

Original article

Knowledge, Attitudes, and Practices of Pharmacists Regarding Hyperlipidemia Management in Tripoli, Libya: A Cross-Sectional Study.Wadiaa Benamer^{ID}, Eman Elmahjoubi^{ID}, Mustafa Targhi*^{ID}

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Email: m.targhi@uot.edu.ly**Abstract**

Hyperlipidemia is a prevalent chronic disorder that often requires long-term lipid-lowering therapy and continuous clinical monitoring. Pharmacists are well positioned to support safe and effective treatment through patient education, medication monitoring, and adherence support. This study was conducted to assess pharmacists' knowledge, attitudes, and practices regarding hyperlipidemia management and evaluate their role in managing the condition across hospital, government, and private pharmacies in Tripoli, Libya. A cross-sectional descriptive study was conducted using a structured questionnaire. The questionnaire was developed based on the relevant literature and reviewed by two academic supervisors for clarity and relevance. A total of 157 completed questionnaires from licensed pharmacists working in hospital, government, and private pharmacies in Tripoli were included in the final analysis. The findings indicated that 84.07% of pharmacists correctly recognized hyperlipidemia and 85.99% were familiar with the concepts of good and bad cholesterol. However, only 18.47% of pharmacists correctly identified recommendations for creatine kinase monitoring, and only 5.09% correctly identified ezetimibe as an appropriate combination therapy with a statin for patients with elevated LDL-C levels. Most pharmacists expressed a positive attitude toward their role in hyperlipidemia management and recognized the importance of patient counselling (83.43%). Regarding practice, 63.69% of pharmacists reported explaining lipid profiles to patients, whereas cholesterol screening was rarely provided (<3%). Patient-related barriers included medication costs, beliefs and attitudes, and health-related behaviors, while lack of effective communication skills was the most frequently reported pharmacist-related barrier (62.42%). Pharmacists demonstrated satisfactory overall knowledge of hyperlipidemia, but substantial gaps remained in pharmacotherapeutic knowledge, guideline-based management, monitoring, and patient-oriented pharmaceutical care. Differences were also observed across pharmacy practice settings. Structured continuing professional education, improved access to evidence-based resources, enhanced communication training, and greater adherence to standardized guidelines are needed to strengthen pharmacist's contribution to hyperlipidemia management in Libya.

Keywords: Hyperlipidemia; Pharmacists; Knowledge; Attitudes; Practices; Lipid Management.

Introduction

Hyperlipidemia, also referred to as dyslipidemia, is a metabolic disorder characterized by abnormal levels of circulating lipids and lipoproteins, particularly cholesterol and triglycerides. The principal lipoproteins involved include very-low-density lipoprotein (VLDL), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C). Abnormal lipid concentrations are an important and potentially modifiable contributor to cardiovascular disease [1],[2]. Dyslipidemia represents a major global health concern and contributes substantially to cardiovascular morbidity and mortality. Cardiovascular disease remains one of the leading causes of death worldwide, and abnormal lipid levels are an important contributor to this burden [3-5].

Hyperlipidemia may be classified as primary, resulting from inherited genetic abnormalities, or secondary, resulting from underlying diseases or other acquired factors that affect lipid metabolism [6],[7]. It is a major modifiable risk factor for atherosclerosis and coronary artery disease. Elevated LDL-C and triglyceride concentrations can contribute to lipid accumulation within arterial walls and promote atherosclerotic plaque formation, increasing the risk of cardiovascular events such as angina, myocardial infarction, ischemic stroke, and peripheral vascular disease [8],[9]. Previous studies have also shown that patients with established cardiovascular disease frequently have one or more modifiable risk factors, including dyslipidemia, hypertension, and smoking [10],[11].

Because hyperlipidemia is often asymptomatic, it may remain undiagnosed until routine laboratory testing or cardiovascular risk assessment is performed [2]. Abnormal lipid levels may be associated with genetic factors or secondary conditions such as diabetes mellitus, hypothyroidism, and primary biliary disease [1]. Early identification and appropriate management of lipid abnormalities are therefore important for reducing the risk of cardiovascular complications [12].

According to recent 2026 ACC/ AHA Guideline on the Management of Dyslipidemia, reduction atherogenic lipoproteins remain the cornerstone of lipid management for the prevention of atherosclerotic cardiovascular disease (ASCVD). LDL-C remains a major therapeutic target for hyperlipidemia treatment; however, treatment decisions are guided by overall cardiovascular risk assessment, with both LDL-C and non - HDL-C treatment goals used to optimize lipid-lowering therapy and reduce ASCVD risk [13]. Pharmacological management may involve lipid-lowering agents such as statins, ezetimibe, PCSK9 inhibitors, fibrates, and prescription omega-3 fatty acids preparations, selected according to the patient's lipid profile, cardiovascular risk, treatment response, and therapeutic goals [14-16]. Appropriate selection and monitoring of therapy are essential to maximize treatment benefits while minimizing adverse effects.

Effective management of hyperlipidemia requires a multidisciplinary approach involving healthcare professionals and active patient engagement. Patient education regarding lipid levels, cardiovascular risk, treatment goals, and lifestyle modification plays an important role in optimizing disease management and reducing cardiovascular risk [17]. Medication adherence is also essential for achieving therapeutic goals; however, non-adherence to cardiovascular medicines remains a significant challenge and may contribute to suboptimal treatment response and poorer clinical outcomes.[18],[19].

Pharmacists are among the most accessible healthcare professionals, and their role has expanded beyond medication dispensing to include patient counseling, medication therapy management, disease monitoring, and adherence support [20],[21]. The International Pharmaceutical Federation (FIP) recognizes the contribution of pharmacists to cardiovascular disease management through pharmaceutical care, medication review, patient education, and support for medication adherence [22].

In hyperlipidemia management, pharmacists can facilitate communication between patients and other healthcare professionals, assess treatment effectiveness, educate patients about lipid-lowering medicines, interpret lipid profiles, and support individualized treatment goals [17] [23],[24]. They can also promote lifestyle modification, including healthy dietary practices, weight management, physical activity, and reduction of cardiovascular risk factors. Follow-up, refill monitoring, medication review, and identification of barriers to treatment can further support adherence [25].

Evidence from randomized controlled trials and systematic reviews indicates that pharmacist-led and collaborative care interventions can improve lipid control and increase the proportion of patients achieving LDL-C treatment targets [26],[27]. These findings support the importance of evaluating pharmacists' knowledge and current practices in hyperlipidemia management, particularly in settings where pharmacy services are increasingly moving toward patient-centered care.

Hyperlipidemia requires long-term management, often involving lipid-lowering medicines and continued follow-up. Although these therapies provide important clinical benefits, appropriate monitoring and patient counseling are necessary to promote safe and effective use, particularly because some lipid-lowering medicines may cause adverse effects or require specific monitoring. Therefore, this study aimed to assess pharmacists' knowledge, attitudes, and practices regarding hyperlipidemia management in Tripoli, Libya, across hospital, governmental and private pharmacy settings. The study also aimed to evaluate pharmacists' involvement in patient counseling and pharmaceutical care, their practices related to medication adherence and patient monitoring, and the perceived barriers to providing comprehensive hyperlipidemia management services.

Methodology

A cross-sectional descriptive study was conducted using a structured questionnaire designed in English version to assess pharmacists' knowledge, attitudes, practices, and professional role in the management of hyperlipidemia.

The questionnaire comprised 24 items covering multiple dimensions of hyperlipidemia management and was developed based on a review of the relevant literature and previously published questionnaires [25],[29],[38]. The content was reviewed by two academic supervisors with expertise in pharmacy practice research to assess clarity, relevance, and consistency with the study objectives. The questionnaire was distributed to 200 pharmacists working in three practice sectors in Tripoli: hospital pharmacies, governmental pharmacies including health-center pharmacies, and private community pharmacies. The participating sites were located in randomly selected areas of Tripoli.

A total of 200 questionnaires were distributed to licensed pharmacists working in the selected pharmacy settings. Of these, 157 completed questionnaires returned, yielding a response rate of 78.5%. Only licensed pharmacists with complete and valid responses were included in the final analysis

The questionnaire consisted of five main sections covering pharmacists' demographic and professional characteristics, knowledge of hyperlipidemia, attitudes toward the condition, clinical practices and patient counseling, and medication adherence. It collected information on participants' gender, practice setting, and professional experience, while assessing their knowledge of hyperlipidemia, cholesterol types, associated risk factors, and lipid-lowering medications. It also explored pharmacists' attitudes toward patient education and physician follow-up, as well as their practices in explaining lipid profiles, counseling on medication use, providing dietary advice, ensuring proper medication storage, monitoring treatment, and identifying drug interactions. Finally, the questionnaire examined pharmacists' approaches to assessing medication adherence, perceived barriers to effective hyperlipidemia management, educational needs, and sources of professional knowledge updates.

Prior to data collection, official permission to conduct the study was obtained from the faculty of Pharmacy, University of Tripoli. Verbal informed consent was obtained from each participant before participation. Pharmacists were informed about the purpose of the study, that participation was voluntary and that their responses would remain confidential.

The collected data were manually coded, entered into Microsoft Excel and analyzed using descriptive statistics. Frequencies and percentages were calculated to summarize participants' responses and were presented in tables and figures. Findings were interpreted in relation to pharmacist professional roles, relevant clinical guidance, and evidence reported in the literature.

Results

A total of 157 pharmacists participated in the study. Private pharmacies represented the largest practice sector (40.76%), followed by governmental pharmacies (33.76%) and hospital pharmacies (25.48%). Nearly half of the participants (49.04%) had three years or less of professional experience. Most participants were female (78.35%), while males accounted for 21.65%.

Table 1. Demographic characteristics of the participating pharmacists

Participants	Response Option	Frequency	Percentage
	Pharmacist	157	100%
Pharmacy type	Hospital pharmacy	40	25.48%
	Governmental pharmacy	53	33.76%
	Private pharmacy	64	40.76%
Experience years	≤ 3years	77	49.04%
	4- 7	38	24.20%
	8- 11	21	13.38%
	> 11	21	13.38%
Participant's Gender	Male	34	21.65%
	Female	123	78.35%

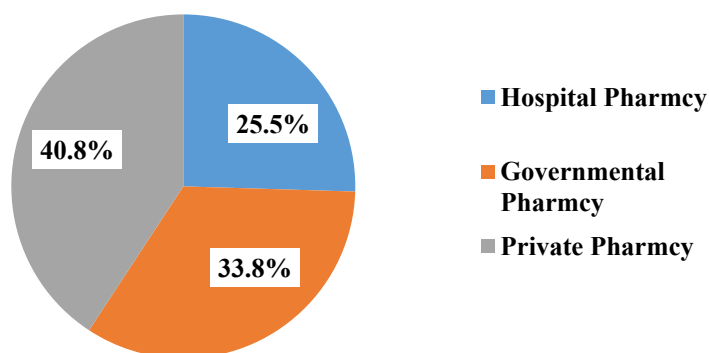


Figure 1. Distribution of pharmacists across hospital, governmental and private pharmacy sectors.

Table 2. Pharmacists' knowledge of hyperlipidemia and its associated risks

Definition of hyperlipidemia	Response Option	Frequency	Percentage
	Yes	132	84.07%
	No	25	15.92%
Definition of bad and good cholesterol	Yes	135	85.99%
	No	22	14.01%
Causes of hyperlipidemia N= 328	Life style	156	47.56%
	Obesity	54	16.46%
	Disease	43	13.11%
	Smoking	34	10.37%
	Other	29	8.84%
	Do not Know	12	3.66%
Risks associated with hyperlipidemia N= 225	C.V.D	119	52.89%
	Atherosclerosis	53	23.56%
	D.M	11	4.89%
	Other	32	14.22%
	Do not know	10	4.44%
Age category at higher risk for hyperlipidemia	< 20 Years old	0	0
	20- 40 Years old	9	5.73%
	40- 60 Years old	139	88.53%
	Don't know	9	5.73%

* Multiple responses were permitted for relevant questions.

Most participants demonstrated satisfactory basic knowledge of hyperlipidemia. A total of 84.07% correctly recognized the definition of hyperlipidemia, while 85.99% reported understanding the distinction between good and bad cholesterol. Lifestyle factors were the most frequently selected cause of hyperlipidemia (47.56%). Cardiovascular disease was the

most frequently identified associated risk (52.89%), followed by atherosclerosis (23.56%). Most participants (88.53%) identified the 40–60-year age group as having the highest risk.

Table 3: Knowledge of pharmacists about lipid-lowering agents

	Response option	Frequency	Percentage
When do patients on statin therapy need to monitor CK?	Periodically	73	46.50%
	Only if symptoms	29	18.47%
	Only high-risk patients	29	18.47%
	Other	7	4.46%
	Do not know	19	12.10%
Why do patients on statin therapy need to monitor CK?	Right answer	40	25.47%
	Wrong answer	45	28.66%
	Do not know	72	45.86%
Suitable time for administering short-acting statins	In the morning	4	2.55%
	At noon	9	5.73%
	In the evening	128	81.53%
	Before meals	5	3.19%
	After meals	11	7.00%
Why should a short-acting statin be taken at night?	Right answer	19	12.10%
	Wrong answer	39	24.84%
	Do not know	99	63.05%
* The most clinically adverse effect associated with statin therapy, N=174	Myopathy	35	20.12%
	Other	39	22.41%
	Don't know	100	57.47%
Second-line drugs for treatment of elevated LDL-C level	Fibrates	87	55.41%
	Niacin	17	10.83%
	Resin	29	18.47%
	Plant sterol & stanol	7	4.46%
	Ezetimibe	17	10.82%
The most adverse effect of niacin	Flushing	11	7.00%
	Vasodilatation	3	1.91%
	Itching	6	3.82%
	Other	8	5.09%
	Do not know	129	82.17%
Actions should be taken to reduce niacin adverse effects	Aspirin	3	1.91%
	Change drug/adjusting the dose	6	3.82%
	Take with a meal	8	5.10%
	Do not know	140	89.17%
The most recommended combination drugs for the treatment of elevated LDL-C	Statin + Omega 3	4	2.54%
	Statin + Cholestyramine	3	1.91%
	Statin + Ezetimibe	8	5.09%
	Do not Know	142	90.45%

* Multiple responses were permitted for relevant questions.

Table 4. Pharmacists' responses regarding the availability of Lipid-lowering agents in Libyan market (n= 368).

Pharmacists' responses regarding the availability of Lipid-lowering agents in Libyan market across the three healthcare sectors (n= 368).			
	Response option	Frequency	Percentage
Drug class	Statins	277	75.30%
	Fibrates	48	13.04%
	Ezetimibe	26	7.07%
	Other (e.g Niacin, Omega-3 fatty acids, Code-liver)	17	4.62%

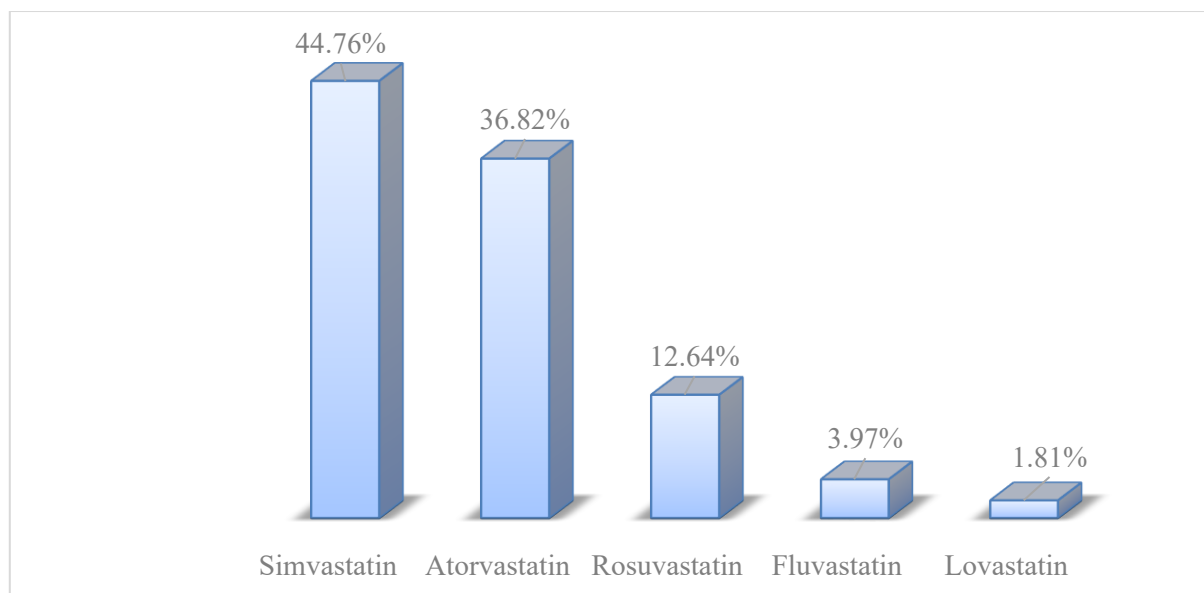


Figure 2. Pharmacists' knowledge regarding the availability of statins in the Libyan market.

Table 5. Pharmacists' attitudes toward hyperlipidemia management

Pharmacists' attitudes toward hyperlipidemia management		Frequency	Percentage
Patient understanding of the meaning of high cholesterol	Ease of understanding	70	44.58%
	Understanding difficulty.	81	51.59%
	Don't know	6	3.82%
The importance of pharmacists educating patients about their disease	Yes	131	83.43%
	No	14	8.91%
	Don't know	12	7.64%
Frequency of recommending that patients with uncontrolled hyperlipidemia see a physician	< 4 Visit/year	9	5.73%
	4 Visit/year	43	27.39%
	4-6 Visit/year	32	20.38%
	> 6 Visit/year	73	46.50%
Frequency of recommending that patients with controlled hyperlipidemia see a physician	< 2 Visit/year	13	8.28%
	2 Visit/year	43	27.39%
	2-4 Visit/year	83	52.87%
	> 4 Visit/year	18	11.46%
Participants' recommendations for educational needs to improve service quality N= 173	Courses & workshops	49	28.32%
	Research and conference	27	15.61%
	Other	26	15.03%
	No recommendation	71	41.04%

* Multiple responses were permitted for relevant questions.

Table 6. Practice pattern of pharmacists in the management of hyperlipidemia

Practice pattern of pharmacists in the management of hyperlipidemia		Frequency	Percentage
Explaining the lipid profile to the patients	Yes	100	63.69%
	No	57	36.31%
Services provided by pharmacists to patients with hyperlipidemia N=208	Blood pressure measurement	72	45.86%
	Weighting	69	43.39%
	Cholesterol measurement by devices / other ways	4	2.55%
	Using Cholesterol test kit	3	1.91%
	No services	60	38.21%

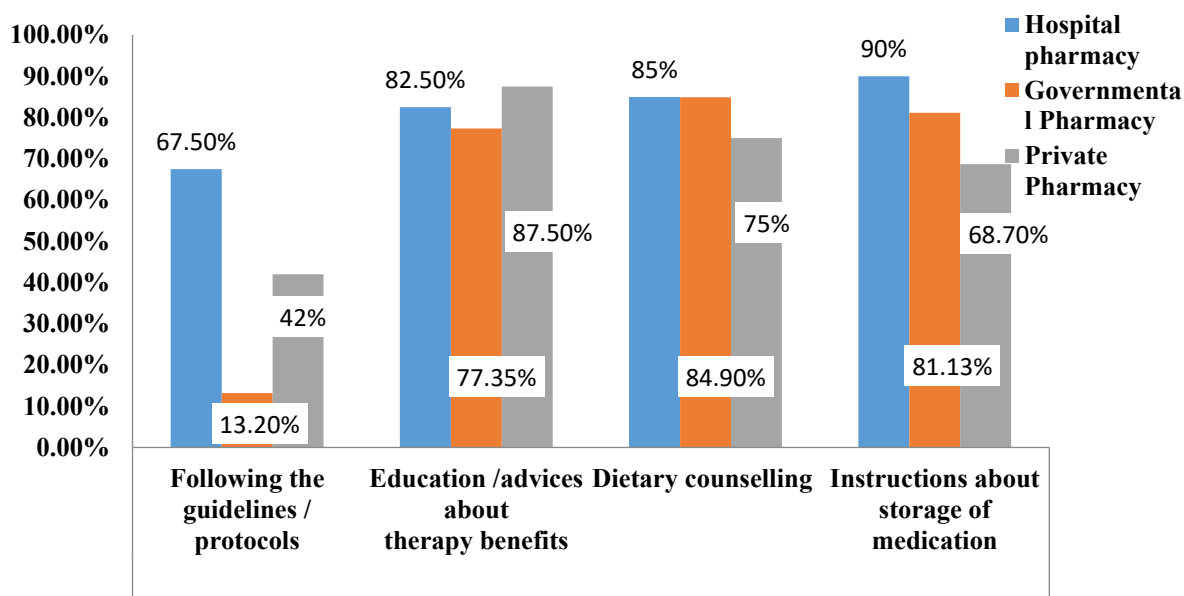


Figure 3. Pharmacists' reported practices in the management of hyperlipidemia.

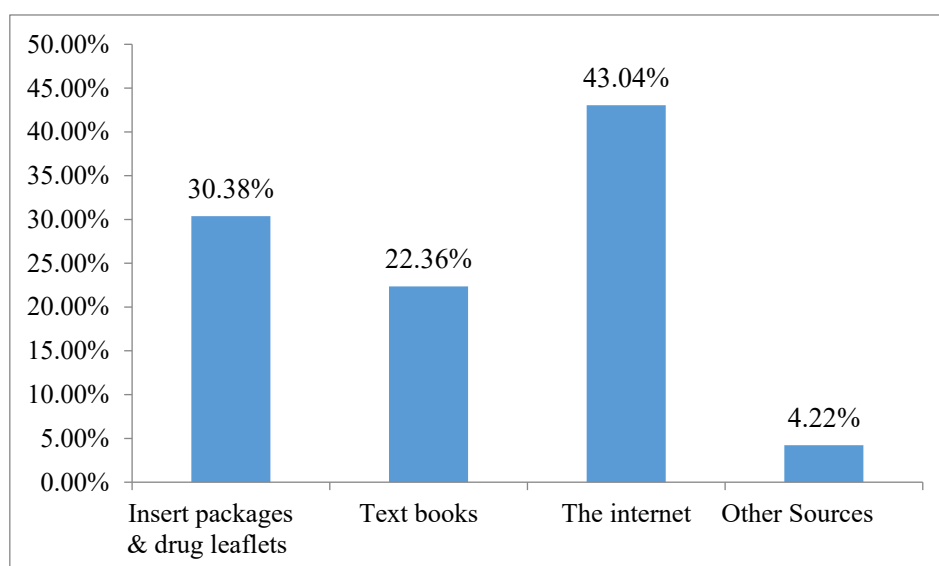


Figure 4. Sources and references used by pharmacists to update their professional knowledge.

Table 7. Pharmacists' assessment of patient adherence to lipid-lowering therapy.

		Frequency	Percentage
Methods used by the participants to evaluate patient medication adherence	By direct question to the patient.	71	45.22%
	By indirect questioning of the patient.	14	8.92%
	Patient follows up on a regular basis.	72	45.86%
Patient adherence level	High	76	48.41%
	Moderate	46	29.30%
	Low	20	12.73%
	Non-compliance.	15	9.55%
Role of participants in providing dose- reminder strategies	No role	119	75.80%
	By alarm	16	10.19%
	Depends on the patient's needs	9	5.73%
	Other	13	8.28%

Table 8: Barriers facing participants in treatment among hyperlipidemic patients:

Patient factors N= 186	Cost	64	34.40%
	Beliefs & attitudes	48	25.80%
	Health habits	41	22.04%
	Non-Adherence	24	12.90%
	Other	9	4.8%
Pharmacist factors	Lack of pharmacist- to effective communication skills	98	62.42%
	Time	40	25.48%
	Other	19	12.10%
Physician factors	Time	113	71.97%
	Other	44	28.02%

* Multiple responses were permitted for relevant questions.

Discussion

This study evaluated pharmacists' knowledge, attitudes, and practices related to hyperlipidemia management among 157 pharmacists in Tripoli, Libya. Participants were distributed across hospital (25.48%), governmental (33.76%), and private (40.76%) pharmacy settings. Nearly half (49.04%) had three years or less of professional experience. The relatively high proportion of early-career pharmacists may partly contribute to variation in clinical knowledge and familiarity with contemporary lipid management (Table 1, Figure 1). Most respondents demonstrated good baseline knowledge, with 84.08% correctly identifying the term of "hyperlipidemia" and 85.99% correctly distinguishing between LDL-C and HDL-C. In addition, 47.56% identified lifestyle factors as major contributors to hyperlipidemia. Furthermore, 52.89% of the pharmacists recognized cardiovascular disease as an important associated risk. In addition, 88.53% correctly identified the 40–60-year age group as the highest-risk category (Table 2). These findings indicate a reasonable level of basic awareness, while also suggesting the need for greater emphasis on advanced pharmacotherapeutic knowledge.

The findings revealed a substantial knowledge gap regarding statin- associated adverse effects and monitoring practice (Table 3). Although 46.50% of pharmacists believed that creatine kinase (CK) should be monitored periodically during statin therapy, only 18.47% correctly recognized that routine CK monitoring is not recommended in asymptomatic patients receiving statins. CK measurement is generally indicated when patients develop muscle- related symptoms or when clinically warranted based on individual patient factors, in accordance with current evidence- based guidelines [1]. Although 81.53% of participants correctly identified nighttime as the appropriate time for administration of short-acting statins, only 12.10% were able to provide the underlying rationale, indicating limited understanding of the pharmacological basis for their recommendation. Short-acting statins, such as simvastatin, lovastatin, and pravastatin, are generally recommended to be administered in the evening to align their activity with the diurnal pattern of cholesterol synthesis and enhance their lipid-lowering effect. This finding highlights a discrepancy between awareness of an appropriate administration practice and understanding of its pharmacological rationale, emphasizing the need for continuing professional education [28].

Knowledge of statin-associated muscle adverse effects was also limited. Only 20.12% of respondents correctly identified myopathy in the relevant question, whereas 57.47% reported that they did not know the major adverse effect and 22.41% selected other responses. This finding highlights an important area for improvement as pharmacists should be able to recognize and appropriately counsel patients about clinically relevant muscle-related adverse effects associated with statin therapy [28],[29].

More than half of the participants (55.41%) selected fibrates as the second-line treatment for elevated LDL-C rather than ezetimibe. This result indicates limited familiarity with contemporary treatment pathways and may also reflect local prescribing patterns or medicine availability. Current guidelines recommend ezetimibe when LDL-C targets are not achieved with maximally tolerated statin therapy or when statin intolerance limits the use of statins [30],[31].

Knowledge of niacin was similarly limited. Only 10.82% identified an appropriate lipid-lowering agent in the relevant question, and 7.00% correctly identified flushing as the principal adverse effect of niacin. Such gaps may affect the quality of patient counseling and the pharmacist's ability to support appropriate management of adverse effects and adherence [32-34].

Furthermore, most participants (89.17%) were unaware of the appropriate measures to mitigate niacin- induced adverse effects, and only 1.91% correctly identified aspirin as an effective approach to reduce niacin- induced flushing. These findings highlight limited knowledge of the management of medication- related adverse effects and the need for improved evidence- based counseling regarding lipid- lowering therapy [8],[35],[36].

A substantial knowledge gap was observed regarding combination therapy for elevated LDL-C, with 90.45% of participants reporting that they did not know the appropriate combination. Only 5.09% identified statin- ezetimibe, an evidence-based combination for patients requiring additional LDL-C reduction [1],[37]. This low proportion may reflect limited awareness of appropriate combination therapy for managing elevated LDL-C.

Table 4 showed that statins were the most frequently reported lipid-lowering agents available across the surveyed healthcare sectors (75.30%) followed by fibrates (13.04%), ezetimibe (7.07%), and other agents (4.62%). Within the statin

class [Figure (2)], simvastatin was the most frequently available agent (44.76%), followed by atorvastatin (36.82%) This finding may reflect their long-standing use and greater affordability compared with other statins and other lipid-lowering agents.

The predominance of statins in the present study is broadly consistent with findings from a Nigerian study, in which most community pharmacists selected a statin as first-line agent for lowering elevated blood cholesterol [38].

More than half of the participants (51.59%) perceived that patients had limited knowledge or difficulty understanding hyperlipidemia and cholesterol. This finding is consistent with reports of suboptimal patient awareness of cardiovascular risk factors in other populations [39],[40]. Pharmacists also demonstrated a generally positive attitude toward patient education, with 83.43% recognizing the importance of educating patients about their disease. Participants also supported regular physician follow-up, particularly for patients with uncontrolled hyperlipidemia. Among respondents, 46.50% recommended more than six physician visits per year for patients with uncontrolled hyperlipidemia, whereas 52.87% recommended two to four visits per year for patients with controlled hyperlipidemia.

When asked about educational needs that could improve the quality of pharmaceutical services, 28.32% of participants selected courses and workshops, while 15.61% recommended participation in research activities and attendance at scientific conferences (Table 5). These findings suggest that some pharmacists recognized the importance of continuing professional development and expanding of their clinical responsibilities beyond traditional dispensing activities [41-45]. Nevertheless, positive attitudes do not necessarily translate into consistent patient-centered practice. Approximately two-fifths of respondents (n=71) did not provide a recommendation for improving the quality of pharmaceutical services. This may reflect uncertainty regarding practical approaches to services development or limited access to structured professional-development opportunities.

The practice patterns of Libyan pharmacists in the management of hyperlipidemia across all sectors are presented in table (6) and Figure (3). The reported practice patterns demonstrated variation in the extent of pharmacists' involvement in hyperlipidemia care. Approximately two-thirds of pharmacists (63.69%) reported routinely explaining lipid profiles to patients, while 36.31% reported that they did not. In contrast, cholesterol screening was rarely provided: 2.55% reported measurement using devices or other methods and 1.91% reported use of cholesterol test kits. The limited availability of screening services may be related to regulatory requirements, space limitations, equipment availability, workload, or time constraints. The limited involvement of community pharmacists in cholesterol screening observed in this study is consistent with findings from an Iranian study conducted in 2017 and involving 200 pharmacists, which similarly reported a low level of pharmacist involvement in cholesterol screening [46].

In contrast, pharmacy services in some developed healthcare systems have incorporated cholesterol screening and cardiovascular risk assessment for many years. The willingness of community pharmacists to receive training in the use of cholesterol-measuring devices, as reported in the literature cited in the original study, supports the potential value of structured point-of-care training programs for pharmacists [47],[17].

Blood pressure measurement was the most frequently reported clinical service (45.86%), followed by weight assessment (43.39%). However, 38.21% of pharmacists reported providing no clinical services related to hyperlipidemia. This relatively limited involvement suggests that pharmacy practice remains predominantly dispensing-oriented in many settings rather than fully integrated into patient-centered chronic disease management [48],[49].

The limited use of preventive and clinical services represents an opportunity to expand the pharmacist's contribution to cardiovascular risk reduction. The findings also demonstrated differences among pharmacy sectors (Figure 3). Hospital pharmacists generally showed stronger adherence to clinical practices, including medication education, dietary counseling, storage counseling, and clinical guidelines. Governmental pharmacists demonstrated moderate involvement but comparatively lower adherence to guidelines and protocols. This pattern may reflect the influence of multidisciplinary practice, institutional policies, and access to structured clinical systems in hospital settings [49].

Private-sector pharmacists demonstrated greater engagement in patient education and counseling regarding therapeutic benefits than pharmacists in hospital and governmental sectors. However, lower involvement in dietary counseling and adherence to standardized guidelines suggests variability in the consistency of pharmaceutical care [47]. The observed differences, particularly the lower adherence to guidelines in the governmental sector, highlight the importance of developing standardized approaches to hyperlipidemia management across pharmacy practice settings in Libya.

The internet was the most frequently reported source used by pharmacists to update their knowledge on hyperlipidemia management, followed by drug leaflets and package inserts. Textbooks were used by 22.36% of respondents, while other sources were less frequently reported (Figure 4). The increasing use of online resources may facilitate rapid access to clinical information; however, reliance on non-standardized internet sources may also result in variability in the quality and timeliness of available information [50]. The high proportion of early-career pharmacists in this study may partly contribute to this pattern. In addition, 30.38% reported relying on manufacturer-provided information. These findings support the need to promote the use of authoritative clinical guidelines, drug-information databases, and other evidence-based resources as part of continuing professional development [51].

Although manufacturer information and general online resources can be useful for basic medicine-related information, they may not provide comprehensive or consistently updated clinical guidance. Reliance on self-directed and non-standardized sources may contribute to differences in pharmacists' knowledge and clinical practice [52]. Similar findings

have been reported in other regional studies, including research from Jordan showing limited routine use of formal drug-information databases [53],[54].

The survey also assessed pharmacists' evaluation of patient adherence to lipid-lowering therapy. Approximately 45.22% of participants assessed adherence through direct patient questioning, while 45.86% relied on medication refill frequency as an indicator of adherence. Overall, pharmacists perceived patient adherence as moderate (29.29%) to high (48.40%). Although these approaches are commonly used in routine pharmacy practice, direct questioning may be influenced by recall and social desirability biases, while refill history does not necessarily confirm actual medication use. Therefore, validated and standardized measures, including the 8-item Morisky Medication Adherence Scale (MMAS-8), Medication Possession Ratio (MPR), Proportion of Days Covered (PDC), and electronic monitoring systems, may provide more objective and reproducible approaches to assessing medication adherence [55-58].

The study explored multiple barriers to hyperlipidemia management across patient-, pharmacist-, and physician-related factors. Cost was identified by the pharmacists as the most frequently patient-related barrier to medication adherence (34.40%), followed by beliefs and attitudes (25.80%) and health habits (22.04%). These findings highlight the socioeconomic and cultural influences on healthcare utilization in low- and middle-income countries, where financial constraints are recognized as important determinant of medication non-adherence in chronic diseases.⁵⁹ Misconceptions about long-term therapy and reliance on lifestyle modifications alone may also contribute to the influence of beliefs and attitudes observed in this study.

Among pharmacist-related barriers, inadequate pharmacist-patient communication skills were the most frequently reported factor (62.42%). This finding is consistent with a previous Libyan study conducted in 2021, which reported that 41% of pharmacy customers were dissatisfied with the communication and drug-related information provided by dispensing pharmacists. Although the two studies examined different perspectives, namely pharmacists' and patients' perspectives, respectively, both findings suggest the presence of challenges in pharmacist-patient communication within Libyan pharmacy practice [59]. Similar evidence from both developed and developing countries has highlighted suboptimal pharmacist-patient communication as a persistent barrier to effective pharmaceutical care [60], [61].

Regarding physician-related barriers, limited consultation time was the most frequently reported factor (71.97%). Restricted consultation time may limit opportunities for patients to discuss their condition, medications, and concerns related to long-term therapy. This finding is consistent with evidence from Middle Eastern and North African (MENA) healthcare settings, where high patient workloads and limited consultation durations have been identified as challenges to effective chronic disease management, including the management of lipid disorders [62].

Strengths and Limitations

This study has several strengths. To the best of our knowledge, it is the first study in Libya to assess pharmacists' knowledge, attitudes, and practices regarding hyperlipidemia management. It therefore provides novel local evidence on pharmacists' preparedness and their role in the management of hyperlipidemia. The inclusion of pharmacists from different practice settings also provides a broader perspective on current pharmacy practice in Tripoli. However; the study was conducted among pharmacists practicing in Tripoli; therefore, the findings cannot be generalized to pharmacists in other regions of Libya. In addition, the use of a self-administered questionnaire may have social desirability bias, finally the relatively modest sample size should be considered when interpreting and generalizing the findings.

Conclusion

This study assessed the knowledge, attitudes, and practices of pharmacists involved in hyperlipidemia management across hospital, governmental and private pharmacy settings in Tripoli, Libya. Participants demonstrated satisfactory general awareness of hyperlipidemia and its cardiovascular implications; however, substantial gaps were identified in knowledge of lipid-lowering pharmacotherapy, statin monitoring and adverse effects, combination therapy, and management of medicine-related problems. Although pharmacists expressed positive attitudes toward patient education and their role in chronic disease management, the provision of preventive and patient-centered services remained limited. The study also identified frequent reliance on internet-based and manufacturer-provided information, particularly in a workforce with a large proportion of early-career pharmacists. Medication costs, limited pharmacist communication skills, and physician time constraints were identified as important barriers. Overall, the findings support the need for structured continuing professional education, greater use of evidence-based guidelines, improved communication training, and expansion of pharmacist-led preventive and pharmaceutical care services in Libya.

Recommendations

The following recommendations are proposed:

1. Establish a national continuing professional development framework to strengthen pharmacists' competencies in dyslipidemia management, including evidence-based pharmacotherapy, treatment monitoring, adverse-effect recognition, and patient counseling.
2. Standardize evidence-based pharmaceutical care by promoting the use of accredited clinical guidelines and reliable drug-information resources and implementing standardized hyperlipidemia management protocols across hospital, governmental, and private pharmacy settings.

3. Expand pharmacists' clinical role in cardiovascular risk management through pharmacist-led lipid-profile interpretation, cardiovascular risk assessment, patient education, adherence support, and appropriate monitoring of blood pressure, weight, and cholesterol.
4. Strengthen medication adherence and interprofessional collaboration through structured follow-up and individualized adherence intervention, alongside effective pharmacist-physician communication, referral, and shared management of patients with uncontrolled hyperlipidemia.
5. Evaluate and strengthen pharmacist-led interventions through research by conducting well-designed studies in the Libyan healthcare setting to determine their impact on lipid control, medication adherence, and cardiovascular outcomes.

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Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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