Vol. 5 No. 2 (2026)

Pakistan Journal of Medical & Cardiological Review

https://pakjmcr.com/index.php/1/about

Online ISSN 3007-2387

Print ISSN 3007-2379

Babar et al., 2026

Knowledge, Attitudes, and Practices Regarding Dyslipidaemia among Patients and Healthcare Professionals in Pakistan: A Cross-Sectional Study

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Received on 20 April, 2026

Accepted on 07 May, 2026

Published on 08 May, 2026

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Abstract

Background. Dyslipidaemia is a leading modifiable driver of cardiovascular mortality, yet evidence on how Pakistani patients and clinicians understand and manage it is limited. We assessed knowledge, attitudes, and practices (KAP) in both groups and identified barriers that hinder optimal lipid care. **Methods.** We carried out a hospital-based, descriptive cross-sectional study at three tertiary-care centres in Islamabad and Rawalpindi between January and March 2026. A structured self-administered questionnaire was completed by 200 adults with diagnosed dyslipidaemia and 130 healthcare professionals (HCPs). KAP scores were derived from item responses and categorised as poor (< 50%), moderate (50–74%), or good (≥ 75%). Bivariate associations were examined with chi-square or Fisher's exact tests; non-parametric tests compared scores across groups; multivariable logistic regression identified independent predictors of adequate KAP. **Results.** Among patients (mean age 45.9 ± 14.1 years; 64.0% male), only 35.5% had good knowledge, 18.0% had a good attitude, and 11.5% reported good practices. Item-level gaps were striking: only 42.0% knew that dyslipidaemia can cause stroke and 39.0% that it harms the kidneys. Educational attainment was the strongest independent predictor of adequate knowledge (none/primary vs. graduate or higher:

aOR 0.21, 95% CI 0.09–0.49, p < 0.001). The most cited barriers were lack of knowledge (38.2%), forgetfulness (30.2%), and family eating habits (60.0%). Among HCPs, knowledge and attitudes were broadly favourable, but only 63.1% reported routine use of any lipid-management guideline; usage was strongly linked to having attended a continuing-medical-education (CME) workshop (95.2% vs. 33.8%, p < 0.001). HCPs identified low health literacy (94.6%), cultural dietary patterns (93.1%), and treatment cost (83.8%) as the principal barriers. **Conclusion.** Substantial gaps exist along the patient–clinician continuum of dyslipidaemia care in Pakistan. Multilevel interventions, including patient education tailored to low-literacy groups, expanded CME on guideline-based lipid management, and structural action on medication cost, are likely required to translate clinical knowledge into measurable cardiovascular risk reduction.

Keywords: dyslipidaemia; KAP study; cardiovascular risk; statin adherence; Pakistan; health literacy; clinical practice guidelines.

1. Introduction

Cardiovascular disease (CVD) remains the leading cause of premature death worldwide, and dyslipidaemia is one of its most consistently reproducible modifiable causes (Pirillo et al., 2021; Du & Qin, 2023). Recent global estimates attribute 3.78 million ischaemic heart-disease deaths and 0.61 million ischaemic-stroke deaths in a single year to elevated low-density lipoprotein cholesterol alone (Pirillo et al., 2021; Xue et al., 2025). A 2025 systematic review and meta-analysis pooling more than two million adults reports a global pooled prevalence of dyslipidaemia of 47% (Ballena-Caicedo et al., 2025), confirming that the condition is no longer confined to high-income settings.

South-Asian populations, including Pakistanis, carry a disproportionate share of this burden because of an early-onset atherogenic profile, dietary transitions toward refined carbohydrates and saturated fats, and a high prevalence of central obesity at low body-mass index (Basit et al., 2020; Haider et al., 2024). The second National Diabetes Survey of Pakistan documented elevated total cholesterol, low high-density lipoprotein cholesterol, or hypertriglyceridaemia in well over half of urban adults, with all three abnormalities clustering more often in women than in men (Basit et al., 2020). Hospital series add that more than 90% of Pakistani patients with type-2 diabetes and a comparable proportion of those with coronary artery disease have at least one lipid abnormality at presentation (Hussain et al., 2023; Muneeb et al., 2022).

Translating these epidemiological numbers into improved outcomes hinges on two fragile links in the care pathway. The first is patient knowledge and self-management. Adherence to lipid-lowering therapy across Pakistan was recently estimated at less than 40%, with female sex, low income, and limited health literacy

among the strongest correlates of non-adherence (Aslam et al., 2024). The second link is the clinician. Studies from the Middle East, China, and India show that many physicians and pharmacists are unaware of current dyslipidaemia guidelines, do not use formal cardiovascular-risk calculators, and undertreat high-risk patients despite frequent encounters (Zaitoun et al., 2019; Al Sada et al., 2023; Bhandari & Ganachari, 2024). Whether these patterns generalise to Pakistan, where local clinical-practice guidance is incomplete and the public sector dominates referral cardiology, is unclear.

The few KAP studies conducted in the South-Asian region tend to be limited to one cadre of participants (patients alone or clinicians alone) and rarely link the two perspectives in a single design (Ejaz et al., 2018; Shrestha et al., 2020; Arun et al., 2024; Rani et al., 2026). A two-survey design can show whether HCP-perceived barriers actually correspond to barriers reported by patients in the same health system, and is therefore a more useful basis for intervention planning (Bhandari & Ganachari, 2024). Against this background, the present study had three objectives: (i) to quantify knowledge, attitudes, and practices regarding dyslipidaemia among adult patients attending tertiary-care hospitals in the Islamabad–Rawalpindi metropolitan region; (ii) to characterise the corresponding KAP profile of healthcare professionals working in the same setting; and (iii) to identify the sociodemographic, clinical, and structural factors that are independently associated with adequate KAP in each group.

2. Materials and Methods

2.1 Study Design and Setting

This descriptive cross-sectional study was conducted in three tertiary-care hospitals in the twin-city region of Islamabad and Rawalpindi, Pakistan: the Pakistan Institute of Medical Sciences (PIMS), Holy Family Hospital, and the Rawalpindi Institute of Cardiology. Recruitment took place between January and March 2026 in cardiology outpatient departments, internal-medicine wards, and clinical-pharmacy services. The hospitals serve a mixed catchment of urban and peri-urban patients drawn from across Punjab and Khyber-Pakhtunkhwa, which improves the external validity of the findings for the population of north-central Pakistan.

2.2 Participants and eligibility

Two distinct samples were enrolled. The patient sample comprised adults aged 18 years or older with a documented diagnosis of dyslipidaemia within the preceding five years, defined according to fasting lipid-panel cut-offs from the National Cholesterol Education Program Adult Treatment Panel III (total cholesterol $\geqslant$ 200 mg/dL, low-density lipoprotein cholesterol $\geqslant$ 130 mg/dL, high-density lipoprotein cholesterol < 40 mg/dL in men or < 50 mg/dL in women, or fasting triglycerides $\geqslant$ 150 mg/dL)

(Berberich & Hegele, 2022). Patients who were critically ill, cognitively impaired, pregnant, or unable to provide written consent were excluded. The HCP sample comprised physicians (consultants, registrars, and house officers), clinical and hospital pharmacists, registered nurses, and allied health staff working in cardiology, internal medicine, or clinical pharmacy services.

2.3 Sample Size

Sample size was estimated using the Raosoft online calculator. Assuming a 95% confidence level, a 5% margin of error, and an anticipated proportion of 50% (to maximise the required sample), the minimum sample size was 196 for the patient survey. Allowing for incomplete responses, 200 patients and 130 HCPs were recruited consecutively by convenience sampling, a strategy used in comparable South-Asian KAP work (Bhandari & Ganachari, 2024; Arun et al., 2024).

2.4 Data-Collection Instrument

Two structured, self-administered questionnaires were developed in English and pretested for clarity in 20 participants whose responses were not included in the analysis. Items were drawn and adapted from previously validated instruments (Liang et al., 2019; Bhandari & Ganachari, 2024). The patient questionnaire contained 25 items covering sociodemographic data (age, sex, education, duration of diagnosis), seven knowledge items (e.g., risk factors, link to heart attack and stroke, kidney involvement, recommended treatments, and dietary fat), six attitude items (importance of regular medication, exercise, smoking avoidance, sugar restriction, and two reverse-coded items on self-discontinuation), and items capturing practices and barriers (frequency of diet adherence, oily-food avoidance, missed doses, counselling received, monitoring frequency, and self-reported barriers to medication and lifestyle change). The HCP questionnaire contained 19 items spanning knowledge of disease epidemiology, attitudes toward early screening and counselling, practices related to lifestyle counselling, guideline use, and risk-stratification tools, and perceived structural barriers.

2.5 Scoring And Reliability

Each correct knowledge response and each appropriate attitude response was assigned a score of 1; reverse-coded items were scored accordingly. Practice items with a frequency response (Often / Sometimes / Never) were scored 2, 1, and 0 respectively, and frequency items reflecting an undesirable behaviour were reverse-coded. Domain scores were converted to percentages of the maximum and categorised as poor (< 50%), moderate (50–74%), or good (≥ 75%), in line with cut-offs used in earlier KAP work in the region (Arun et al., 2024; Kaur et al., 2024). Internal consistency was assessed with Cronbach's α: it was 0.78 for the patient knowledge scale, 0.54 for the patient attitude

scale, and 0.42 for the patient practice scale; the latter two values reflect the small number of items per scale and the heterogeneous content rather than internal incoherence, and are therefore reported transparently as a limitation.

2.6 Statistical Analysis

Data were entered into Microsoft Excel, cleaned, and analysed using IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY) and Python 3.11 with the SciPy and statsmodels libraries used for verification. Continuous variables were summarised as mean ± standard deviation when normally distributed (Shapiro–Wilk $p > 0.05$) and as median (interquartile range) otherwise; categorical variables were summarised as frequencies and percentages. Distribution checks rejected normality for all three KAP scores in both samples (Shapiro–Wilk $p < 0.001$ throughout), so non-parametric tests were used: Mann–Whitney U for two-group comparisons and Kruskal–Wallis H for multi-group comparisons. Categorical associations were tested with the chi-square test, with Fisher's exact test substituted whenever an expected cell count fell below five in a 2 × 2 table. Variables associated with adequate KAP at $p < 0.20$ in bivariate analysis were entered into multivariable logistic-regression models, with adequate KAP (⩾ 50%) as the outcome and adjusted odds ratios (aOR) reported with 95% confidence intervals. Model assumptions were checked through inspection of multicollinearity (variance inflation factor < 2 in all final models), the Hosmer–Lemeshow goodness-of-fit test ($p > 0.10$ in all models), and the receiver-operating-characteristic area. Two-tailed tests were used throughout; $p < 0.05$ indicated statistical significance.

2.7 Ethical Considerations

Ethical approval was granted by the Institutional Review Board of IBADAT International University, Islamabad. Each participant received a written information sheet, gave written informed consent, and was free to withdraw at any time. No personal identifiers were retained; survey records were stored in a password-protected database accessible only to the investigators. The study was conducted in accordance with the Declaration of Helsinki.

3. Results

3.1 Sample Characteristics

All approached participants in both samples completed the questionnaire, giving a response rate of 100%. The patient sample (n = 200) had a mean age of 45.9 ± 14.1 years; 64.0% were male, 50.5% had received only secondary schooling or less, and 64.5% had carried the diagnosis for one to five years. The HCP sample (n = 130) was demographically more uniform: 53.1% were male, 96.2% were younger than 50 years, and physicians made up 49.2%, with pharmacists, nurses, and allied health staff making

up the remainder. Detailed sociodemographic and clinical features of both samples are presented in Table 1.

Table 1; *Sociodemographic and clinical characteristics of the patient and healthcare-professional samples (n = 330).*

Variable	Patients (n = 200), n (%)	Healthcare Professionals (n = 130), n (%)
Age (mean ± SD, years)	45.9 ± 14.1	—
< 30 years	31 (15.5)	60 (46.2)
30–44 years	68 (34.0)	65 (50.0)
45–59 years	68 (34.0)	—
⩾ 60 years	33 (16.5)	5 (3.8)
Sex		
Male	128 (64.0)	69 (53.1)
Female	72 (36.0)	61 (46.9)
Education		
None / primary	63 (31.5)	—
Secondary	60 (30.0)	—
Graduate / postgraduate	77 (38.5)	—
Professional role		
Physician	—	64 (49.2)
Pharmacist	—	35 (26.9)
Nurse	—	25 (19.2)
Allied health professional	—	6 (4.6)
Duration of diagnosis		—
< 1 year	71 (35.5)	—
1–5 years	90 (45.0)	—
> 5 years	39 (19.5)	—

Variable	Patients (n = 200), n (%)	Healthcare Professionals (n = 130), n (%)
Patients with dyslipidaemia seen per day	—	
1–2	—	24 (18.5)
3–4	—	33 (25.4)
4–5	—	32 (24.6)
> 5	—	41 (31.5)

Note. SD = standard deviation. Percentages are calculated within sample. Dashes indicate variables not collected for that group.

3.2 Patient Knowledge, Attitudes, And Practices

Mean scores for patients were 4.26 ± 2.13 of 7 for knowledge (60.8%), 3.13 ± 1.58 of 6 for attitude (52.1%), and 3.16 ± 1.20 of 6 for practice (52.6%). After categorisation, only 35.5% of patients had good knowledge, 18.0% had a good attitude, and 11.5% had good practices, with the majority falling into the moderate band for attitudes (48.5%) and practices (63.0%). The full distribution is shown in Figure 1.

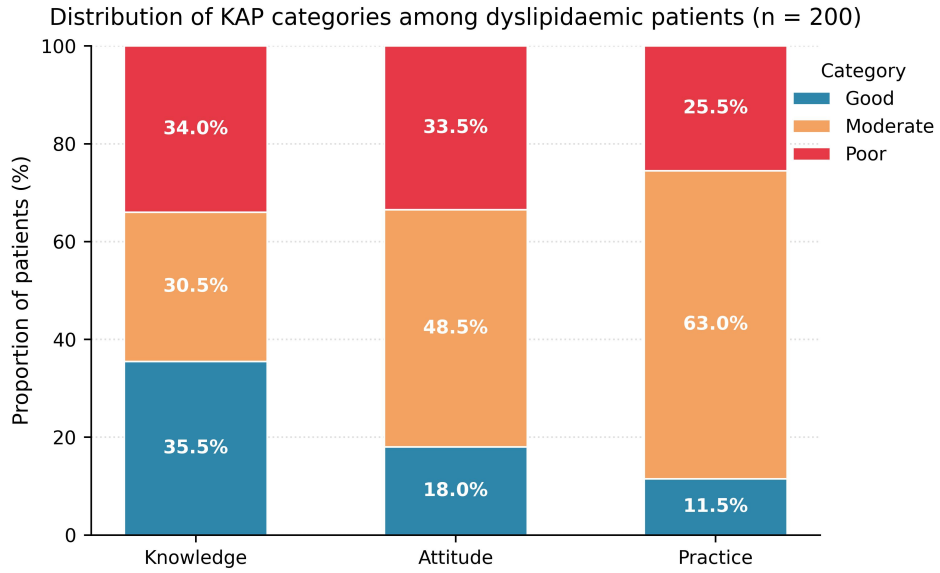

Figure 1. Distribution of knowledge, attitude, and practice categories among adult patients with diagnosed dyslipidaemia (n = 200). Categories were defined as poor (< 50% of maximum domain score), moderate (50–74%), and good (≥ 75%).

Item-level analysis exposed important blind spots. Although 85.5% of patients accepted that high cholesterol increases the risk of a heart attack and 74.5% had heard the term "dyslipidaemia", only 42.0% knew that the condition can cause a stroke, and just 39.0% knew that it can affect the kidneys. Awareness of recommended treatments was reported by 52.5% of patients, and 67.0% knew that fatty-acid intake should be limited. Frequencies of correct responses to all knowledge items, broken down by educational attainment, are presented in Figure 2 and Table 2.

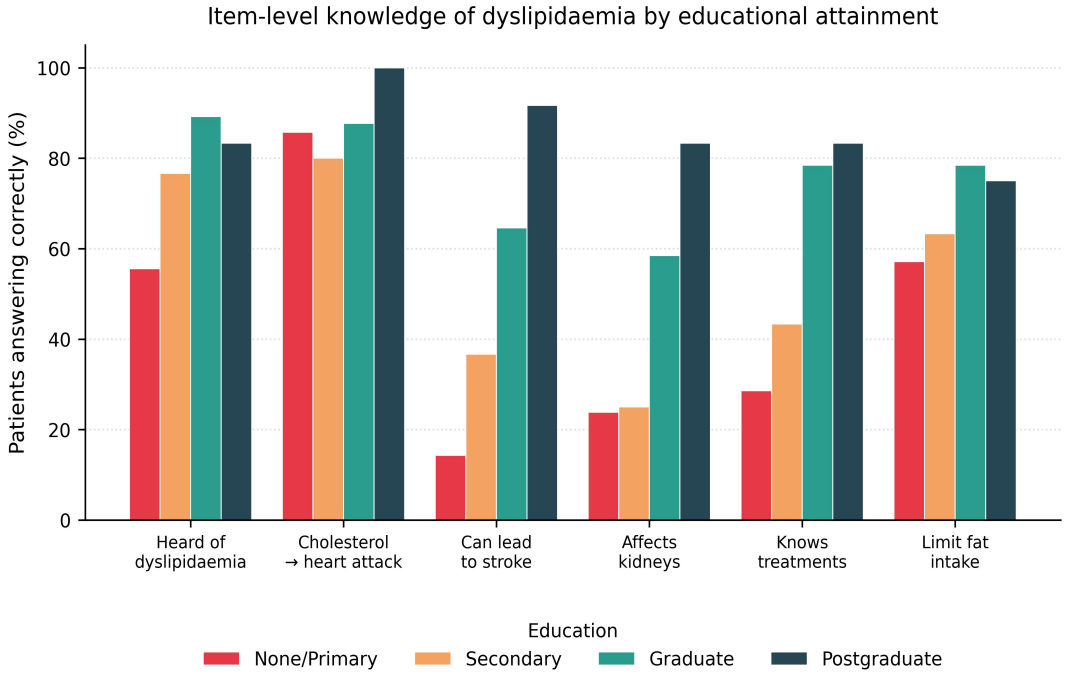

Figure 2. Item-level knowledge of dyslipidaemia among patients (n = 200), stratified by educational attainment. Bars represent the proportion of patients within each educational stratum who answered the item correctly.

Table 2: *Patient responses to knowledge, attitude, and practice items (n = 200).*

Item	Correct / favourable, n (%)	Incorrect / unfavourable, n (%)	Domain
Have heard of dyslipidaemia	149 (74.5)	51 (25.5)	Knowledge
Aware of major risk factors	131 (65.5)	69 (34.5)	Knowledge
High cholesterol increases heart-attack risk	171 (85.5)	29 (14.5)	Knowledge
Dyslipidaemia can lead to	84 (42.0)	116 (58.0)	Knowledge

Item	Correct / favourable, n (%)	Incorrect / unfavourable, n (%)	Domain
stroke			
Dyslipidaemia can affect the kidneys	78 (39.0)	122 (61.0)	Knowledge
Aware of recommended treatments	105 (52.5)	95 (47.5)	Knowledge
Adults should limit fatty-acid intake	134 (67.0)	66 (33.0)	Knowledge
Should take medications regularly	149 (74.5)	51 (25.5)	Attitude
Should exercise regularly	95 (47.5)	105 (52.5)	Attitude
Should avoid smoking	123 (61.5)	77 (38.5)	Attitude
Should limit sugary foods	111 (55.5)	89 (44.5)	Attitude
Stops medications when feeling better*	61 (30.5)	139 (69.5)	Attitude
Skips medication for side effects*	88 (44.0)	112 (56.0)	Attitude
Forgets to take medication (Never)	34 (17.0)	166 (83.0)	Practice
Follows a heart-healthy diet (Often)	35 (17.5)	165 (82.5)	Practice
Avoids oily food (Often)	51 (25.5)	149 (74.5)	Practice
Receives counselling from clinician (Often)	40 (20.0)	160 (80.0)	Practice
Cholesterol monitored at least every 6 months	80 (40.0)	120 (60.0)	Practice

**Reverse-coded items: "Correct/favourable" denotes the response not endorsing the unfavourable behaviour.*

3.3 Sociodemographic correlates of patient KAP

Bivariate analysis (Table 3) showed a strong dose–response relationship between educational attainment and knowledge. Median knowledge scores rose from 4 of 7 in patients with no formal or only primary education to 6.5 of 7 in those with a postgraduate qualification (Kruskal–Wallis H = 52.76, p < 0.001). A weaker but still significant gradient emerged with age (H = 7.86, p = 0.049). Sex and duration of diagnosis were not associated with knowledge. For attitudes, the only significant correlate was age group (chi-square p = 0.019), with younger patients endorsing more favourable attitudes; for practices, the only significant correlate was likewise age group (p = 0.005).

Table 3: *Patient KAP scores by sociodemographic and clinical strata (n = 200).*

Variable (subgroup)	Knowledge, median (IQR)	Attitude, median (IQR)	Practice, median (IQR)	p-value*
Sex				
Male (n = 128)	5 (3–6)	3 (2–4)	3 (2–4)	0.198 (K)
Female (n = 72)	4 (3–6)	3 (2–4)	3 (3–4)	
Age group				
< 30 years (n = 31)	5 (4–6)	4 (3–5)	4 (3–4)	
30–44 years (n = 68)	5 (3–6)	3 (2–4)	3 (3–4)	0.049 (K)
45–59 years (n = 68)	4 (3–6)	3 (2–4)	3 (2–4)	
⩾ 60 years (n = 33)	4 (2–5)	2 (2–3)	3 (2–3)	
Education				
None / primary (n = 63)	4 (2–5)	3 (2–4)	3 (2–4)	
Secondary (n = 60)	4 (3–5)	3 (2–4)	3 (3–4)	< 0.001 (K)
Graduate (n = 65)	6 (4–7)	3 (3–4)	3 (3–4)	
Postgraduate (n = 12)	6.5 (6–7)	4 (3–5)	3.5 (3–4)	
Duration of diagnosis				
< 1 year (n = 71)	5 (3–6)	3 (2–4)	3 (3–4)	0.090 (K)

Variable (subgroup)	Knowledge, median (IQR)	Attitude, median (IQR)	Practice, median (IQR)	p-value*
1–5 years (n = 90)	4 (3–6)	3 (2–4)	3 (3–4)	
> 5 years (n = 39)	4 (3–6)	3 (2–4)	3 (2–4)	

**p-value from Kruskal–Wallis H test (multi-group) or Mann–Whitney U test (two groups). The most relevant domain is shown in parentheses; significant p-values are bold-faced in the text. IQR = interquartile range; K = knowledge.*

3.4 Independent predictors of adequate patient KAP

Multivariable logistic regression confirmed education as the dominant independent predictor of adequate knowledge (Table 4). Compared with patients holding a graduate or postgraduate degree, those with no formal or only primary schooling had an adjusted odds of 0.21 (95% CI 0.09–0.49, p < 0.001) of attaining adequate knowledge, and those with secondary schooling had an adjusted odds of 0.22 (95% CI 0.10–0.51, p < 0.001). Age, sex, and duration of diagnosis did not retain significance. Predictors of adequate practice and attitude differed: female sex (aOR 0.37, 95% CI 0.17–0.78 for males vs. females, p = 0.010) and lower education predicted poorer practice, while age ⩾ 45 years (aOR 0.45, 95% CI 0.22–0.95, p = 0.035) and male sex (aOR 0.35, 95% CI 0.17–0.70, p = 0.003) predicted poorer attitudes; longer duration of diagnosis was unexpectedly associated with a better attitude (aOR 2.45, 95% CI 1.11–5.43, p = 0.027), suggesting that chronic-illness experience itself can foster more favourable health beliefs even when knowledge remains static.

Table 4: *Multivariable logistic-regression models for predictors of adequate (⩾ 50%) knowledge, attitude, and practice in patients (n = 200).*

Predictor	Adequate knowledge, aOR (95% CI)	p-value	Adequate practice, aOR (95% CI)	Adequate attitude, aOR (95% CI)
No formal / primary education	0.21 (0.09–0.49)	< 0.001	0.34 (0.15–0.81)	0.32 (0.14–0.71)
Secondary education	0.22 (0.10–0.51)	< 0.001	0.49 (0.21–1.13)	0.52 (0.23–1.13)
Age ⩾ 45 years	0.56 (0.28–1.14)	0.110	1.10 (0.52–2.32)	0.45 (0.22–0.95)
Male sex	0.74 (0.38–	0.380	0.37 (0.17–	0.35 (0.17–

Predictor	Adequate knowledge, aOR (95% CI)	p-value	Adequate practice, aOR (95% CI)	Adequate attitude, aOR (95% CI)
	1.44)		0.78)	0.70)
Diagnosis ⩾ 1 year	0.98 (0.45–2.17)	0.967	1.01 (0.45–2.30)	2.45 (1.11–5.43)

Reference categories: graduate/postgraduate education; age < 45 years; female sex; diagnosis < 1 year. aOR = adjusted odds ratio; CI = confidence interval. Bold p-values reach the conventional 0.05 threshold.

3.5 Patient-Reported Barriers

Patients identified four medication-adherence barriers and three lifestyle-modification barriers (Figure 3). Lack of knowledge about the disease was the most frequently cited adherence barrier (38.2%), followed by forgetfulness (30.2%), drug-related side effects (19.1%), and cost (12.6%). For lifestyle change, family eating habits dominated (60.0%), well ahead of lack of time (24.0%) and lack of motivation (16.0%). When asked about specific causes of dyslipidaemia, patients most often blamed lack of exercise (48.0%), high-fat diet (37.0%), obesity (33.0%), and family history (30.5%); only 26.0% spontaneously mentioned smoking and just 1.0% mentioned alcohol, reflecting both the cultural prohibition on alcohol and a likely under-recognition of smoking as a causal factor.

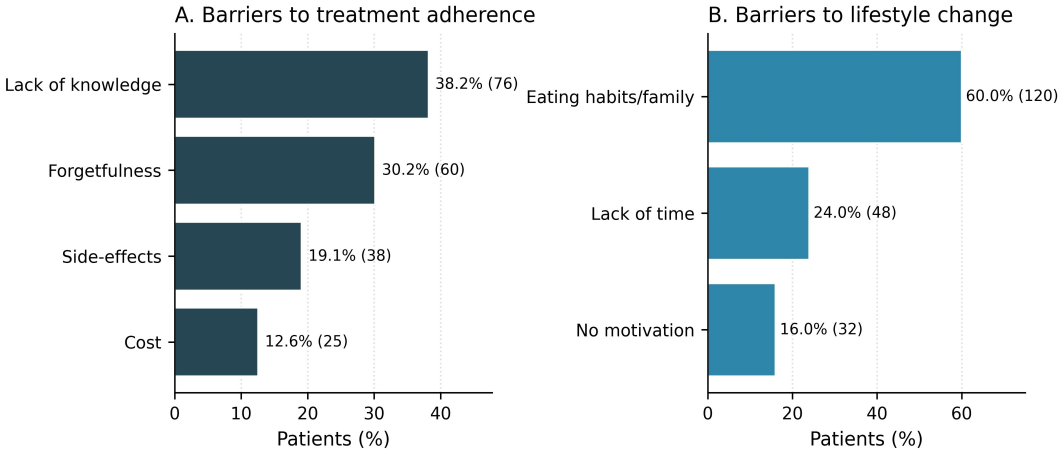

Figure 3. Patient-reported barriers to (A) treatment adherence and (B) lifestyle modification. Bars show the percentage of patients (n = 200) endorsing each barrier with absolute counts in parentheses.

3.6 Healthcare-professional knowledge, attitudes, and practices

HCP knowledge and attitudes were generally favourable. Almost all respondents (97.7%) considered themselves knowledgeable about dyslipidaemia management, agreed that early screening prevents cardiovascular events (97.7%), endorsed counselling as having a positive impact on adherence (94.6%), and acknowledged that dyslipidaemia is rising in Pakistan (96.9%). Practice-level metrics, however, told a more nuanced story (Table 5). Although 63.8% reported that they always discuss healthy lifestyle practices with their patients, only 63.1% used any specific lipid-management guideline, and a sizeable group either did not use a formal cardiovascular-risk-stratification tool (30.0%) or were unsure which one to use (9.2%). Only 47.7% had attended a continuing-medical-education session or workshop on dyslipidaemia in the preceding 12 months.

Table 5: *Healthcare-professional responses to knowledge, attitude, and practice items (n = 130).*

Item	Favourable / Yes, n (%)	Unfavourable / No, n (%)	Domain
Considers self knowledgeable about lipid management	123 (94.6)	7 (5.4)	Knowledge
Believes dyslipidaemia is rising in Pakistan	126 (96.9)	4 (3.1)	Knowledge
Considers patient knowledge to be low	124 (95.4)	6 (4.6)	Knowledge
Believes early screening prevents CV risk	127 (97.7)	3 (2.3)	Knowledge
Encourages routine health examinations	128 (98.5)	2 (1.5)	Attitude
Agrees counselling has a positive impact	123 (94.6)	7 (5.4)	Attitude
Informs patients about long-term disease control	123 (94.6)	7 (5.4)	Attitude
Always discusses healthy lifestyle practices	83 (63.8)	47 (36.2)	Practice
Uses a specific lipid-management	82 (63.1)	48 (36.9)	Practice

Item	Favourable / Yes, n (%)	Unfavourable / No, n (%)	Domain
guideline			
Uses a specific risk-assessment tool*	79 (60.8)	51 (39.2)	Practice
Has attended CME / workshop in past 12 months	62 (47.7)	68 (52.3)	Practice

**Specific tool defined as ASCVD risk calculator, WHO South-East Asia chart, or Framingham score; all other responses ("I do not use any tool" or "Not sure") were classified as unfavourable. CV = cardiovascular; CME = continuing medical education.*

3.7 Hcp Practice Patterns By Professional Role

Practice indicators differed sharply across professional roles (Figure 4A; Table 6). Self-reported guideline use was highest among physicians (78.1%) and lowest among nurses (44.0%); the difference was statistically significant (chi-square p = 0.006). CME attendance followed the same gradient (physicians 70.3%, pharmacists 31.4%, nurses 20.0%, allied health professionals 16.7%; p < 0.001), and was itself a powerful correlate of guideline use. Of HCPs who had attended a CME activity, 95.2% reported routine guideline use, compared with only 33.8% of those who had not (chi-square = 49.79, p < 0.001), and the crude association corresponded to a more-than-thirty-fold increase in odds of guideline use among CME attendees. The most frequently chosen risk-assessment instrument was the ASCVD risk calculator (30.0%), followed by the WHO chart for the South-East Asian population (23.8%); 30.0% of HCPs reported using no formal tool at all.

Table 6: *Practice indicators by professional role among healthcare professionals (n = 130).*

Practice indicator	Physician (n = 64), n (%)	Pharmacist (n = 35), n (%)	Nurse (n = 25), n (%)	p-value*
Always discusses lifestyle	44 (68.8)	22 (62.9)	13 (52.0)	0.31
Uses any lipid guideline	50 (78.1)	18 (51.4)	11 (44.0)	0.006
Uses specific risk tool	47 (73.4)	20 (57.1)	10 (40.0)	0.013

Practice indicator	Physician (n = 64), n (%)	Pharmacist (n = 35), n (%)	Nurse (n = 25), n (%)	p-value*
CME / workshop in past year	45 (70.3)	11 (31.4)	5 (20.0)	< 0.001

**Chi-square test across all four professional categories (Allied health professional group n = 6 not shown for brevity; included in the test).*

3.8 HCP-Perceived Barriers And Improvement Priorities

Three structural barriers were endorsed by more than 80% of HCPs (Figure 4B): low patient health literacy (95.4%), entrenched cultural and dietary habits (93.1%), and the cost of long-term lipid-lowering therapy (83.8%). When asked which single change would most improve dyslipidaemia care, HCPs were divided across five viable options (Table 7), with improved medication coverage (26.2%), better patient-education tools (25.4%), and improved access to lipid testing (16.9%) leading the list. Notably, 24 HCPs (18.5%) explicitly called for greater involvement of clinical pharmacists or for guideline-focused CME, suggesting that the workforce itself perceives a need for restructured task allocation.

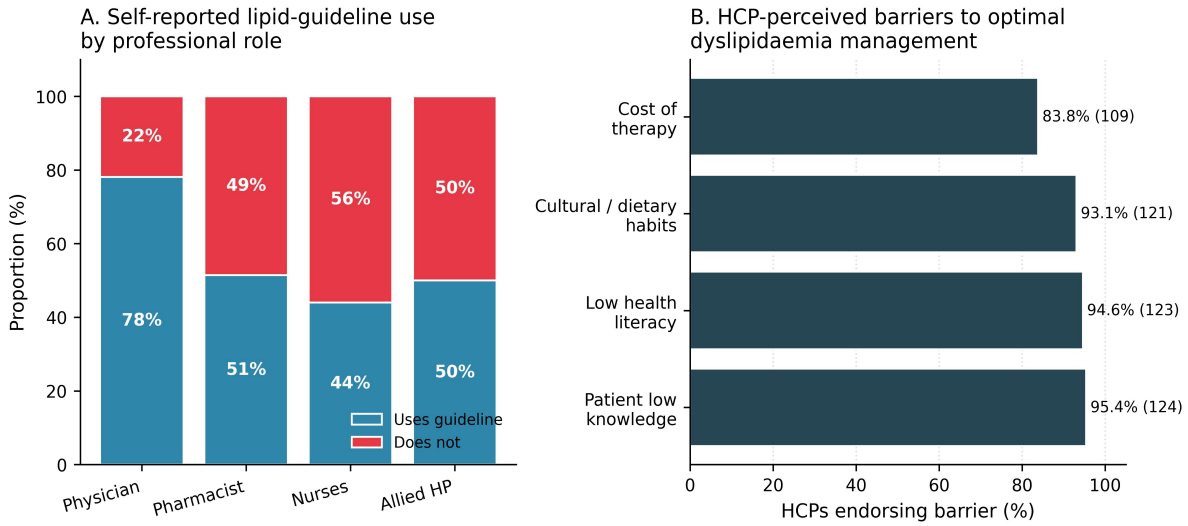

Figure 4. Practice and barrier patterns among healthcare professionals (n = 130). (A) Self-reported lipid-guideline use stratified by professional role. (B) HCP-perceived structural barriers to optimal dyslipidaemia management.

Table 7: *Healthcare-professional priorities for improving dyslipidaemia care in Pakistan (n = 130).*

Priority for improvement	n	%
Improved medication coverage / affordability	34	26.2
Better patient-education tools	33	25.4
Improved access to lipid testing	22	16.9
CME / updated HCP training	18	13.8
More involvement of clinical pharmacists	18	13.8
Unified national clinical-practice guideline	5	3.8

3.9 Inter-domain correlations and patient–clinician comparison

Spearman rank correlations were used to test the internal coherence of the KAP construct within each sample (Table 8). In patients, knowledge correlated moderately with attitude (ρ = 0.368, $p < 0.001$) and attitude with practice (ρ = 0.321, $p < 0.001$), but the direct knowledge–practice link was weak (ρ = 0.145, $p = 0.040$), suggesting that attitude operates as the proximal driver of behaviour. Among healthcare professionals, knowledge and attitude were positively but weakly correlated (ρ = 0.221, $p = 0.012$), and the knowledge–practice association did not reach statistical significance (ρ = 0.078, $p = 0.377$), indicating that familiarity with guidelines did not, on its own, translate into their consistent application (Table 8).

Table 8: *Inter-domain Spearman correlations*

Comparison	Patients (n = 200)	HCPs (n = 130)
Within-sample correlations **(Spearman ρ, p)**		
Knowledge ↔ Attitude	0.368, < 0.001	0.221, 0.012
Knowledge ↔ Practice	0.145, 0.040	0.078, 0.377
Attitude ↔ Practice	0.321, < 0.001	0.187, 0.033
Knowledge	71.4 (42.9–85.7)	100.0 (100.0–100.0)
Attitude	50.0 (33.3–66.7)	100.0 (100.0–100.0)
Practice	50.0 (33.3–66.7)	75.0 (50.0–100.0)

IQR, interquartile range; HCP, healthcare professional.

4. Discussion

Our two-survey design produced three findings that bear directly on the design of dyslipidaemia interventions in Pakistan. First, patients showed wide variation in knowledge and consistently weaker attitudes and practices, with educational attainment as the single most powerful determinant of adequate knowledge. Second, healthcare professionals were almost uniformly positive in their stated knowledge and attitudes, but this confidence was not matched by their reported practices: roughly four in ten HCPs do not use a formal lipid-management guideline, and a similar fraction do not use any cardiovascular-risk-stratification tool. Third, patient-reported barriers and HCP-perceived barriers converged on the same three structural problems, namely health literacy, dietary culture, and cost, implying that an intervention that addresses any of these will benefit both ends of the care relationship simultaneously.

The dominance of education as a predictor of knowledge is consistent with Indian and Nepali data. Arun and colleagues found that 81.9% of Delhi outpatients had inadequate dyslipidaemia knowledge and reported a similar education gradient (Arun et al., 2024); Shrestha et al. likewise observed that secondary-or-higher education explained much of the variance in cardiovascular knowledge in eastern Nepal (Shrestha et al., 2020). Importantly, in our multivariable model the duration of diagnosis did not predict adequate knowledge. A patient who has carried the diagnosis for more than five years was no more likely to know that dyslipidaemia can cause stroke or kidney disease than a newly diagnosed patient. This suggests that simple exposure to the health system is insufficient: structured patient education is needed at the point of first diagnosis and at every routine follow-up. The South-Asian "Talking Rx" trial provides one promising template, demonstrating that low-literacy-friendly mobile-health prompts can improve medication adherence in Pakistani patients with vascular disease (Bhandari & Ganachari, 2024).

The two specific item-level gaps, with only 42% of patients knowing about the stroke risk and only 39% about the renal risk, are clinically meaningful. Patients who do not appreciate the multi-organ consequences of dyslipidaemia are unlikely to value continued therapy when they feel well, which fits with our finding that 69.5% of patients agreed with the statement that medication can be stopped when symptoms improve. This pattern mirrors the systematic-review evidence that perceived low risk is one of the strongest behavioural barriers to long-term statin adherence (Bhandari & Ganachari, 2024).

Almost every HCP in our sample said they were knowledgeable about dyslipidaemia (94.6%) and almost every one accepted the value of early screening (97.7%), yet only

63.1% routinely used any lipid-management guideline. The gap between self-rated knowledge and operational practice is well documented elsewhere: Zaitoun and colleagues found that only 77% of physicians and 48% of clinical pharmacists in Saudi Arabia knew of the 2013 ACC/AHA dyslipidaemia guidelines, and median knowledge scores were just 4 of 10 (Zaitoun et al., 2019). Al Sada et al. reported that around 63% of internists in Bahrain failed to initiate lipid-lowering therapy in line with current guidelines (Al Sada et al., 2023). Our data therefore extend an established regional pattern to the Pakistani setting and locate the most actionable lever: CME attendance, which was associated with a more-than-thirty-fold odds of routine guideline use. CME interventions in pediatric dyslipidaemia have been shown to substantially improve screening behaviour after a single short course (Thorsen et al., 2025), and a similar approach focused on adult lipid management could close the gap demonstrated here.

The role-specific gradient, in which physicians used guidelines twice as often as nurses, also has implications for service design. International experience indicates that nurse- and pharmacist-led lipid clinics can match physician-led care for LDL-C goal attainment when supported by clear protocols (Bhandari & Ganachari, 2024). Pakistan's HCP workforce already includes a sizable pharmacist cadre, and 13.8% of HCPs in our survey explicitly identified greater involvement of clinical pharmacists as a priority for improvement; this is a low-cost, high-yield avenue worth piloting.

The three barriers identified by both samples, namely cost, culture, and literacy, are interconnected. Cost is no minor consideration: a recent multi-country analysis estimated median statin availability of just 0% in public facilities and 5.4% for generic statins in low- and middle-income countries, with monthly originator costs sometimes exceeding six days' wages (Li et al., 2024). In a Pakistani national survey, 60.6% of patients were non-adherent to antihyperlipidaemic medication, and the highest non-adherence rates clustered in the lowest-income districts (Aslam et al., 2024). Cultural eating patterns, including domestic preparation of foods rich in saturated fats and communal meals where individual restriction is socially difficult, were endorsed by 60.0% of patients in our study as the principal barrier to lifestyle change, and by 93.1% of HCPs as a barrier to optimal management. The recently published systematic review on the nutritional management of dyslipidaemia in Pakistan calls for a culturally adapted Pakistani "healthy plate" model, an approach that matches our patients' description of why generic dietary advice fails them (Khan et al., 2024). Health literacy, finally, is the connective tissue: a patient who cannot read a medication label or interpret a clinician's risk explanation cannot benefit fully from either the cheapest generic statin or the most culturally appropriate diet (Nazar et al., 2019; Aslam et al., 2024).

Our patient knowledge percentage of approximately 35% in the "good" band sits between the 18% reported in Delhi (Arun et al., 2024) and the 51.9% median knowledge score reported in a Chinese hyperlipidaemic-stroke prevention cohort (Zuo et al., 2024). Our HCP guideline-use rate of 63% is comparable to the 60–70% range reported for primary-care physicians in Sudan (Idress et al., 2024) and notably higher than the rates seen in earlier Saudi data (Zaitoun et al., 2019), perhaps because our sample was urban, hospital-based, and skewed toward younger clinicians who completed training after the publication of widely promulgated international guidelines (Berberich & Hegele, 2022). At the structural level, our findings mirror the conclusions of the Lancet Regional Health–Southeast Asia survey on the management infrastructure for familial hypercholesterolaemia, which highlighted the absence of a unified national lipid-screening framework in Pakistan as the principal systemic shortcoming (Sadiq et al., 2023).

Three implications follow from this study. First, patient-education tools should be designed for low-literacy users and embedded in the routine outpatient encounter rather than offered as optional add-ons; pictogram-based and audio-recorded counselling materials are particularly promising in our setting. Second, regular dyslipidaemia-focused CME should become a condition of professional licensure renewal for cardiology, internal medicine, and clinical pharmacy practitioners, given the size of the effect we observed on guideline use. Third, no patient-level or clinician-level intervention will succeed at scale unless statin affordability is addressed; expansion of the existing Sehat Sahulat health-coverage programme to include long-term lipid-lowering therapy would be a logical and tractable next step. The recent call to rethink global statin guidelines for resource-diverse settings (Chaabna et al., 2025) makes the same point: simple importation of high-income-country recommendations will not work; locally validated, cost-conscious algorithms are needed.

Strengths of this study include the parallel patient and HCP design, the multi-centre tertiary-care recruitment in Pakistan's twin-city region, the use of validated questionnaire elements, and a transparent statistical plan that combined non-parametric tests with multivariable adjustment. Several limitations should be acknowledged. First, the cross-sectional design precludes causal inference; the strong association between CME and guideline use, for example, may partly reflect that more motivated clinicians both attend CME and follow guidelines. Second, convenience sampling at three urban hospitals may overestimate KAP relative to rural settings; rural Pakistani patients are likely to score lower. Third, all data were self-reported, which exposes the practice domain in particular to social-desirability bias. Fourth, our patient practice scale showed

modest internal consistency (Cronbach's α = 0.42); we report this transparently and recommend that future Pakistani KAP studies use a longer practice instrument with embedded objective behavioural anchors (e.g., medication-possession ratios). Finally, lipid-profile values were not collected, so we could not assess whether higher KAP scores translated into better lipid control, a question that deserves follow-up longitudinal study.

5. Conclusion

In this two-sample cross-sectional study of dyslipidaemia care in tertiary hospitals of Islamabad and Rawalpindi, only one in three patients had adequate knowledge, and barely one in nine reported good lifestyle and treatment practices. Healthcare professionals expressed strong knowledge and attitudes but translated them into guideline-based practice only in approximately two thirds of cases, with continuing medical education emerging as the most consistent correlate of guideline use. Patients and clinicians independently identified the same three barriers, namely cost of therapy, cultural dietary patterns, and low health literacy, pointing to a small set of high-leverage targets for action. Multilevel intervention combining low-literacy patient education at every clinical encounter, mandatory dyslipidaemia-focused CME for relevant cadres, structural reforms to widen access to affordable statins, and stronger involvement of clinical pharmacists has the potential to close measurable gaps in the Pakistani dyslipidaemia care pathway and, ultimately, to reduce avoidable cardiovascular events at the population level.

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