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Original Research Article

Beliefs about and adherence to statin therapy among hyperlipidemic patients in Saudi Arabia: A cross-sectional study

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Abstract

Purpose: *To assess patients' beliefs about the necessity and safety of statins and their impact on adherence in Jeddah, Saudi Arabia.*
Methods: *This cross-sectional study involved 150 hyperlipidemic patients undergoing statin therapy for at least six months. A structured questionnaire was used to assess sociodemographic data, statin adherence and beliefs about statin necessity and safety using a 5-level Likert scale.*
Results: *Over 40 % of participants were nonadherent by missing seven or more doses in the past month, 26.7 % often forgot medication when traveling and 45.3 % perceived themselves as non-compliant. The main noncompliance reasons were forgetfulness (28.0 %), perceived cholesterol control (14.7 %) and side effects like muscle aches (10.3 %). Less than 25 % agreed on statin necessity for health, with 45.0 % unsure. Higher belief scores correlated with longer statin use and fewer missed doses. About 27.0 % were concerned about adverse effects, but concerns showed no consistent effect on adherence.*
Conclusion: *Hyperlipidemic patients in Jeddah exhibit inadequate adherence to statin therapy, primarily due to forgetfulness, concerns about transporting medication and varying beliefs regarding the necessity and potential adverse effects of statins. These findings underscore the critical need for targeted educational interventions and enhancement of clinical practices.*

Keywords: *Adherence, Beliefs, Hyperlipidemia, Patient perception, Saudi Arabia, Statins*

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INTRODUCTION

Hyperlipidemia is a chronic metabolic disease representing one of the major risk factors for cardiovascular disease and stroke [1]. It constitutes a global health issue with a constantly increasing prevalence and related morbidity and mortality. The Global Burden of Disease (GBD) data from 2019 indicate that hyperlipidemia ranked second – after obesity – in terms of mortality and disability-adjusted life years (DALYs) associated with metabolic diseases and before diabetes and hypertension. Thus, it is responsible for 4.3 million deaths, representing up to 44 % of mortality cases associated with metabolic diseases depending on the region and an overall 99 million DALYS [2]. The same report showed that the burden is considerable in the

Eastern Mediterranean region and greatest in Middle and high-middle-income countries.

In Saudi Arabia, hyperlipidemia is highly prevalent, with population-based laboratory data showing figures ranging from 12.5 % in the Al Kharj region in Central Saudi Arabia [3], to 54% in Arar City in the north of the country [4]. Besides plausible regional variances, the two studies differed in the age groups included, with the study from Al Kharj recruiting adults aged ≥ 18 years while that from Arar included those ≥ 21 years. Another concerning trend is the rising incidence of hyperlipidemia among the younger Saudi population, forecasting dramatic increases in the associated health and economic burdens, notably DALYs [5].

Among the revolutionary advances in hyperlipidemia treatment is the discovery of 3-hydroxymethyl-3-methylglutaryl coenzyme A reductase inhibitors (statins), which is a family of natural cholesterol biosynthesis inhibitors. After their use, their effect on rapidly lowering levels of atherogenic lipoprotein has been demonstrated to prevent cardiovascular morbidity and mortality [6]. A large network meta-analysis of 76 randomized trials and over 170,250 patients showed that any statin use reduced the risk of all-cause mortality, cardiovascular mortality, fatal myocardial infarction (MI) and nonfatal MI by 10, 20, 18 and 26 %, respectively [7]. Therefore, patients with hyperlipidemia are required to strictly adhere to statin therapy to achieve therapeutic targets and reduce the occurrence or recurrence of cardiovascular and cerebrovascular events.

Despite these data and the establishment of strict guidelines and ongoing efforts, the use of and adherence to statins remain largely inadequate, resulting in suboptimal control [8]. Maintaining strict adherence to recommended guidelines for statin use plays a crucial role in achieving favorable health outcomes. Beyond achieving lipid goals, which highly depend on adherence [9], studies have consistently shown a significant positive correlation between compliant statin use and improved health benefits. For instance, a systematic review among patients at high risk revealed that inadequate adherence to statin regimens, or complete cessation of therapy, considerably increased the risk of cardiovascular and cerebrovascular incidents, as well as an overall increase in mortality rates. Furthermore, discontinuation of statin therapy was found to correlate with considerable increase in acute myocardial infarction events, suggesting the existence of a rebound effect following the withdrawal from statin treatment [10].

Several studies and clinical and policy measures have been deployed to enhance statin adherence among high-risk patients and understand its factors and determinants [11]. Yet, nonadherence remains a global and persisting issue [12]. Among the significant factors for nonadherence are the patients' perceptions and beliefs about the necessity, efficacy and safety of statins [13]. Assessing the role of these factors is central to developing educational interventions and corrective measures. In Saudi Arabia, there have been mixed findings about adherence to statins and cardiovascular medications in general [14]. However, no studies have explored the cognitive factors of nonadherence.

This study aimed to investigate hyperlipidemic patients' beliefs regarding the necessity and safety of statins and how these beliefs affect adherence. Additionally, it examined the relationship between statin beliefs and sociodemographic factors. By understanding the cognitive reasons behind nonadherence, this study could inform the development of targeted educational and intervention programs to improve statin adherence among hyperlipidemic patients.

METHODS

Design and setting

A cross-sectional study was conducted over six months. This study took place in the Outpatient Clinics and malls in Jeddah, Saudi Arabia, targeting hyperlipidemic patients undergoing statin therapy.

Ethical consideration

The study protocol was approved by the Biomedical Research Committee (the Institutional Review Board) of the Faculty of Medicine at King Abdulaziz University, Jeddah, Saudi Arabia (no. 327-18). All participants provided informed consent before participating in the study, with confidentiality maintained through data coding. The study was conducted in accordance with the Declaration of Helsinki [15].

Population

The study population comprised adults older than 18 years, diagnosed with hyperlipidemia and on statin medication for at least six months prior to the study.

Sampling and sample size

Participants were recruited from King Abdulaziz University Hospital (KAUH) Outpatient Clinics and during health campaigns in various malls in Jeddah. A sample size of 133 patients was deemed necessary, based on a 40 % estimated rate of medication non-adherence among chronic disease patients in Saudi Arabia, with a 95 % confidence level and a 10 % confidence interval width.

Data collection tools

Data were collected through one-on-one interviews, using a structured questionnaire encompassing three parts. Part 1 encompassed sociodemographic data including age, gender, nationality, educational level and occupation while Part 2 explored practices in and adherence to statins including duration of hyperlipidemia, treatment duration, frequency of missed doses, compliance during travel and reasons for noncompliance, etc. On the other hand, Part 3 used a 5-level Likert-type agreement scale to explore beliefs about the necessity of statins for controlling hyperlipidemia (two items) and concerns about potential adverse effects (two items).

Procedure

Eligible participants were approached by the investigators during their visit to the clinics or malls. After explaining the study aims and procedures, verbal consent was obtained followed by reading and explanation of the informed consent form. Participants then completed the questionnaire during a single interview.

Data analysis

Statistical analysis for the study was conducted using IBM SPSS Statistics Version 23.0. Data were summarized and explored through simple frequency tables, cross-tabulations and percentages for initial descriptive statistics. Reliability of beliefs and concerns scales was analyzed using Cronbach's Alpha coefficient. The relationship between two categorical variables was examined using the Chi-square test and binomial logistic regression analysis was applied to identify predictors of binary outcome variables. Significance throughout the analysis was determined at a threshold of $p < 0.05$.

RESULTS

Demographic characteristics

Demographic analysis included 150 subjects comprising 68.0 % females and 32.0 % males (Table 1). The most common age group was 51 – 65 years (50.7 %), followed by the elderly (> 65 years, 32.0 %). The majority of participants were Saudis (53.3 %) and the most prevalent education level was intermediate education level (30.7 %), followed by high school (30.0 %). A minority of the participants were workers (14.0 %).

Table 1: Demographic characteristics of participants

Characteristic		Frequency	Percent
Gender	Male	48	32.0
	Female	102	68.0
Age	18-35 years	2	1.3
	36-50 years	24	16.0
	51-65 years	76	50.7
	> 65 years	48	32.0
Nationality	Saudi	80	53.3
	Non-Saudi	70	46.7
Education level	Primary	19	12.7
	Intermediate	46	30.7
	High school	45	30.0
	University	40	26.7
Job	Not worker	129	86.0
	Worker	21	14.0

Practice and adherence to statins

Hyperlipidemia duration was more than 2 years in 84.7 % of the participants with statins taken for more than one year in 82.0 % of them. Regarding the practices towards statins, more than three-quarters stated that they took their medication at nighttime (78.0 %). Notably, over 40.0 % of participants exhibited significant nonadherence by missing 7 or more doses in the past month. Furthermore, 26.7 % declared that they often (13.3 %), usually (3.3 %) or always (10 %) forget to carry their medications with them during travel and 45.3 % perceived themselves as noncompliant with their medications. The most frequently reported reason for noncompliance was forgetfulness (28.0 %), followed by perceived cholesterol control (14.7 %) and experiencing side effects such as muscle aches (10.3 %). The results are presented in Table 2.

Beliefs about statins' necessity and potential adverse effects

Regarding patients' beliefs about the necessity of statins, majority (45.3 %) were not sure when confronted by statements like "Without my

medicines, I would become very ill" or "My health in the future will depend on my medicines", while a minority reported agreement with these two statements (19.3 and 24.0 %, respectively).

This sub-scale of the questionnaire showed good reliability with a Cronbach's alpha of 0.8. Regarding concerns about potential adverse consequences, 33.3 % of patients were not sure of the statement "My medicines disrupt my life" and 11.3 % were not sure of "I sometimes worry about the long-term effects of my medicines". However, 26.7 % agreed with both statements. The related subscale showed weak internal consistency, with a Cronbach's alpha of 0.5 (Table 3 and Table 4).

Factors associated with beliefs about the necessity of statins

By dichotomizing the level of belief about statins' necessity into non-belief (score < 6 out of 10) and belief (score ≥ 6 out of 10), the percentages of believers were compared across the different factors' categories. In this analysis, local Saudis were less likely to believe in the necessity of statins (57.5 %) compared with their non-Saudi counterparts (77.1 %), and the difference was statistically significant (p = 0.011). Additionally, a longer duration of statin use (>1 year) was associated with a higher belief rate (72.4 vs 40.7 %) compared with shorter statin use respectively (p = 0.002). Furthermore, we observed a consistent correlation between belief in statins' necessity and the levels of adherence in the three explored dimensions including dose missing during the past month (p = 0.001), medication oversight during travel (p = 0.001) and self-assessed compliance status (p = 0.001). Additionally, beliefs about statins' necessity were significantly associated with reasons for noncompliance. Specifically, forgetfulness (47.4 %) and other reasons (65.6 %) correlated with more positive beliefs about statins' necessity, while experiencing side effects (28.6 %) and perceived cholesterol control (20.0 %) correlated with less belief in the necessity of these drugs (p = 0.001; Table 5).

Factors associated with concerns about potential adverse effects of statins

By dichotomizing the level of concern about potential adverse effects of statins into non-concerned (score < 6 out of 10) and concerned (score ≥ 6 out of 10), the percentages of concerned patients were compared across the different factors' categories.

Table 2: Participants' practice in anti-hyperlipidemic drugs

Characteristic		Frequency	Percent
Duration of hyperlipidemia	Less than 2 years	23	15.3
	More than 2 years	127	84.7
Duration of taking anti-hyperlipidemic drugs	Less than one year	27	18.0
	More than a year	123	82.0
Usually, when do you take your anti-hyperlipidemic drugs?	Day time	6	4.0
	Nighttime	117	78.0
	No specific time	27	18.0
During the last month, how many days did you not take your anti-hyperlipidemic drugs?	< 7 times	88	58.7
	7-13 times	33	22.0
	14-20 times	14	9.3
	> 20 times	15	10.0
When you travel or leave home, do you forget to bring your medications?	Always (76%-100%)	15	10.0
	Usually (51%-75%)	5	3.3
	Often (26%-50%)	20	13.3
	Rare (0%-25%)	110	73.3
The compliance status from the patient's perspective.	Non- compliance	68	45.3
	Compliance	82	54.7
Reasons for non-compliance with anti-hyperlipidemic drugs?	Forgetfulness	19	28
	Side effects such as muscle pain	7	10.3
	When I feel that cholesterol levels are under control	10	14.7
	Other	32	47

Table 3: Participants' beliefs about anti-hyperlipidemic drugs

Characteristic	Strongly disagree (1)		Disagree (2)		Not sure (3)		Agree (4)		Strongly agree (5)	
	Count	*Table (n %)*	*Count*	*Table (n %)*	*Count*	*Table (n %)*	*Count*	*Table (n %)*	*Count*	*Table (n %)*
Patients' beliefs about the necessity of prescribed medication for controlling hyperlipidemia										
Without my medicines I would become very ill	27	18.0	26	17.3	68	45.3	17	11.3	12	8.0
My health in the future will depend on my medicines	31	20.7	15	10.0	68	45.3	23	15.3	13	8.7
Patients' concerns about potential adverse consequences of taking anti-hyperlipidemic drugs										
I sometimes worry about the long-term effects of my medicines	76	50.7	17	11.3	17	11.3	18	12.0	22	14.7
My medicines disrupt my life	43	28.7	17	11.3	50	33.3	28	18.7	12	8.0

Table 4: Reliability statistics of participants' beliefs about anti-hyperlipidemic drugs

Characteristic	Cronbach's Alpha	Items
Patients' beliefs about the necessity of prescribed medication for controlling hyperlipidemia	0.8	2
Patients' concerns about potential adverse consequences of taking anti-hyperlipidemic drugs	0.5	2

Local Saudis (23.8 %) were less likely to be concerned compared with their non-Saudi (50.0 %) counterparts (p = 0.001), while workers were more likely to be concerned (47.6 % versus 34.1 %) compared with non-workers (p = 0.001). Longer disease duration (> 2 years) was associated with a higher concern rate (39.4 vs 17.4 %) compared with shorter duration (p = 0.043). Additionally, concerns about statins' potential side effects were significantly associated with reasons for noncompliance. Specifically, forgetfulness was associated with a lower level of concern (21.1 %) compared with perceived cholesterol control (40.0 %), experienced side effects (57.1 %) or other reasons (56.3 %) and the difference was statistically significant (p = 0.034; Table 6). A significant association was observed between forgetting to bring medications when leaving home and concern with adverse effects (p = 0.023). However, the data showed inconsistency. Specifically, 20.0 % of participants who always forgot their medications expressed concern, compared to 80.0 % of those who usually forget but did not express concern, 55.0 % of those who often forget, and 32.7 % of those who rarely forget. Additionally, no statistically significant association was found between patients' self-perceived compliance and their concern for adverse effects of prescribed medications (p = 0.059).

DISCUSSION

Nonadherence to statins represents a significant challenge for primary and secondary prevention of cardiovascular morbidity [16]. In this cross-sectional study conducted in Jeddah, Saudi Arabia, multiple aspects of adherence to statin therapy among hyperlipidemic patients were explored and the influence of their beliefs about statins, as well as demographic factors, on medication adherence was also examined. Findings reveal a significant proportion of participants exhibiting notable nonadherence, often attributing missed doses to forgetfulness. Other aspects of nonadherence included varying degrees of concern over carrying medications during travel, with inconsistency between the level of concern and the frequency of forgetting medications.

Beliefs about the necessity of statins and concerns regarding their potential adverse effects varied significantly among participants, with a minor proportion believing in their necessity and over one-quarter being concerned about their adverse effects. Factors such as nationality, duration of disease and/or statin use and employment status significantly influenced these beliefs and concerns. Importantly, beliefs in statins' necessity correlated with the three explored dimensions of adherence, including dose missed during the previous month, medication oversight during travel and self-assessed compliance status.

These findings consistently indicate that the weaker the belief in the necessity of statins, the more frequent the nonadherence. Additionally, reasons for noncompliance, specifically experiencing side effects and perceived

cholesterol control, correlated with less belief in the necessity of statins. On the other hand, while statistically significant, the association of concerns about potential adverse effects and the reasons for noncompliance was not consistent. Overall, these findings underscore the complex interplay between patients' beliefs, demographic factors and medication adherence behaviors, highlighting the need for targeted interventions to improve statin adherence among hyperlipidemic patients.

The study revealed practices indicating low adherence to statin medication among participants, with 41.3 % frequently missing doses and 26.6 % omitting treatment during travel. Moreover, nearly half of the participants self-identified as non-adherent to their statin regimen. By comparison, a study from Riyadh involving diabetic patients showed higher adherence to statins in 77 % of the patients. However, there was no significant association between adherence and LDL goal attainment. Conversely, another study in Al Qassim, Saudi Arabia, found significantly lower levels of statin adherence among diabetic patients, with only 30 % demonstrating adequate adherence. Moreover, adherence levels declined with disease duration [14].

Table 5: Factors affecting patients' beliefs about the necessity of prescribed medication for controlling hyperlipidemia

Characteristic		Beliefs		
		Nonbelievers n (%)	Believers n (%)	*P*-value
N (%)		50 (33.3)	100 (66.7)	
Gender	Male	14 (29.2)	34 (70.8)	0.458
	Female	36 (35.3)	66 (64.7)	
Age	18-35 years	1 (50.0)	1 (50.0)	0.911
	36-50 years	9 (37.5)	15 (62.5)	
	51-65 years	25 (32.9)	51 (67.1)	
	> 65 years	15 (31.3)	33 (68.8)	
Nationality	Saudi	34 (42.5)	46 (57.5)	0.011
	Non-Saudi	16 (22.9)	54 (77.1)	
Education level	Primary	7 (36.8)	12 (63.2)	0.611
	Intermediate	15 (32.6)	31 (67.4)	
	High school	12 (26.7)	33 (73.3)	
	University	16 (40.0)	24 (60.0)	
Job	Not working	43 (33.3)	86 (66.7)	0.990
	Working	7 (33.3)	14 (66.7)	
Duration of hyperlipidemia	Equal/less than 2 years	9 (39.1)	14 (60.9)	0.522
	More than 2 years	41 (32.3)	86 (67.7)	
Duration of taking anti-hyperlipidemic drugs	Equal/less than one year	16 (59.3)	11 (40.7)	0.002
	More than a year	34 (27.6)	89 (72.4)	
Usually, when do you take your anti-hyperlipidemic drugs?	Day time	3 (50.0)	3 (50.0)	0.586
	Nighttime	37 (31.6)	80 (68.4)	
	No specific time	10 (37.0)	17 (63.0)	
During the last month, how many days did you not take your anti-hyperlipidemic drugs?	< 7 times	15 (17.0)	73 (83.0)	0.001
	7-13 times	19 (57.6)	14 (42.4)	
	14-20 times	7 (50.0)	7 (50.0)	
	> 20 times	9 (60.0)	6 (40.0)	
When you travel or leave home, do you forget to bring your medications?	Always (100-76%)	12 (80.0)	3 (20.0)	0.001
	Usually (75-51%)	1 (20.0)	4 (80.0)	
	Often (50- 26%)	7 (35.0)	13 (65.0)	
	Rare (25-0%)	30 (27.3)	80 (72.7)	
The compliance status from the patient's perspective.	Non- compliance	34 (50.0)	34 (50.0)	0.001
	Compliance	16 (19.5)	66 (80.5)	
Reasons for non-compliance with anti-hyperlipidemic drugs?	Forgetfulness	10 (52.6)	9 (47.4)	0.001
	Side effects such as muscle pain	5 (71.4)	2 (28.6)	
	When I feel that cholesterol levels are under control	8 (80.0)	2 (20.0)	
	Other	11 (34.4)	21 (65.6)	

Table 6: Factors affecting patients' concerns about potential adverse consequences of taking anti-hyperlipidemic drugs

Characteristic		Concerns		
		Not Concerned n (%)	***Concerned n (%)***	***P*-value**
N (%)		**96 (64.0)**	**54 (36.0)**	
Gender	Male	27 (56.3)	21 (43.8)	0.175
	Female	69 (67.6)	33 (32.4)	
Age	18-35 years	2 (100.0)	0 (0.0)	
	36-50 years	15 (62.5)	9 (37.5)	
	51-65 years	53 (69.7)	23 (30.3)	0.236
	> 65 years	26 (54.2)	22 (45.8)	
Nationality	Saudi	61 (76.3)	19 (23.8)	0.001
	Non-Saudi	35 (50.0)	35 (50.0)	
Education level	Primary	11 (57.9)	8 (42.1)	
	Intermediate	26 (56.5)	20 (43.5)	0.254
	High school	34 (75.6)	11 (24.4)	
	University	25 (62.5)	15 (37.5)	
Job	Not worker	85 (65.9)	44 (34.1)	0.001
	Worker	11 (52.4)	10 (47.6)	
Duration of hyperlipidemia	Equal\ less than 2 years	19 (82.6)	4 (17.4)	0.043
	More than 2 years	77 (60.6)	50 (39.4)	
Duration of taking anti-hyperlipidemic drugs	Equal\ less than one year	21 (77.8)	6 (22.2)	0.100
	More than a year	75 (61.0)	48 (39.0)	
Usually, when do you take your anti-hyperlipidemic drugs?	Day time	4 (66.7)	2 (33.3)	
	Nighttime	75 (64.1)	42 (35.9)	0.984
	No specific time	17 (63.0)	10 (37.0)	
During the last month, how many days did you not take your anti-hyperlipidemic drugs?	< 7 times	59 (67.0)	29 (33.0)	
	7-13 times	19 (57.6)	14 (42.4)	0.149
	14-20 times	6 (42.9)	8 (57.1)	
	> 20 times	12 (80.0)	3 (20.0)	
When you travel or leave home, do you forget to bring your medications?	Always (100%-76%)	12 (80.0)	3 (20.0)	
	Usually (75%-51%)	1 (20.0)	4 (80.0)	0.023
	Often (50%- 26%)	9 (45.0)	11 (55.0)	
	Rare (25%-0%)	74 (67.3)	36 (32.7)	
The compliance status from the patient's perspective.	Non- compliance	38 (55.9)	30 (44.1)	0.059
	Compliance	58 (70.7)	24 (29.3)	
Reasons for non-compliance with anti-hyperlipidemic drugs?	Forgetfulness	15 (78.9)	4 (21.1)	
	Side effects such as muscle pain	3 (42.9)	4 (57.1)	
	When I feel that cholesterol levels are under control	6 (60.0)	4 (40.0)	0.034
	Other	14 (43.8)	18 (56.3)	

The previous two local studies differ from the current study in that they involved diabetic patients, who represent a specific high-risk population. The variability between these studies in nonadherence rates could stem from different methods used to assess adherence, or it might be attributed to variations in factors related to the setting, practices or other elements specific to the study population.

Nonadherence to statins is a worldwide issue widely reported in several countries and has persisted over the years. A retrospective cohort study from the US analyzed compliance to and persistence with statin therapy between 2007 and 2014 among private- and government-insured individuals with various cardiovascular risk levels. Results showed that persistence rates did not differ between the two study periods, being 78.1 % and 79.1 % in 2007 and 2014, respectively. However, these rates were lower among patients who initiated statins following myocardial infarction (~67%) and diabetes mellitus (~64%), with no significant change between the two study periods [12].

In response to this challenge, researchers have shown great interest in assessing the factors that influence patients' adherence to statin therapy, aiming to understand and mitigate the barriers to effective treatment. A systematic review of reviews published in 2020 showed that lower adherence to statins was associated with co-payment requirements, lack of insurance, female

gender, younger and older adults compared to middle-aged, racial minorities, first-time users, and those with lower income or depression. Conversely, factors such as higher income the presence of comorbidities like diabetes and hypertension, and previous cardiovascular events tended to improve adherence. Additionally, patient perceptions around the necessity and efficacy of statins, side effects and cost concerns played significant roles in adherence rates [13].

While the current study did not investigate factors influencing statin adherence, it showed a consistent correlation between the level of adherence and beliefs about statins' effectiveness. This is demonstrated by higher belief scores associated with a longer duration of statin use and reduced instances of missed doses or treatment forgetfulness during travel. On the other hand, longer duration of statin use was associated with increased concern about potential adverse effects. Nonetheless, the other adherence aspects did not consistently correlate with concerns about medication. This indicates that adherence among the study population primarily depends on beliefs regarding the necessity of medication. It is important to note the potential reliability limitations of the scale of the concern, which could affect score validity and analysis of associations. Nonetheless, these cognitive factors may have a mixed impact on adherence. By comparison, a study by Tarn explored cognitive and behavioral factors for primary non-adherence to statins, defined as never taking the statin pills. Results showed that concerns about adverse effects were the most frequent cause reported by 27 % of surveyed participants. Additionally, the expectation to try diet or exercise before initiating treatment, conducting further laboratory tests, low perceived cholesterol levels and a preference for traditional or natural remedies were also common reasons. Furthermore, authors observed that majority of these primary nonadherent patients had inadequate knowledge and beliefs about statins efficacy and safety.

Psychology studies concurs that medication adherence is a dynamic construct, shaped by patients' causal learning about a drug's effectiveness and side effects, influenced by their experiences and beliefs. This learning is affected by how patients interpret their experiences with medications and the cycle of beliefs, adherence and experiences. Understanding nonadherence as a causal learning issue allows clinicians to address misconceptions more effectively, helping patients develop accurate perceptions of their medications, and thereby improving adherence [17]. This highlights the critical need for patient education on the effectiveness and safety of statins, emphasizing the value of adopting a personalized prescribing approach. Such an approach should foster shared decision-making between clinicians and patients, aiming to enhance patient satisfaction and adherence to medication regimens and ultimately improve health outcomes [18]. By engaging patients in their treatment planning, clinicians can better address individual concerns and preferences, leading to more informed decisions and increased patient commitment to their prescribed treatments. Considering these factors, the role of cognitive and behavioral therapies has been demonstrated to be effective in improving adherence [11].

Furthermore, in assessing beliefs about the necessity and concerns regarding side effects of statins, Saudi nationals exhibited lower levels of both beliefs and concerns compared to their non-Saudi counterparts. This suggests that these cognitive factors might be influenced by cultural sensitivities, highlighting the importance of implementing culturally sensitive educational interventions. However, beliefs and cultural factors may be compounded by other socioeconomic and clinical factors that influence the care experience, as well as the receipt of appropriate education and guideline-recommended statin therapy [19]. Hence, targeted interventions should aim to correct misconceptions and improve knowledge and awareness about statins and cardiovascular risk, tailored to the socioeconomic, clinical and cultural contexts of the target population. This implies addressing potential factors related to prescribers and providers that may affect adherence which is the crucial role in patient education.

Another prescriber-dependent aspect of nonadherence concerns the adequacy of prescribed statin dosage according to guidelines. A study from Riyadh, involving 753 patients discharged from a teaching hospital with statin prescriptions revealed that approximately 45 % of these patients were prescribed statin dosages that did not align with the 2013 ACC/AHA guidelines [20]. This is likely due to variability in physician practices and beliefs about statins, in addition to lack of familiarity with the applicable guidelines [20]. This indicates a need for enhancing guideline awareness among prescribers and addressing variability in physician practices and beliefs about statins. This could potentially improve adherence by ensuring patients receive dosages that are both effective and guideline-compliant.

Further interventions have been implemented to enhance medication adherence, such as combination pills, follow-up visits, personal reminders, incentives, etc. However, the applicability of these interventions within a specific context depends on their feasibility and cost-effectiveness [11].

The complex interplay of beliefs, demographic factors and medication adherence behaviors highlighted in this study support the relevance of several complementary actions. Firstly, there is an urgent need for targeted educational interventions that are tailored to the specific sociodemographic, clinical and cultural contexts of patients. These programs should aim to address misconceptions about statins and improve overall knowledge and awareness of cardiovascular risks and the benefits of adherence. Secondly, enhancing prescriber and provider awareness of guideline-recommended statin dosages and encouraging personalized prescribing practices can bridge the gap in adherence rates. Finally, fostering shared decision-making between clinicians and patients could address individual concerns more effectively, leading to better adherence and health outcomes. These actions underscore a multi-faceted approach, emphasizing both patient and provider education, to mitigate the barriers to statin adherence.

The age distribution in this study aligns with epidemiology of hyperlipidemia across adults and the elderly. However, female over-representation contrasts with local studies indicating lower hypertriglyceridemia and hypo-HDL-cholesterolemia risks among females and inconsistent findings regarding hypercholesterolemia [3]. This discrepancy indicates a possible selection bias, potentially affecting the generalizability of results to the broader population. Another limitation of this study is the risk of multiple information biases inherent in its cross-sectional design, notably recall bias and reliance on subjective, self-reported assessments of adherence. Finally, the study did not explore socioeconomic and clinical factors influencing adherence, as this was beyond its scope to simplify the questionnaire and enhance participation.

CONCLUSION

Hyperlipidemic patients in Jeddah exhibit inadequate adherence to statin therapy, primarily due to forgetfulness, concerns about transporting medication and varying beliefs regarding the necessity and potential adverse effects of statins. These factors highlight the critical need for targeted interventions. Interventions should aim to address and correct misconceptions about statin efficacy and safety, enhance patient knowledge and awareness about cardiovascular risks and encourage adherence. Moreover, the complex interplay of adherence with cognitive and behavioral factors highlights the importance of personalized prescribing practices and shared decision-making between clinicians and patients to improve health outcomes effectively. Furthermore, the findings reveal a disparity in beliefs and concerns about statins between Saudi and non-Saudi nationals, indicating the influence of cultural sensitivities. This supports the relevance of culturally sensitive educational interventions, alongside addressing socioeconomic and clinical factors that condition the care experience.

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Ethical approval

None provided.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

No conflict of interest associated with this work.

Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. Rania Magadmi and Ranya Alawy Ghamri were

involved in conceptualization, methodology, analysis, data curation, and writing and review of the original draft. All authors have read and agreed to the published version of the manuscript.

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