difference in patients' adherence to statin therapy based on their demographic characteristics (p>0.05).

Conclusion: This study shows the generally high adherence to statin therapy among dyslipidemia patients despite the presence of common comorbidities like hypertension in Saudi Arabia. Importantly, the adherence of the patients does not relate to demographic factors-meaning there could be other variables affecting adherence more significantly, such as attitude toward medication and health behavior. Health care providers should provide a rationale to the patient regarding the need for consistent therapy and then propose individualized interventions to overcome the barriers for adherence, including lifestyle changes and education of the patients.

Keywords: Adherence; Dyslipidaemia; Saudi Arabia; Statin

INTRODUCTION

Dyslipidaemia is a modifiable medical condition characterized by an abnormal distribution of lipids in the blood, which can significantly increase the risk of cardiovascular diseases [1]. A dyslipidemic patient can disrupt any lipid parameter, including high-density lipoproteins (HDL), low-density lipoproteins (LDL), triglycerides, or a combination of these. There are two types of dyslipidemia: primary and secondary. Inheritable genetic mutations affecting lipid metabolism cause primary dyslipidemia, while lifestyle-related factors or medical comorbidities that alter lipid levels in the blood can cause secondary dyslipidemia. Usually, dyslipidemia remains symptomless, but a blood test can detect it [1]. Al-Kaabba et al. estimated that the prevalence of dyslipidemia among Saudi persons aged 15-65 is 20-44%, which draws attention to a major health problem that requires a tailored multi-sectorial intervention plan that identifies prevention strategies. Given the variable nature of dyslipidemia, guidelines recommend a treatment plan that includes both non-pharmacological, such as lifestyle modification, and pharmacological treatment strategies [2,3]. The mainstay pharmacological therapy for the treatment of dyslipidemia is HMG-CoA reductase inhibitors, commonly referred to as statins. Statins work by adjusting cholesterol levels in the bloodstream, thereby preventing atherosclerotic cardiovascular disease (ASCVD) [4]. Despite the well-established evidence demonstrating that poor compliance with statins increases the risk of cardiovascular events and cardiovascular-related mortality, non-adherence to statins remains an issue of interest [5]. Multiple studies were conducted to establish an in-depth understanding of patient attitudes towards statin therapy.

The primary management of dyslipidemia, which predisposes patients to numerous cardiovascular events, involves the use of statins as the first-line, evidence-based medications [6]. In Andersson et al.'s study, it was concluded that primary prevention of dyslipidemia with statin therapy was associated with 17% risk reduction of all-cause mortality, 15% reduced risk of cardiovascular mortality, and in women, 34%

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less risk of MI [7]. Nevertheless, discontinuation and nonadherence to statin therapy remain a global challenge [8]. Studies have observed poor adherence to statin dosing regimens in up to 50% of patients. Statin discontinuation rates vary widely, from 15% to 75%, with most studies indicating rates of 50% or higher. Additionally, long-term persistence is lacking, as a study reported that only 52% of patients continued using statins after five years of first prescription [9]. This non-adherence significantly increases the risk of adverse cardiovascular events due to persistently elevated cholesterol levels [5]. Studies have shown that age, gender, income, and educational level have an impact in statin adherence. The majority of these studies consistently found that factors such as younger or older adults, female gender, low socioeconomic and educational status, and being a new statin, user could predict poor adherence to therapy [8,10-12]. However, reports have indicated differences between the findings. For example, Umarje et al.'s study reported a pattern of excellent statin adherence among female patients [11]. Furthermore, a history of cardiovascular diseases, hypertension, or diabetes tends to improve adherence rates [11]. In addition, adverse effects of statin therapy, such as muscle symptoms, costs, and mistrust in the pharmaceutical industry, contribute to patient nonadherence, with patients often reporting worries about potential dependency and addiction [8,10-13]. To illustrate, despite knowing that one in every four Americans over 40 years old uses statin therapy, approximately 10% of them stop using the medication due to the reasons mentioned above [13]. Another key factor influencing statin adherence is patient perceptions and knowledge about treatment. Patient's understanding and beliefs about the efficacy and necessity of statins positively influence their compliance, whereas misconceptions regarding the treatment can lead to poor compliance [12]. With the time constraints in clinical practice, many patients tend not to disclose nonadherence, emphasizing the need for provider awareness and early shared decision-making to align treatments with patient preferences [10-12]. This study aimed to assess patients' adherence towards statin therapy and its associated predictors.

METHOIDS

Study design

A cross-sectional online survey study was conducted in Saudi Arabia between August and September 2024 to examine patients' adherence towards statin therapy and its associated predictors.

Sampling strategy and study population

Data were collected using a convenience sampling technique in which potential participants were either invited to take part in this study. An invitation for participation was extended to as many people as possible through the use of social network sites such as Facebook, WhatsApp, Twitter, and Instagram. All the participants provided informed consent on a purely voluntary basis; hence, written consents were not obtained. Full details of the study, its aims, and objectives were clearly explained at the commencement to the subjects included in the survey. Inclusion criteria were the participants with a diagnosed condition of dyslipidemia, aged 18 years or older, and resident in the Kingdom of Saudi Arabia. Participants who were less than the age of 18 years or unable to read or understand Arabic were excluded from the study.

Study tool

This study utilized previously developed questionnaire tool by Ueno et al [14]. The original questionnaire comprised the 12-item Medication Adherence Scale, divided into the four assessed factors (Medication compliance, Collaboration with healthcare providers, Willingness to access and use information about medication, and Acceptance to take medication and how taking medication fits patient's lifestyle), each with three items. Each item was rated on a five-point Likert-type scale, with responses ranging from 1 (never) to 5 (always). Scores for the subscale items were summed to provide a subscale score, and an overall score of medication adherence was also calculated by summing all 12 items. Items' scores were reversed items 3) and 12), so that higher scores reflected higher medication adherence. The questionnaire also gathered general demographic information, including patient gender, age, education level, employment status, yearly income, smoking habits, and physical activity.

Ethical approval

This research was approved by the Institutional Review Board at Al-Imam Muhammad Ibn Saud Islamic University, Riyadh, Saudi Arabia (Project number: 684/2024). The study's objectives were communicated to all participants and their consent were obtained. All data obtained from this study were kept strictly confidential, with full access granted only to the authors of the study.

Sample size

Using Raosoft software, it was estimated that we should sample at least 377 patients in order for us to be 95% sure that our conclusions following data extraction are true, taking into consideration a 5% margin of error.

Statistical analysis

All statistical analyses were done using SPSS, version 29. Descriptive statistics were used to describe the demographic features of participants in the study. The normality of the data was checked using histogram, skewness, and kurtosis. Continuous data for normally distributed variables were presented as mean ± standard deviation (SD). The categorical data were presented as percentages, with frequencies. Odds ratio and 95% confidence intervals for the predictors of higher medication adherence were determined using binary logistic regression. The cut-off for logistic regression was based on the mean adherence score of the patients (which was 45.4 (SD: 10.7)).

RESULTS

Table 1 below presents patients' demographic characteristics. A total of 417 patients were involved in this study. The majority of them were males (74.6%; n= 311). Around 37.4% of them (n= 156) were aged 51-60 years. The majority of the patients (89.2%) were married. More than half of them reported that they have bachelor degree (56.4%; n= 235). Around 28.1% of them were working in the governmental sector. Around 42.0% of them (n= 175) reported that their monthly income category was between 5001-15000 SAR. The majority of the patients (60.7%; n= 253) reported that they are non-smokers. Around 58.5% of the patients were diagnosed with dyslipidaemia since more than 24 months.

Table 1. Patients demographic characteristics

Variable	Frequency	Percentage
Gender		
Males	311	74.6%
Age categories		
18-30 years	7	1.7%
31-40 years	83	19.9%
41-50 years	133	31.9%
51-60 years	156	37.4%
61 years and older	38	9.1%

Marital status		
Not married	45	10.8%
Married	372	89.2%
Education level		
Primary school or lower	8	1.9%
Intermediary school	17	4.1%
Secondary school	103	24.7%
Diploma	40	9.6%
Bachelor degree	235	56.4%
Higher education	14	3.4%
Employment status		
Unemployed	50	12.0%
Governmental sector employee	117	28.1%
Private sector employee	58	13.9%
Others	121	29.0%
Military	43	10.3%
Student	4	1.0%
Healthcare sector	24	5.8%
Monthly income categories		
Less than 5000 SAR	78	18.7%
5001-15000 SAR	175	42.0%
15001 SAR and above	164	39.3%
Smoking status		
Non-smoker	253	60.7%
Ex-smoker	90	21.6%
Current smoker	74	17.7%
Duration of disease		
Less than six months	72	17.3%
6-12 months	37	8.9%
12-18 months	38	9.1%
18-24 months	24	5.8%
More than 24 months	244	58.5%

SAR: Saudi Arabia Riyal

Dysleipidemi and patients' health profile:

Table 2 below presents dyslipidaemia and patients' health profile. Around half of the patients (49.6%) reported that they practice daily exercises for less than 30 minutes. The most common comorbidity among the participating patients was hypertension (30.7%).

Table 2. Dyslipidaemia and patients' health profile

Variable	Frequency	Percentage
Daily exercise level		
Less than 30 minutes	207	49.6%
30-60 minutes	160	38.4%
60-90 minutes	38	9.1%
More than 90 minutes	12	2.9%
Comorbidities		
Hypertension	128	30.7%
Cardiovascular diseases	88	21.1%
Diabetes mellitus	87	20.9%
Patients' taking other chronic diseases medications	263	63.1%

Patients' drug adherence of hypertension medications

The mean adherence score for the patients was 45.4 (SD: 10.7) out of 60; which reflects high adherence for statin therapy (75.7%). The statement that showed highest mean score was that "patients stopped taking medication based on my own judgment (not including times when I forgot to take my medication" with a mean score of 4.3 (1.1). The statement that showed the lowest mean score was that patients sometimes get annoyed that I have to keep taking medicine every day "with a mean score of 3.2 (1.4), Table 3.

Table 3. Patients' mean response score to items examined adherence to statin therapy

Number	Question	Mean score (standard deviation)
1	"Over the past 3 weeks, I have taken the prescribed daily dosage of my medication"	4.0 (1.4)
2	"Over the past 3 weeks, I have followed the instructions about when or how often to take my medication"	4.0 (1.3)
3	"I have stopped taking medication based on my own judgment (not including times when I forgot to take my medication)"	4.3 (1.1)
4	"I feel comfortable asking my healthcare provider about my medication"	3.8 (1.3)
5	"My healthcare provider understands when I tell him/her about my preferences in medication taking"	3.6 (1.4)
6	"My healthcare provider understands when I explain to him/her about my past medication including previous allergic reactions"	3.6 (1.4)
7	"I understand both the effects and the side effects of my medication"	3.6 (1.3)
8	"I report side effects, allergic reactions, or unusual symptoms caused by the medication"	3.6 (1.4)
9	"personally search for and collect information that I want about my medicine"	3.8 (1.2)
10	"I accept the necessity of taking medication in the prescribed manner to treat my illness"	4.1 (1.2)
11	"Taking medication is part of my everyday life, just like eating or brushing my teeth"	4.1 (1.3)
12	"I sometimes get annoyed that I have to keep taking medicine every day"	3.2 (1.4)

Predictors of high adherence for statin therapy

Binary logistic regression analysis identified that there is no statistically significant difference in patients' adherence to statin therapy based on their demographic characteristics ($p>0.05$), Table 4.

Table 4. Predictors of high adherence for statin therapy

Variable	Odds ratio of higher adherence to statin therapy (95% confidence interval)	p-value
Gender		
Females (Reference group)	1.00	
Males	1.23 (0.78-1.93)	0.371
Age categories		
18-30 years (Reference group)	1.00	
31-40 years	0.88 (0.19-4.19)	0.872
41-50 years	1.89 (0.41-8.79)	0.416
51-60 years	2.13 (0.46-9.87)	0.332
61 years and older	3.73 (0.71-19.67)	0.120

Marital status		
Not married (Reference group)	1.00	
Married	0.54 (0.29-1.01)	0.053
Education level		
Primary school or lower (Reference group)	1.00	
Bachelor degree	3.98 (0.79-20.13)	0.095
PhD	4.00 (0.59-27.25)	0.157
Master degree	4.06 (0.73-22.64)	0.110
Secondary school	4.73 (0.91-24.57)	0.065
Intermediary school	2.67 (0.41-17.17)	0.302
Employment status		
Governmental sector employee (Reference group)	1.00	
Private sector employee	2.03 (0.84-4.91)	0.118
Military	1.14 (0.49-2.64)	0.765
Student	0.33 (0.03-3.68)	0.370
Unemployed	1.27 (0.48-3.38)	0.628
Monthly income categories		
5001-15000 SAR (Reference group)	1.00	
Less than 5000 SAR	0.92 (0.60-1.42)	0.697
15001 SAR and above	0.64 (0.37-1.11)	0.111
Smoking status		
Non-smoker (Reference group)	1.00	
Current smoker	0.78 (0.05-12.73)	0.863
Ex-smoker	1.07 (0.72-1.59)	0.737
Duration of disease		
12 – 18 months (Reference group)	1.00	
18-24 months	0.56 (0.15-2.13)	0.392
6-12 months	0.242 (0.06-1.04)	0.057
Less than six months	0.40 (0.11-1.52)	0.179
More than 24 months	1.07 (0.76-1.51)	0.099

SAR: Saudi Arabia Riyal

DISCUSSION

The purpose of our study is to assess the patient adherence to statins, which are considered first- line treatment for dyslipidemia due to their proven efficacy and safety compared to other antidyslipidemics. The clinical effectiveness of statin therapy depends on its ability to significantly lower LDL cholesterol level. If patients fail to achieve this goal due to insufficient follow-up, inadequate are coordination, or poor adherence, these drugs may become ineffective.

In our study, approximately 49.6% of patients reported engaging in daily exercise for less than 30 minutes. This finding aligns with a study conducted in Spain, which found that 57.2% of participants were physically active [15]. Such similarities underscore the importance of recognizing the role daily exercise in the management of chronic diseases.

Hypertension was the most prevalent comorbidity among the patients in our study, affecting 30.7% of the sample. This result corresponds with several other studies that also identify hypertension as a most common comorbidity in statin use. For instance, one study reported that 40.1% of patients experienced hypertension, while research conducted in Taiwan found an even higher prevalence of 68% among statin users, with 47% also having ischemic heart disease[16,17]. The consistency in these findings likely stems from the close relationship between hyperlipidaemia and cardiovascular conditions, particularly hypertension. Statins are frequently to manage cardiovascular risk factors, making hypertension a common comorbidity among patients requiring statin therapy in different populations.

Consistent with previous research, our study demonstrated a high level of adherence to statin therapy with a mean adherence score of 45.4 (SD: 10.7) out of 60, translating to a 75.7% adherence rate. This finding in line with a study by Beenrisk et al., which reported a similar high adherence rate of 89% among 314 patients taking statin [18]. The close alignment in adherence rates between our study and that of Beenrisk et al. suggests that statin adherence is generally well-maintained among patients, likely reflecting a growing awareness of the importance of statin therapy for managing cardiovascular risk. Additionally, a high-quality pharmacy services in countries like Saudi Arabia and the Netherlands- characterized by robust patient education programs, effective medication management systems, and regular follow-up may contribute to improved adherence to prescribed therapies.

A study conducted in Taiwan reported a relatively high adherence rate of 71% after six months of follow-up [17]. While this percentage is slightly lower than the adherence rates observed in our study and that of Beenrisk et al.'s, the difference could be due to follow-up duration as adherence dropped to 54% by the end of the year [18]. Other factors, such as differences in healthcare systems or cultural influences on patient behavior and adherence may also play a role. The follow-up period is crucial in adherence studies, and it is important to note that long-term adherence tends to decline over time. Thus, while our study indicated high adherence, ongoing monitoring over extended periods is essential to determine this trend persists in the long term[19-21]. In contrast, a smaller cross-sectional observational study conducted at a tertiary care teaching hospital, involving 130 outpatient department patients, reported a lower adherence of only 42.3% for statin therapy [22]. This discrepancy may result from differences in study design, population size, or setting. The single-hospital approach and smaller sample size could limit the generalizability of its findings.

In our study, binary logistic regression analysis revealed no statistically significant association between patients' adherence to statin therapy and their demographic characteristics ($p > 0.05$). This contrasts with findings from other studies. For example, research assessing statin adherence among patients who initiated treatment between 2007 and 2014 found that male patients were significantly more likely to adhere to statin therapy (RR = 1.17, 95% CI = 1.16-1.18, $p < 0.05$)[23]. Similarly, another study involving diabetic patients on statins indicated that females were less likely to adhere (OR = 0.64, 95% CI = 0.47-0.87, $p = 0.003$) [24]. These findings are consisting with multiple studies that have reported higher adherence rates among male patients compared to female patients[25-27]. The discrepancy between our results and those of other studies, despite being conducted in the same context of KSA, could be due to variations in sample characteristics, study design, or specific interventions targeting statin adherence in our cohort. Additionally, regional or healthcare practice differences within KSA, such as the level of patient education or support, may contribute to this variance.

Our study evaluated adherence among patients taking statins. Further research is warranted to explore factors that influence the adherence level, such as specific statin medications used and potential impact on adherence, particularly in the presence of adverse effects. Additionally, adherence to statins therapy may enhance patients' quality of life and significantly reduce the risks of cardiovascular diseases. Further studies should investigate how adherence affects the achievement of LDL goals, as well as its role in lowering hospitalization rates and

healthcare costs. These insights could inform targeted interventions to improve adherence and optimize treatment outcomes.

There were several potential limitations to this study. First, self-reporting bias may have affected the accuracy of adherence measurements, as patients might overestimate their medication adherence. Second, the relatively small sample size may limit the generalizability of the findings, as the results might not fully represent the broader population. Lastly, cultural and healthcare system differences in Saudi Arabia may influence the applicability of the study's findings to other regions. Variations in health literacy levels, access to medications, and patient-physician interactions could complicate comparisons across different healthcare settings or populations. The study design is prone to social desirability bias and reporting bias. These limitations should be considered when interpreting the study's results.

CONCLUSION

This current study highlights the generally high adherence to statin therapy among dyslipidemia patients despite the presence of common comorbidities like hypertension. Importantly, the adherence of the patients does not relate to demographic factors-meaning there could be other variables affecting adherence more significantly, such as attitude toward medication and health behavior. While most patients maintain good adherence, there is room for improvement, particularly regarding frustrating situations in daily medication routines. Health care providers should provide a rationale to the patient regarding the need for consistent therapy and then propose individualized interventions to overcome the barriers for adherence, including lifestyle changes and education of the patients.

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Competing Interest: None

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