

Availability of Point-of-care Testing Diagnostic Devices and Assessment of Knowledge, Attitude and Practice for Screening of Cholesterol in Community Pharmacies in Kathmandu Metropolitan City

Chaudhary P,¹ Bhujel R,¹ Shahukhal S,¹ Shrestha S,² KC B²

¹Pharmacovigilance Unit,

Dhulikhel Hospital, Kathmandu University Hospital,

Dhulikhel, Kavre, Nepal.

²Department of Pharmacy,

School of Science, Kathmandu University,

Dhulikhel, Kavre, Nepal.

Corresponding Author

Pushparaj Chaudhary

Pharmacovigilance Unit,

Dhulikhel Hospital, Kathmandu University Hospital,

Dhulikhel, Kavre, Nepal.

E-mail: pushparaj9808@gmail.com

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ABSTRACT

Background

Cardiovascular diseases are the leading cause of global mortality. Elevated blood cholesterol is a major modifiable risk factor of cardiovascular diseases. Community pharmacies are accessible primary healthcare providers and can offer onsite cholesterol screening through point-of-care testing devices. Effective cholesterol-lowering interventions require adequate knowledge of cholesterol testing, cardiovascular disease risk factors, and a positive attitude toward cholesterol screening.

Objective

To determine the availability and adoption of the point-of-care testing devices for determining blood cholesterol level in community pharmacies and assess the Knowledge, Attitude and Practice of pharmacy professionals.

Method

A cross-sectional study was conducted among 340 community pharmacies and their professionals in Kathmandu using a pretested questionnaire to assess Knowledge, Attitude, and Practice related to cholesterol screening. Data were analyzed descriptively and presented as frequencies and percentages.

Result

Overall, 63.7% of pharmacy professionals demonstrated adequate knowledge of cholesterol and its association with cardiovascular diseases. Only 9.1% of community pharmacies had adopted point-of-care testing devices for cholesterol screening, while 52.1% of professionals expressed willingness to receive training in cholesterol meter use. Academic qualification and age were significantly associated with Knowledge, Attitude, and Practice regarding cholesterol screening. However, 40% of participants had a negative attitude toward cholesterol screening.

Conclusion

Community pharmacy professionals demonstrated satisfactory knowledge of cholesterol and its impact in cardiovascular diseases. Although adoption of point-of-care testing devices was low, over half of the professionals were willing to receive training in cholesterol screening. Nonetheless, the attitude toward cholesterol screening devices was negative.

KEY WORDS

Cardiovascular disease, Cholesterol, Community pharmacy, Point-of-Care testing

INTRODUCTION

The World Health Organization (WHO) has stated that cardiovascular diseases (CVDs) claim 17.9 million lives annually.¹ Elevated serum cholesterol, hypertension, diabetes mellitus, smoking, obesity, alcohol, and sedentary lifestyle are the risk factors for CVDs.² Reduction in cholesterol is effective in the prevention of CVDs and fatality.^{3,4} Insight into the blood cholesterol evaluates the condition of the patient and the necessary intervention to lower the cholesterol level.⁵ Consequently, point-of-care testing (POCT) can meet the diagnostic demand of the patient and the caregivers by providing instantaneous analytical conditions of the patient, and appropriate treatment can immediately be administered.^{6,7}

The most accessible healthcare services for patients are community pharmacies, and the availability of POCT in pharmacies would promote the effective management of acute and chronic illnesses.^{8,9} POCT offers pharmacists a chance to take an active role in patient care for dyslipidemia management and lower the risks of CVDs by conducting lipid screenings, encouraging lifestyle modification, and counseling on lipid-lowering drugs.¹⁰ However, good knowledge of POCT, cholesterol and its influence on CVDs, and a positive attitude are necessary.¹¹ In South Asian countries, pharmacists are principally involved in dispensing of medicines.¹⁰ Thus, it is essential to conduct a study in community pharmacies in Nepal to assess the availability of POCT and Knowledge, Attitudes, and Practices (KAP) of community pharmacy practitioners use of POCT devices for cholesterol screening.

Therefore, in this study, different POCT devices available in Kathmandu metropolitan city, the use of cholesterol-POCT devices in community pharmacies, and the KAP of the community pharmacies' personnel towards impact of high cholesterol level on CVDs and use of cholesterol-POCT devices for screening were analyzed in detail.

METHODS

A cross-sectional study was done in the community pharmacies of Kathmandu metropolitan city. A self-administered questionnaire (Supplementary 1) was distributed in the community pharmacies for assessing KAP of pharmacy professionals on cholesterol monitoring POCT devices. The distributed questionnaire had been adopted from the Adje et al. after obtaining permission from the authors.¹² Cronbach's alpha value was 0.7 indicating good reliability.

Kathmandu is the capital city of Nepal and includes 6.91% of the total population.¹³ In Kathmandu metropolitan city there is a larger numbers of community pharmacies compared to the other part of the nation. Furthermore, many teaching hospitals, several general hospitals, private medical facilities and majority of the public and private

laboratory providing healthcare facilities are available in the capital.^{14,15} Thus, the study was conducted in community pharmacies located in Kathmandu metropolitan city, from February 28, 2022 to August 15, 2022.

The sample population comprises community pharmacies in Kathmandu metropolitan city. A convenience sampling technique was used to select the participants who met the inclusion criteria. The total number of community pharmacies registered in Department of Drug Administration (DDA) Nepal until November 2018 in Kathmandu metropolitan city was 2,888.¹⁵ Sample size was determined through Raosoft sample size calculator with predetermined margin of error of 5% and CI (confidence interval) level of 95%. Sample size of 340 was obtained. Therefore, 340 community pharmacies were included in the study. A total of 340 questionnaires was distributed to community pharmacies and a single pharmacy professional from each pharmacy was asked to fill the questionnaires.

A pretested self-administered questionnaire was distributed to the community pharmacy professionals located in Kathmandu metropolitan city after taking written informed consent (Supplementary 2) from the interested participants. The final data collection form comprised of four sections, Section A addressed participants' demographics, section B comprised of 5 questions relating to resource availability for POCT in community pharmacies, section C contained 15 questions to assess the pharmacy professionals' knowledge in relation to cholesterol, cholesterol related risk factors (CVDs) and cholesterol screening. Similarly, section D comprised 7 statements to evaluate the pharmacy professional's attitude towards the cholesterol screening.

To assess pharmacy personnel's knowledge, a scoring system was used. Each correct answer was scored as one and an incorrect answer was scored as zero. The cumulative and mean scores were calculated. Respondents who scored above the mean score (> 0.5) were defined as having satisfactory knowledge, and those who scored below the mean score (< 0.5) were defined as having unsatisfactory knowledge.¹⁵ To assess attitude of the respondents, a five-point Likert scale was used. Each point was given a representative score, such as, strongly agree=1; Agree=2; Undecided=3; Disagree=4 and strongly disagree=5, with a mean score of 3. Based on the cumulative score, the respondents who scored below the mean score of three (< 3) were defined as having a "negative attitude", and those who scored above the mean score (> 3) were defined as having a "positive attitude".

The ethical approval was granted by Kathmandu University-School of medical Science Institutional Review Committee (KUSMS IRC). The protocol approval number of the study is 267/2021.

Registered Community pharmacy professionals (pharmacists, health assistant (HA), community medical

assistants (CMA)), with at least one year of experience in community pharmacy, working in DDA registered community pharmacies and willing to participate in the study were enrolled in the study. Whereas, pharmaceutical wholesalers, pharmacies located in the periphery of hospitals and hospital pharmacies were excluded.

Data collected were recorded in Microsoft Excel spreadsheet (Microsoft Office Professional Plus 2019, Version 2409) and cross checked for errors and missing data. The data were then exported to the Statistical Package for Social Sciences (SPSS) software version 20. Data of the study were presented with descriptive measures such as frequency (N) and percentage (%) for responses to the 15 knowledge questions. Rated scores were treated as interval data suitable for quantitative analysis. Chi-square test was performed to explore the relationship between demographic variables and pharmacist's knowledge. A p-value < 0.05 was considered as statistically significant.

RESULTS

Demographic Characteristics of community pharmacies professionals

The demographic information of the participants is presented in figure 1. Majority of the participants were male (58.8%). Most of the respondents were within the age bracket of 25 to 30 years (52.1%) with the experience of 5 to 10 years (48.5%). Majority of the respondents had a formal professional degree except for 0.3% of the respondents, who did not have professional qualifications.

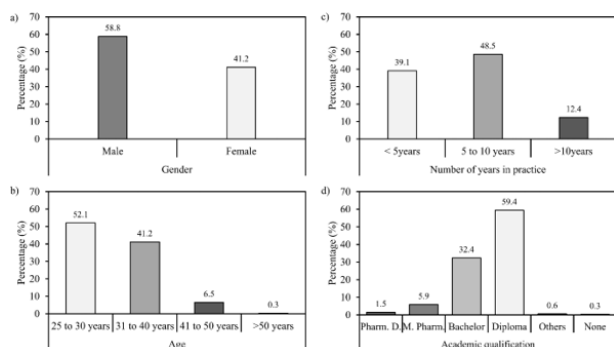


Figure 1. Socio-demographic characteristics of respondents based on, a) gender, b) age, c) number of years in practice, and d) academic qualification.

Knowledge assessment of impact of high cholesterol level on CVDs and use of cholesterol-POCT devices for screening

A satisfactory level of knowledge regarding cholesterol and its influence on CVDs was demonstrated by the respondents, with the mean score of 0.6. More than half (63.7%) of the respondents correctly answered each knowledge-related question. However, scores were very low on questions relating to the treatment for atherogenic lipid fractions and side effects of statins (Table 1).

Table 1. Community pharmacy professional's knowledge of cholesterol as a risk factor for CVD.

Knowledge questions	N (%)
What is the major source of high level of cholesterol in humans?	334 (98.2)
Which of the forms of cholesterol is most implicated in development of heart diseases in humans?	252 (74.1)
Cholesterol level can only be measured in the laboratory?	227 (66.8)
The mainstay of drug therapy for high blood cholesterol is?	255 (75.0)
Dietary approach to reducing high cholesterol is not effective?	180 (52.9)
A high fiber diet is not helpful in lowering high cholesterol?	141 (41.5)
The treatment benchmark for low density lipoprotein cholesterol (LDL) is?	133 (39.1)
For CV risk assessment only fasting serum cholesterol can be used?	212 (62.4)
Conversion factor from mg/dl for total blood cholesterol level is?	48 (14.1)
The most common side effect of statin is?	136 (40.0)
Stanol esters/plant sterols can lower cholesterol levels?	82 (24.1)
The highest level of cholesterol can be found in egg-white?	237 (69.7)
Which of the following type of cholesterol is cardio protective?	182 (53.5)
The treatment goal for total blood cholesterol level is?	57 (16.8)
The treatment goal for low density lipoprotein cholesterol (LDL) is?	56 (16.5)
(Mean Score)	Mean
Satisfactory Knowledge (≥ 0.5)	0.6
Unsatisfactory Knowledge (< 0.5)	0.4

Association of demographic characteristics and knowledge of impact of high cholesterol level on CVDs and use of cholesterol-POCT devices for screening

Age and academic qualifications were significantly ($p < 0.05$) associated with pharmacist's knowledge of cholesterol, its screening through POCT devices and its CVD risks. Moreover, gender and experience or number of years in practice had no significant association with knowledge. ($p > 0.05$) (Table 2).

Attitude to cholesterol screening

The attitude of community pharmacy professionals toward cholesterol screening is shown in Table 3. A negative attitude towards cholesterol screening was seen among 40% of the respondents, demonstrating most of the professionals are against screening of blood cholesterol level in their pharmacy. Amongst the respondents, 58.8% answered that the high blood pressure should be more importantly considered than high cholesterol in heart disease. Nearly half, 42.4% agreed that cholesterol screening was not feasible in the pharmacy and 63.2% believed that the cholesterol screening should be left to the laboratory scientists. Approximately, 18.9% respondents believed that measuring cholesterol in community pharmacy is expensive, 11.5% reported that they could not afford cholesterol screening test kit and 7.7% stated cholesterol screening is time consuming.

Table 2. Pharmacist's knowledge score stratified by age, gender, years of practice and academic qualifications.

Gender	χ^2	P value
Male	0.992	0.609
Female		
Age	17.374	0.008
25 to 30 years		
31 to 40 years		
41 to 50 years		
Above 50 years		
Number of years in practice	7.518	0.111
< 5 years		
5 to 10 years		
> 10 years		
Academic qualifications	21.863	0.000
Pharm. D.		
M. Pharm.		
Bachelor		
Diploma		
Others		
None		

Resources for cholesterol screening

In this study, 100% of pharmacy professionals reported that they were involved in blood pressure monitoring, followed by 94.4% in temperature monitoring, 92.4 % in pregnancy test and 82.1% in glucose test monitoring. However, only 31(9.1%) had cholesterol meters in the pharmacy and cholesterol screening was done by them. Approximately, 54.7% (6.5% very willing and 48.2% willing) of the respondents were interested to provide blood cholesterol monitoring services. Moreover, 52.1% of the pharmacy professionals expressed a readiness to be trained in the use of cholesterol meter (Table 4).

Table 3. Community pharmacy professional's attitude towards cholesterol screening.

Variable	Responses; N (%)						
	SA*	A**	U***	D****	SD*****	Negative %	M ± Std. Dev.
High blood pressure should be more importantly considered than high cholesterol in heart disease.	55 (16.2)	145 (42.6)	93 (27.4)	43 (12.6)	4 (1.2)	58.8	2.4 ± 0.9
Cholesterol measurements are not feasible in community pharmacy settings.	21 (6.2)	123 (36.2)	58 (17.1)	128 (37.6)	10 (2.9)	42.4	3.0 ± 1.0
Measuring cholesterol in community pharmacy is very expensive.	7 (2.1)	57 (16.8)	142 (41.8)	127 (37.4)	7 (2.1)	18.8	3.2 ± 0.8
I would rather send my patients to laboratory for cholesterol tests.	100 (29.4)	164 (48.2)	17 (5.0)	54 (15.9)	5 (1.5)	77.6	2.1 ± 1.0
It's the role of physician and laboratory scientists to check cholesterol.	32 (9.4)	183 (53.8)	29 (8.5)	85 (25.0)	11 (3.2)	63.2	2.6 ± 1.1
Cholesterol screening test kit is expensive so, I cannot afford.	8 (2.4)	31(9.1)	219 (64.4)	80 (23.5)	2 (0.6)	11.5	3.1 ± 0.7
It may be time consuming process.	3 (0.9)	23 (6.8)	136 (40.0)	175 (51.5)	3 (0.9)	7.6	3.4 ± 0.7
Total	40.0%	2.8 ± 0.9					

*Strongly agree (SA) = 1; **Agree (A) = 2; ***Undecided (U) = 3; ****Disagree (D) = 4; *****Strongly disagree (SD) = 5; Scale 1 to 5; midpoint = 3; Negative (%) = Including strongly agree and agree; M= Mean

Table 4. Resource availability for cholesterol screening in Pharmacies.

Variable	Responses	N (%)
Please indicate which of the following test you perform in your pharmacy?	Blood pressure monitoring	340(100)
	Glucose test	279(82.1)
	Cholesterol test	31(9.1)
	Pregnancy test	314(92.4)
	Pulse oximeter	201(59.1)
	Thermometer	321(94.4)
	Urinalysis	28(8.2)
	Covid-19 Ag test	137(40.3)
	Glycated hemoglobin analysis	-
	Prothrombin time/international normalized ratio (PT/INR)	-
Do you have cholesterol meter in your pharmacy?	Yes	31(9.1)
	No	309(90.9)
Do you do cholesterol test/ screening in your pharmacy?	Yes	31(9.1)
	No	309(90.9)
If no, how willing are you to acquire a cholesterol meter?	Very willing	22(6.5)
	Willing	164(48.2)
	Not willing	154(45.3)
Are you willing to train to use cholesterol meter in your pharmacy?	Yes	177(52.1)
	No	163(47.9)

DISCUSSIONS

The present study explored the availability of point-of-care testing devices for cholesterol screening in community pharmacies and assessed the knowledge, attitude, and practice of community pharmacy professionals in Kathmandu Metropolitan City. The findings provide valuable insights into the current status of community pharmacy-based cholesterol screening services and

identify important opportunities for strengthening the role of pharmacists in the prevention and early detection of cardiovascular diseases.

The findings revealed that the most common services delivered at the community pharmacies of Kathmandu metropolitan city were blood pressure monitoring, glucose monitoring, pregnancy test and body temperature measurement. These services are well established in many community pharmacies because they require relatively simple equipment, are inexpensive to provide, and are frequently requested by patients. In contrast, cholesterol screening services were rarely available, with only a small proportion (9.1%) of pharmacies possessing cholesterol testing devices. This finding suggests that community pharmacies in Kathmandu continue to focus primarily on basic screening services rather than comprehensive cardiovascular risk assessment. Similar findings have been reported in developing countries where limited financial resources, inadequate infrastructure, and insufficient training restrict the implementation of advanced diagnostic services. A study conducted in India by Mitra et al. reported that the availability of POCT devices was not sufficient to deal with the increasing burden of the non-communicable diseases in resource constrained developing countries.¹⁶ With such a high illness burden and high demand of POCT devices, POCT tools were not readily available.¹⁶ The present findings therefore reinforce the need to improve access to cholesterol screening technologies within primary healthcare settings.

An encouraging finding of this study was that the most of the community pharmacies were handled by the skilled personnel with a specialized degree in pharmacy, i.e., 59.4% had diploma in Pharmacy, 32.4% had bachelor's degree in Pharmacy, 5.9% had master's degree in Pharmacy and 1.5% had Doctor of Pharmacy (Pharm D). This reflects the gradual professionalization of community pharmacy practice in Nepal. In contrast, just a few years ago, the community pharmacies were operated by unskilled and untrained human resources.¹⁷ The increasing proportion of academically qualified pharmacy professionals observed in this study may indicate improvements in pharmacy education, regulatory enforcement, and public awareness regarding the importance of qualified healthcare providers. A professionally trained workforce is essential for expanding patient-oriented pharmacy services, including chronic disease screening, medication counseling, and preventive healthcare.

Majority (63.7%) of community pharmacy professionals possessed a satisfactory level of knowledge in relation to cholesterol and its influence on cardiovascular diseases. This might be due to the employment of skilled personnel in community pharmacies. Community pharmacy professionals' knowledge about the source of cholesterol, form of cholesterol, diet, cholesterol lowering therapies

was impressive, with majority of the pharmacists selecting a statin as the first line drug for lowering high blood cholesterol. This is in line with the American College of Cardiology/American Heart Association (ACC/AHA, 2013) task force on clinical practice guidelines.¹⁸ Therefore, these findings suggest that pharmacy professionals have a sound understanding of the basic principles of dyslipidemia management and may therefore be capable of providing appropriate patient education regarding cardiovascular risk reduction.

Community pharmacy professionals however showed gaps in knowledge of treatment benchmark for total cholesterol and treatment goal for low-density lipoprotein (LDL) cholesterol. Similar result in knowledge gap was also discovered in study conducted by Adje et al.¹² Moreover, knowledge related to side effects of statins was poor as more than half of the community pharmacy professionals did not answer the question correctly. Likewise, the study conducted by Al-Ashwal et al. demonstrated that majority of pharmacists and physicians failed to give correct answers to the questionnaire on the clinical knowledge of statins, provided during the study.¹⁹ These deficiencies may reduce pharmacists' confidence in counseling patients regarding medication safety, monitoring adverse drug reactions, and identifying patients requiring referral to physicians. Good knowledge in these areas may provide improved case identification rates in the community pharmacy through opportunistic testing of selected patients with a statin prescription. These findings indicate a need for additional training of community pharmacy professionals in Kathmandu metropolitan city.

Although the overall level of knowledge was encouraging, attitudes toward cholesterol screening were less favorable. Nearly half of the community pharmacy professionals had a negative attitude towards cholesterol screening. This result contrasts with a study conducted on 200 Iranian pharmacists, which revealed that most (70.4%) of those in practice had a positive attitude toward offering cholesterol screening services.¹⁹ This may be due to poor resource availability and accessibility in the community pharmacies surveyed in this study. Other barriers to cholesterol screening could be due to the absence of regulatory standards for introducing POCT methods, shortage of qualified personnel trained in various POCT devices and an issue regarding preexisting infrastructures, which varies across different countries and the arrangement or variability of financial resources to complete the newer diagnostic applications' purchase.²⁰

Factors such as academic qualifications and young age were significantly associated with higher knowledge and increased involvement in cholesterol screening. This could be due to the rise in population seeking health related degrees and these population fall under young generation (25 to 40 years old).²¹ Moreover, younger pharmacists may have benefited from updated pharmacy curricula that place

greater emphasis on pharmaceutical care, evidence-based practice, preventive healthcare, and patient-centered services. Similar associations between higher educational attainment and improved professional competence have been reported by Ahmad et al. which showed that pharmacist with academic qualifications were significantly more knowledgeable than those with only basic pharmacy experiences.²⁰ These findings emphasize the importance of continuing professional development programs that ensure pharmacy professionals of all educational backgrounds remain current with evolving clinical guidelines and emerging healthcare technologies.

Even though the cholesterol meter available at community pharmacies were limited, majority of the respondents were prepared (willing; 48.2 % and very willing; 6.5%) to adopt cholesterol meter to analyze the blood cholesterol level in their pharmacy. This positive willingness suggests that the low adoption rate is not solely attributable to resistance among pharmacy professionals but is more likely related to limited access to equipment, training opportunities, institutional support, and financial resources. Moreover, majority of community pharmacy professionals who responded to the survey indicated that they would be willing to receive training in the use of a cholesterol meter, indicating that national pharmacy organizations should develop, start, and carry out POCT programs for community pharmacy professionals.

As the study was a descriptive and cross-sectional survey conducted only in Kathmandu metropolitan city, cautions should be exercised when generalizing to other regions in Nepal. This study was conducted only among community pharmacies for KAP of cholesterol POCT, the exclusion of hospital pharmacies, wholesale pharmacies and clinical pharmacies might limit the generalization of the study. Moreover, this study excluded the opinion from public/patient perspective which affects conclusiveness of some of the findings.

Similar studies are to be conducted nationwide in coming days. In addition to policy and government regulation, community pharmacy-based POCT study should be included in the pharmacy curriculum. Similarly, POCT training model should be established to improve pharmacist's engagement, output, and impact in disease screening activities and to raise opportunistic high cholesterol diagnosis rates in the general population.

CONCLUSION

Community pharmacy professionals demonstrated satisfactory level of knowledge regarding the cholesterol and its influence on cardiovascular disease, with significant ties with age and academic qualifications. Furthermore, respondents' attitude toward the cholesterol screening was negative and resource availability was also poor. However, majority of the community pharmacy professionals surveyed expressed willingness to be trained in the use of cholesterol meter.

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