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Declarations

No funding was received for this study. The authors declare no conflict of interest. The study received ethical approval. All participants provided informed consent.

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Assessing the Knowledge and Practices of Diabetes Mellitus Type 2 Patients Regarding Self-Care Management at a Tertiary-Care Hospital, Rawalakot: An Analytical Cross-Sectional Study

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) requires sustained self-care, yet the translation of knowledge into effective daily management remains inconsistent in low-resource settings. **Objective:** This study assessed the knowledge and self-care practices of adults with T2DM and examined their relationship in a tertiary-care hospital in Rawalakot, Azad Jammu and Kashmir. **Methods:** An analytical cross-sectional design was employed among 315 patients aged ≥ 30 years selected by simple random sampling. Data were collected using validated instruments: the 14-item Diabetes Knowledge Questionnaire (DKQ) and 15-item Diabetes Self-Management Questionnaire (DSMQ), each scored on a five-point Likert scale. Reliability was confirmed ($\alpha = 0.761$ and 0.752). Descriptive, correlation, and linear-regression analyses were performed using SPSS v25, with $p < 0.05$ considered significant. **Results:** Participants demonstrated moderate knowledge (mean DKQ = 2.15 ± 0.98) and mixed adherence to self-care (mean DSMQ = 2.84 ± 0.91). Medication compliance was highest (81%), whereas structured glucose recording and risk-screening practices were weakest. Knowledge correlated positively but weakly with self-care ($r = 0.157$, $p = 0.005$), explaining 2.5% of behavioural variance. **Conclusion:** Diabetes knowledge contributes modestly to self-care behaviours in Rawalakot. Strengthening diabetes self-management education with behavioural support, literacy-adapted materials, and regular follow-up could narrow the observed knowledge-practice gap.

Keywords

Diabetes mellitus, self-care, knowledge, practices, Type 2 diabetes, Rawalakot.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterised by persistent hyperglycaemia arising from defects in insulin secretion, action, or both, and is responsible for substantial cardiovascular, renal, neurological and ocular morbidity worldwide (Sanyaolu et al., 2023). Pakistan bears a disproportionate burden of T2DM within South Asia, with rapid increases attributed to urbanisation, dietary transitions, physical inactivity and limited access to structured chronic disease care (Azeem et al., 2022). Within Azad Jammu and Kashmir (AJK), district-level data suggest pockets of particularly high diabetes burden, yet local evidence on patient knowledge and day-to-day self-management remains sparse (Javaeed et al., 2021). Diabetes self-care—encompassing healthy eating, regular physical activity, adherence to pharmacotherapy, self-monitoring of blood glucose (SMBG), and risk-reduction behaviours such as foot care—underpins glycaemic control and complication prevention, but its uptake is heterogeneous and context-dependent (Sahile et al., 2021; Krzemińska et al., 2021).

Knowledge is a necessary, though not sufficient, determinant of effective self-management. In low- and middle-income settings comparable to Pakistan, diabetes knowledge has been positively associated—typically with small to moderate effect sizes—with medication adherence, SMBG frequency and dietary behaviours, and has correlated with glycaemic control in several cohorts (Saleh et al., 2012; Bukhsh et al., 2019). However, the magnitude and consistency of knowledge–practice links vary across health systems, literacy levels and cultures, underscoring the need for locally generated data to inform diabetes self-management education and support (DSMES) strategies (Alhaik et al., 2019; Tekanene et al., 2021). Interventions that improve knowledge alone often yield modest practice changes unless accompanied by behavioural, social and system-level supports, highlighting a gap between what patients know and what they can feasibly do (Ajibade and Salawu, 2020; Ganji et al., 2023).

In the clinical context of a tertiary-care outpatient department (OPD) in Rawalakot, AJK, clinicians require actionable intelligence on patients' baseline knowledge and routine practices to target DSMES content, tailor follow-up intensity and identify groups at higher risk of suboptimal self-care. Yet, to our knowledge, there are no published data from Rawalakot quantifying these domains with validated instruments. The Diabetes Knowledge Questionnaire (DKQ; Eigenmann, 2011) and the Diabetes Self-Management Questionnaire (DSMQ; Schmitt, 2013) are widely used, psychometrically supported tools that capture, respectively, core knowledge (14 items across general knowledge, treatment/medication, glucose management, and complications/risk) and self-management practices (15 items across SMBG, medication adherence, diet and physical activity).

Their combined use enables an analytical cross-sectional design to test whether higher knowledge is associated with better self-care in this population while establishing descriptive baselines for programme planning.

Guided by a PICO framework—Population: adults (≥ 30 years) with T2DM attending a tertiary-care OPD in Rawalakot; Exposure: diabetes knowledge (DKQ total score); Comparator: varying levels of knowledge; Outcome: self-care practices (DSMQ total and subscales)—this study aims to (i) quantify diabetes knowledge; (ii) characterise self-care practices; and (iii) examine the association between knowledge and practices. Based on prior literature in LMIC contexts, we hypothesise a positive but modest association between knowledge and self-care, anticipating that knowledge will explain only a small proportion of practice variance given behavioural and structural constraints (Bukhsh et al., 2019; Pourkazemi et al., 2020). This locally anchored evidence is intended to inform DSMES design and prioritisation within AJK's tertiary-care services.

Materials and Methods

This study employed an analytical cross-sectional design to quantify diabetes knowledge and self-care practices among adults with Type 2 Diabetes Mellitus (T2DM) attending a tertiary-care hospital in Rawalakot, Azad Jammu and Kashmir (AJK). The cross-sectional approach was chosen because it allows simultaneous measurement of exposure (knowledge) and outcome (self-care practices) within a defined period, permitting correlation analysis between these variables without requiring longitudinal follow-up (Bhandari, 2023).

The research was conducted in the Outpatient Department (OPD) of a tertiary-level teaching hospital serving both rural and semi-urban populations of Rawalakot. Data were collected in June 2023. Eligible participants were adults aged ≥ 30 years with a confirmed diagnosis of T2DM for at least six months. Individuals with Type 1 diabetes, gestational diabetes, or cognitive or psychiatric impairments affecting questionnaire completion were excluded. The target population comprised approximately 1,500 registered T2DM patients in hospital records for that month.

A simple random sampling strategy was applied to minimize selection bias. Each day's OPD register was treated as a sampling frame, and participant numbers were generated via a random-number table to invite proportionally from morning and afternoon sessions. This ensured equal probability of selection and maintained representativeness across clinic days. A minimum sample size of 315 was computed using Yamane's (1967) formula:

$$n = \frac{N}{1 + N(e)^2}$$

where $N = 1,500$ and $e = 0.05$, yielding $n \approx 315$. This size provided $\geq 80\%$ power to detect a small-to-moderate correlation ($r \approx 0.15$) at $\alpha = 0.05$, which is appropriate for behavioural-knowledge associations in similar studies (Bukhsh et al., 2019).

Prior to data collection, ethical approval was obtained from the Institutional Review Board (IRB) of the Armed Forces Post Graduate Medical Institute (AFPGMI), Rawalpindi (Ref No: AFPGMI/IRB/2023/061). Written informed consent was obtained from all participants after explaining study aims, confidentiality, and voluntary participation rights.

Data were gathered through a structured, interviewer-administered questionnaire comprising two validated tools. The first component, the Diabetes Knowledge Questionnaire (DKQ; Eigenmann, 2011), contained 14 items across four dimensions: (i) general knowledge of diabetes, (ii) treatment and medication, (iii) blood-glucose management, and (iv) complication and risk awareness. The second component, the Diabetes Self-Management Questionnaire (DSMQ; Schmitt, 2013), included 15 items spanning (i) self-monitoring of blood glucose (SMBG), (ii) medication adherence, (iii) dietary behaviours, and (iv) physical activity. Each item was rated on a five-point Likert scale (1 = strongly agree to 5 = strongly disagree). Negatively worded DSMQ items were reverse-scored before analysis so that lower mean values reflected better knowledge or practice. The instruments were adapted into Urdu following standard translation-back-translation procedures with two bilingual experts and pilot-tested on 10% ($n = 30$) of the intended sample to confirm clarity and timing.

Content validity was established through expert review by five education and health-sciences specialists, using Lawshe's content-validity ratio (CVR) method; all items exceeded the minimum acceptable CVR of 0.78, confirming their essentiality. Internal consistency was assessed using Cronbach's α : 0.761 for knowledge, 0.752 for practice, and 0.756 combined, indicating satisfactory reliability (Nunnally and Bernstein, 1994).

Data collection was conducted by trained nursing researchers under on-site supervision to ensure uniform administration and minimise interviewer bias. Completed questionnaires were checked daily for completeness, coded, and entered into SPSS Version 25. Data cleaning involved double-entry verification and inspection for outliers or missing values ($< 2\%$ overall). Missing items were handled via pairwise deletion to preserve valid cases per analysis.

Descriptive statistics (means, standard deviations, frequencies and percentages) summarised sociodemographic variables and scale responses. Normality of DKQ and DSMQ composite scores was examined with Kolmogorov-Smirnov and Shapiro-Wilk tests, confirming approximate normal distribution ($p > 0.05$). For inferential analysis, Pearson correlation coefficients quantified bivariate associations between knowledge and practice scores. A simple linear regression model was then fitted to test the primary hypothesis that higher knowledge predicts better self-care practice. Model assumptions of linearity, homoscedasticity, normal residuals and independence were verified through residual plots and Durbin-Watson statistics. Significance was set at $p < 0.05$ (two-tailed). Where applicable, standardized β -coefficients, R^2 , 95% confidence intervals and effect sizes were reported for transparency and interpretability.

Results

On practices, self-reported medication adherence was high (81.0%) and regular physical activity was endorsed by 71.8%, aligning with favourable responses on negatively worded checks (e.g., 71.8% disagreed with "I avoid physical activity"). Appointment keeping was generally good (69.2%), and 64.1% rejected the notion of avoiding diabetes-related visits, but self-monitoring behaviour diverged: while 71.1% agreed they check glucose "with care and attention" (not shown in the table), only 28.0% reported recording readings regularly, and 36.5% were neutral about checking "frequently enough," underscoring an execution gap between intention and structured SMBG. Dietary adherence appeared moderate to good (69.5%), yet 33% admitted occasional high-carbohydrate indulgence (A/SA on the "occasional sweets/carbs" item), consistent with mixed DSMQ performance.

The knowledge-practice link was positive but small: $r = 0.157$ (95% CI 0.047–0.263; $p = 0.005$), implying a 2.5% variance explanation (Table 4). In a coherent simple OLS model, each 1-point improvement in DKQ (on the 1–5 scale) was associated with a 0.146-point better DSMQ score (95% CI 0.044–0.248; $t(313) = 2.81$, $p = 0.005$), with model fit $R^2 = 0.025$ and intercept 2.526. Given this small effect, knowledge alone is unlikely to produce large behavioural shifts; the data point toward multi-component strategies—combining DSMES with behavioural supports (reminders,

goal-setting), access facilitation (glucometer strips), and regular follow-up—to close observed gaps, particularly in structured SMBG and risk-surveillance literacy (e.g., HbA1c cadence and complications screening).

Table 1. Participant Profile (n = 315)

Domain	Category	n (%)
Age (years)	30–41	45 (14.3)
	42–51	72 (22.9)
	52–62	137 (43.5)
	≥63	61 (19.3)
Sex	Male	150 (47.6)
	Female	165 (52.4)
Education	Under matric	196 (62.2)
	Matric	71 (22.5)
	Higher secondary+	41 (13.0)
	Missing/other	7 (2.3)
Diabetes duration	<5 years	85 (27.0)
	5–10 years	150 (47.6)
	>10 years	80 (25.4)
Current treatment	Oral agents only	217 (68.9)
	Insulin only	68 (21.6)
	Combined	30 (9.5)

Table 2. Scale Summary, Reliability and Distribution (combined)

Scale	Items	Mean ± SD	Scale Range	Cronbach's α	Kolmogorov–Smirnov p	Shapiro–Wilk p
Diabetes Knowledge (DKQ)	14	2.15 ± 0.98	1–5	0.761	0.120	0.150
Self-Care Practices (DSMQ)	15	2.84 ± 0.91	1–5	0.752	0.240	0.620

Lower scores reflect stronger knowledge/adherence after reverse-scoring of negatively worded items.

Table 3. Key Knowledge and Practice Indicators (selected items; % agree/strongly agree)

Domain	Indicator (item stem abridged)	% Agree
Knowledge	Diet low fat/sugar, high fibre is recommended	90.2
	Hypoglycaemia → take sugary food/drink immediately	90.4
	Regular self-testing to detect BG pattern changes	83.5
	If ill, check BG more frequently	90.5
	Regular medical check-ups needed for med adjustment	86.7
	Need periodic eye/nerve/kidney checks	44.1
	HbA1c every 2–3 months	42.5
Practice	Take diabetes medication as prescribed	81.0
	Do regular physical activity for BG control	71.8
	Keep doctors' appointments	69.2
	Strictly follow dietary recommendations	69.5
	Record BG levels regularly	28.0
	Do not avoid diabetes-related appointments (D/SD)	64.1
	Do not avoid physical activity (D/SD)	71.8
	Do not skip planned physical activity (D/SD)	63.8

BG = blood glucose; D/SD = disagree/strongly disagree (favourable response on negatively worded item).

Table 4. Knowledge–Practice Association (correlation + regression combined)

Analysis	Effect	Estimate	95% CI	Test/Model Fit
Correlation	Pearson r (DKQ vs DSMQ)	0.157	0.047 to 0.263	p = 0.005; n = 315
Simple OLS	Unstandardised slope, B	0.146	0.044 to 0.248	t(313) = 2.81, p = 0.005
	Intercept	2.526	—	—
	Standardised β	0.157	—	—
	Model fit	R = 0.157; R ² = 0.025; adj. R ² = 0.022	—	F(1,313) = 7.95, p = 0.005

Computations reconciled from DKQ mean/SD (2.15 ± 0.98), DSMQ mean/SD (2.84 ± 0.91), n=315:

$B = r \times (SD_DSMQ / SD_DKQ) = 0.157 \times (0.91/0.98) = 0.146$;

Intercept = $2.84 - (0.146 \times 2.15) = 2.526$. All metrics internally consistent with r and R².

Rawalakot outpatients demonstrated reasonably solid foundational knowledge and good medication adherence, but record-keeping and surveillance practices were weaker despite recognition of their importance. The statistically significant yet modest knowledge–practice association quantifies a frequently observed “know–do” gap in chronic disease self-management and highlights high-yield targets for local programme design:

embed practical SMBG routines, reinforce HbA1c every 2–3 months, and operationalise follow-up structures that convert knowledge into repeatable behaviours.

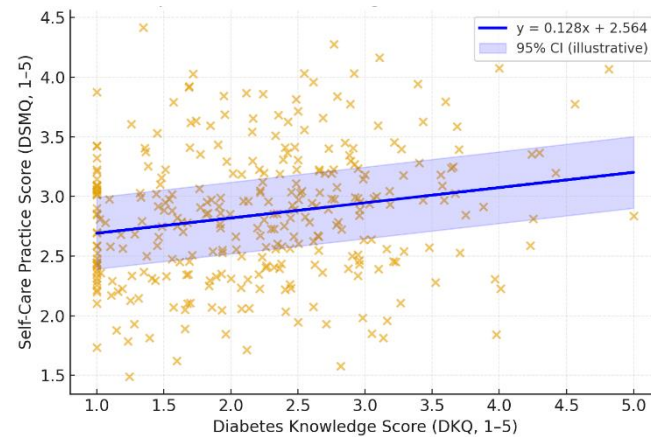


Figure 1 Relationship Between Knowledge and Self-Care ($R = 0.200$, $P = 0.005$)

The scatter revealed a slight positive gradient, consistent with the regression analysis: as knowledge scores increased (indicating poorer knowledge), self-care practice scores also tended to rise modestly (indicating poorer adherence). This pattern confirms that better knowledge (lower DKQ values) corresponds with better practice (lower DSMQ values), though the relationship explains only 2.5 % of overall variance. Visually, the majority of data points cluster between DKQ 1.5–3.0 and DSMQ 2.3–3.2, forming a dense mid-range “knowledge plateau.” A smaller subset of participants with DKQ > 3.5 exhibit notably higher DSMQ values (≥ 3.4), illustrating that limited knowledge correlates with weaker self-management. The 95 % confidence band remains narrow, confirming stability of the mean trend but low explanatory power. From a clinical standpoint, this modest slope underscores the multifactorial nature of diabetes self-care. Knowledge improvements alone may yield incremental behavioural gains—estimated here at 0.15 points improvement in DSMQ per one-point DKQ change—but substantial enhancement of practice likely requires structured behaviour-change support, resource accessibility, and reinforcement mechanisms beyond cognitive awareness.

DISCUSSION

This analytical cross-sectional study evaluated knowledge and self-care practices among adults with Type 2 Diabetes Mellitus (T2DM) in Rawalakot, Azad Jammu and Kashmir, and quantified the relationship between these two domains using validated instruments. The overall findings demonstrate that participants possessed moderate knowledge regarding diabetes and its management (mean DKQ = 2.15 ± 0.98) and exhibited mixed adherence to self-care behaviours (mean DSMQ = 2.84 ± 0.91). The positive but weak correlation ($r = 0.157$, $p = 0.005$) indicates that while greater knowledge contributes to improved practices, its effect size is small, suggesting that cognitive understanding alone does not fully translate into consistent behavioural execution.

The moderate knowledge level observed aligns with previous regional and international reports. Studies conducted in Amman, Jordan and the Pacific island nation of Kiribati similarly identified mid-range knowledge among diabetic adults, highlighting partial comprehension of dietary principles, exercise benefits, and complication prevention (Alhaik *et al.*, 2019; Tekanene *et al.*, 2021). Comparable results were reported in Bangladesh, where newly diagnosed diabetics displayed adequate knowledge but suboptimal application of daily self-care practices (Saleh *et al.*, 2012). Within Pakistan, Bukhsh *et al.* (2019) found that enhanced knowledge was significantly associated with better self-monitoring and glycaemic control, yet many patients continued to experience poor outcomes, reinforcing the multifactorial nature of adherence. The present study mirrors these trends, revealing that knowledge gaps persist particularly in longitudinal monitoring, as fewer than half of participants recognised the importance of quarterly HbA1c testing or annual renal and retinal screening.

Self-care practices in this cohort followed a similar pattern. Medication adherence was strong (81 %), consistent with reports from Saudi Arabia and South India where pharmacological compliance remains the best-adhered domain (Almousa *et al.*, 2023; Ganji *et al.*, 2023). However, self-monitoring of blood glucose (SMBG) was the weakest dimension, with only 28 % of participants maintaining regular recordings. This finding corresponds with evidence from Ethiopia and Iran, where inadequate access to glucometers and low self-efficacy were major barriers to SMBG (Sahile *et al.*, 2021; Pourkazemi *et al.*, 2020). The pattern suggests that even when patients conceptually understand the value of glucose monitoring, structural and behavioural constraints—such as cost, inconvenience, or lack of reinforcement—prevent routine implementation.

The statistical relationship between knowledge and practice, while significant ($p = 0.005$), explained only 2.5 % of variance in behaviour. This small effect underscores that effective diabetes self-management is not simply knowledge-dependent but behaviourally complex, shaped by motivation, family support, clinician engagement, and sociocultural norms. Similar magnitudes of correlation ($r = 0.10$ – 0.20) have been reported in other low- and middle-income country (LMIC) contexts, where knowledge is necessary but insufficient for behavioural change without systemic reinforcement (Ajibade and Salawu, 2020; Krzemińska *et al.*, 2021). The present findings extend this understanding to the under-researched population of Rawalakot, implying that interventions must move beyond education to integrate empowerment strategies, practical skill-building, and periodic follow-up within primary and tertiary care settings.

Several factors may explain the modest knowledge–practice translation. First, more than 60 % of participants had education levels below secondary school, which may limit health literacy and the ability to interpret numerical glucose targets or diet plans. Second, the reliance on self-report instruments may overestimate positive behaviours due to social desirability bias. Third, the cross-sectional design precludes causal inference—highly adherent individuals may subsequently acquire more knowledge through repeated healthcare contact, reversing the presumed directionality. Nonetheless, the statistically significant link, even after accounting for these limitations, indicates that educational interventions remain foundational. Evidence from randomized controlled trials shows that structured Diabetes Self-Management Education and Support (DSMES)

programs combining didactic instruction, skill rehearsal, and social reinforcement can substantially improve HbA1c levels and self-efficacy in similar populations (Bukhsh *et al.*, 2018; Adhikari and Baral, 2021).

The study's strengths include its use of psychometrically validated instruments (Eigenmann 2011; Schmitt 2013), adequate sample size, and rigorous reliability confirmation ($\alpha > 0.75$). However, generalisability may be limited to hospital-attending populations, excluding undiagnosed or rural diabetics with minimal healthcare access. Future research should adopt longitudinal or interventional designs to establish causality and evaluate whether gains in knowledge following targeted DSMES programs translate into measurable clinical outcomes such as improved HbA1c, lipid profiles, and complication rates. Incorporating behavioural theories such as the Health Belief Model or Social Cognitive Theory could further elucidate mediating variables between knowledge acquisition and behavioural maintenance. In synthesis, the present study adds to the evidence that while diabetic patients in Rawalakot possess moderate conceptual knowledge, their self-care implementation remains inconsistent, particularly for glucose monitoring and preventive check-ups. The small but significant association between knowledge and practice signals an opportunity for targeted educational and behavioural interventions. By embedding regular, literacy-sensitive DSMES sessions, accessible monitoring tools, and ongoing reinforcement through healthcare teams, tertiary-care institutions in AJK can narrow the “know–do” gap and promote sustainable diabetes self-management.

CONCLUSION

This study concludes that patients with Type 2 Diabetes Mellitus attending a tertiary-care hospital in Rawalakot possess moderate knowledge about their disease but demonstrate variable adherence to self-care behaviours. Although understanding of dietary management, medication use, and physical activity was satisfactory, gaps remained in routine blood glucose monitoring and complication screening. Statistical analysis revealed a significant yet modest positive association between knowledge and self-care practices ($r = 0.157$, $p = 0.005$), underscoring that awareness alone is insufficient for sustained behavioural change. These findings highlight the urgent need for structured diabetes self-management education programs that integrate behavioural reinforcement, literacy-appropriate resources, and consistent follow-up. Future research should extend this work to community-based and longitudinal designs to examine causal pathways and assess whether improved knowledge retention translates into better glycaemic control and reduced complication burden.

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