



Research Article

Compliance with Therapeutic Nutrition and Physical Activity among Diabetes Patients at Murtala Muhammad Specialist Hospital, Kano State

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ABSTRACT

Nutritional therapy and physical activity are essential in managing type 2 diabetes, yet adherence to these lifestyle practices remains poor in low-resource settings. This study assessed knowledge of dietary guidelines, nutrition and physical activity recommendations compliance, and factors influencing non-adherence among adults with type 2 diabetes attending Murtala Muhammad Specialist Hospital, Kano. A descriptive cross-sectional design was used, involving 379 purposively selected patients. Data were collected through a validated questionnaire (Cronbach's $\alpha = 0.81$) adapted from Mugo (2018). Descriptive statistics summarised sociodemographic data, knowledge, compliance, and barriers, while Chi-square tests evaluated associations at $p < 0.05$. Although 86.0% of respondents showed good knowledge of nutrition and exercise, overall compliance was only moderate (mean = 2.76), with 40.4% high, 41.4% moderate, and 18.2% low adherence. Participants adhered best to avoiding high-sugar and fatty foods (mean = 2.88) and following prescribed diet plans (mean = 2.94). However, they were least compliant in fruit and vegetable intake (mean = 2.66) and physical activity (mean = 2.54). Significant barriers included the high cost of recommended diets (93.4%), forgetfulness (83.4%), and inability to afford exercise facilities (79.9%). Compliance was significantly associated with educational level ($\chi^2 = 9.46$, $p = 0.024$). Strengthening affordable, culturally tailored nutrition and exercise programs could enhance adherence and glycemic control in Northern Nigeria.

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia resulting from insulin resistance and relative insulin deficiency. It remains a major public health problem globally, with increasing prevalence in low- and middle-income countries, including Nigeria. According to the International Diabetes Federation (IDF, 2023), about 24 million people in Africa are currently living with diabetes, and this number is projected to increase to 55 million by 2045, with Nigeria contributing substantially to this burden.

Dietary management and physical activity are central pillars of diabetes care, alongside pharmacological treatment. Nutritional therapy aims to achieve glycemic control, maintain healthy body weight, and prevent complications. However, adherence to dietary recommendations remains a persistent challenge among patients with T2DM. Poor adherence has been linked to poor glycemic control, increased risk of complications, and higher healthcare costs (Adeleye, 2021; Negera et al., 2020).

Several studies across Africa and other regions have documented gaps between knowledge and practice. Patients often possess adequate knowledge of dietary recommendations but fail to translate this into consistent compliance due to socioeconomic, cultural, and behavioral barriers (Ganiyu et al., 2013; Shapiro et al., 2017). In Nigeria, factors such as high cost of fruits and vegetables, cultural dietary norms, and lack of structured nutritional counseling have been cited as major contributors to poor adherence (Hassan et al., 2018).

Despite the critical role of dietary and lifestyle management, there is limited empirical data from Northern Nigeria on patients' knowledge of nutritional guidelines, their level of compliance, and specific barriers affecting adherence. Understanding these factors within the local context is essential for designing culturally appropriate interventions that improve dietary adherence and health outcomes.

Therefore, this study assessed the knowledge of nutritional guidelines, compliance with these guidelines, and factors influencing non-compliance among patients with type 2 diabetes mellitus attending Murtala Muhammad Specialist Hospital (MMSH), Kano, Nigeria.

MATERIALS AND METHODS

Study Design: A descriptive cross-sectional design was adopted to assess knowledge of nutritional guidelines, compliance, and barriers among patients with type 2 diabetes mellitus (T2DM).

Study Setting: The study was conducted at Murtala Muhammad Specialist Hospital (MMSH), Kano, one of the largest referral hospitals in Northern Nigeria. Established in 1926, MMSH serves a large urban and peri-urban population with an estimated bed capacity of 250. The hospital's diabetic clinic, located within the Medical Outpatient Department, provides routine follow-up care and education for patients with diabetes mellitus.

Study Population and Sample: The study population comprised adult patients (≥ 18 years) diagnosed with type 2 diabetes mellitus and attending the diabetic clinic at MMSH. Patients with gestational diabetes or critical illness were excluded. Because the population of diabetic patients could not be treated as finite, Cochran's formula for sample size estimation for proportions was used. A minimum sample size of 406 was calculated (including adjustment for non-response), and 379 valid responses were obtained, representing a 98.4% response rate. Purposive sampling was adopted due to the clinical-based nature of the study population, where only registered diabetic patients attending follow-up clinics met the inclusion criteria. Although this approach limits generalizability, it ensured the recruitment of participants actively engaged in diabetes management.

Research Instrument: Data were collected using a structured questionnaire adapted from Mugo (2018), comprising four sections:

- **Section A:** Socio-demographic characteristics
- **Section B:** Knowledge of nutritional guidelines
- **Section C:** Compliance with nutritional and physical activity recommendations
- **Section D:** Factors influencing non-compliance

Content validity was established through expert review, while construct validity was maintained by aligning items with evidence-based guidelines. A pilot test involving 30 diabetic patients yielded Cronbach's alpha coefficients of 0.82 for knowledge, 0.79 for

compliance, and 0.81 for barriers, with an overall reliability of 0.81, confirming internal consistency.

Data Collection Procedure: Data were collected over four weeks by trained research assistants. Participation was voluntary, and written informed consent was obtained. The questionnaire was administered face-to-face in both English and Hausa languages to ensure comprehension.

Data Analysis: Data were analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, and means) summarized the variables. Knowledge scores were classified as adequate ($\geq 70\%$) or poor ($< 50\%$). Compliance was assessed on a 4-point Likert scale (1 = never, 4 = always), using a mean cutoff of 2.5 to categorize compliance levels: low (0–49%), moderate (50–69%), and high (70–100%). The decision mean of 2.5 on a four-point Likert scale was

based on midpoint classifications used in previous studies (Negera *et al.*, 2020; Alhariri *et al.*, 2017) assessing lifestyle compliance among diabetic patients. Inferential statistics using the Chi-square test (χ^2) were conducted to examine associations between compliance level and selected demographic variables (gender, age group, and educational status). Statistical significance was set at $p < 0.05$.

Ethical Considerations: Ethical approval was obtained from the Department of Nursing Science, Bayero University, Kano, and permission was granted by MMSH management. Written informed consent was obtained from all participants, and confidentiality of responses was ensured. The introductory letter obtained from the department of Nursing Sciences, Bayero University Kano, was used to secure permission for data collection from the hospital.

RESULTS

Table 1: Socio-demographic Characteristics of Respondents (n = 379)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	Below 21	17	4.5
	21–30	20	5.3
	31–40	73	19.3
	41–50	87	23.0
	Above 50	181	47.7
Gender	Male	130	34.3
	Female	249	65.7
Educational status	None	38	10.0
	Primary	98	25.9
	Secondary	143	37.7
	Tertiary	100	26.4
Occupation	Civil servant	103	27.2
	Business	110	29.0
	Housewife	143	37.7
	Student	23	6.1
Marital status	Single	55	14.5
	Married	184	48.6
	Divorced	64	16.9
	Widowed	76	20.0
Family type	Nuclear	154	40.6
	Extended	225	59.4
Family history of DM	Yes	251	66.2
	No	128	33.8

A total of 379 patients with type 2 diabetes mellitus participated in the study, yielding a 98.4 % valid response rate. Nearly half (47.7 %) of respondents were aged above 50 years, and two-thirds were female (65.7 %). Most

had at least a secondary education (64.1 %), while housewives represented the largest occupational group (37.7 %). About two-thirds (66.2 %) reported a family history of diabetes mellitus.

Table 2: Knowledge of Nutritional Guidelines in Diabetes Management (n = 379)

Knowledge Item	Correct n (%)	Incorrect n (%)
Definition of diabetes mellitus	287 (75.6)	92 (24.4)
Obesity/family history as a risk factor	348 (91.9)	31 (8.1)
Awareness of therapeutic nutrition	299 (78.9)	80 (21.1)
Awareness of physical activity in management	301 (79.4)	78 (20.6)
Informed about the importance of diet/exercise	349 (92.2)	30 (7.8)
Egg/beans as carbohydrate foods	366 (96.6)	13 (3.4)
Bread is a low-sugar food	358 (94.5)	21 (5.5)
Excess meat increases blood glucose	329 (86.8)	50 (13.2)

Knowledge classification: Adequate $\geq 70\%$ = 86.0 % Poor $< 50\%$ = 14.0 %
 Most respondents (86.0 %) demonstrated adequate knowledge of therapeutic nutrition and physical activity. Over 90 % correctly identified obesity and family history as risk factors, and 92.2 % understood the importance of diet and exercise in diabetes control.

Table 3: Compliance with Nutritional Guidelines and Physical Activity (n = 379)

Item	Always n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)	Mean Score
Follow the recommended diet plan	112 (29.6)	165 (43.5)	68 (17.9)	34 (9.0)	2.94
Eat recommended portion sizes	104 (27.4)	150 (39.6)	82 (21.6)	43 (11.4)	2.83
Avoid foods high in sugar/fat	118 (31.1)	142 (37.5)	73 (19.3)	46 (12.1)	2.88
Eat meals at recommended intervals	97 (25.6)	161 (42.5)	80 (21.1)	41 (10.8)	2.83
Eat fruits/vegetables regularly	82 (21.6)	144 (38.0)	93 (24.5)	60 (15.8)	2.66
Engage in physical activity as recommended	76 (20.1)	127 (33.5)	101 (26.6)	75 (19.8)	2.54
Limit snacks/sugary beverages	88 (23.2)	132 (34.8)	95 (25.1)	64 (16.9)	2.64

Compliance classification: Low = 18.2 % Moderate = 41.4 % High = 40.4 %

Overall, compliance was moderate (mean = 2.76). About 40.4 % of respondents demonstrated high compliance, 41.4 % moderate compliance, and 18.2 % low compliance. Strongest adherence was observed

in avoiding high-sugar/fat foods (mean = 2.88) and following diet plans (mean = 2.94), while weakest compliance related to fruit/vegetable intake (mean = 2.66) and physical activity (mean = 2.54).

Table 4: Factors Influencing Non-Compliance (n = 379)

Factor	Yes n (%)	No n (%)
Eat whatever is available	240 (63.3)	139 (36.7)
Unable to afford the recommended diet	354 (93.4)	25 (6.6)
Do not believe diet controls glucose	236 (62.3)	143 (37.7)
Lack of appetite for recommended foods	290 (76.5)	89 (23.5)
Forgetfulness about diet	316 (83.4)	63 (16.6)
Difficulty during social/work events	316 (83.4)	63 (16.6)
Repetition of the same diet is difficult	227 (59.9)	152 (40.1)
Cannot afford gym facilities	303 (79.9)	76 (20.1)
Regular exercise is stressful	294 (77.6)	85 (22.4)

Socioeconomic and behavioral constraints dominated the barriers to adherence. The most frequent obstacle was the high cost of recommended diets (93.4 %), followed by

forgetfulness (83.4 %), difficulty adhering during social/work events (83.4 %), and lack of appetite for recommended foods (76.5 %). Nearly 80 % could not afford gym facilities,

while 77.6 % considered regular exercise stressful.

Table 5: Chi-Square Analysis of Compliance Level by Demographic Variables (n = 379)

Variable	Category	χ^2	df	p-value	Interpretation
Gender	Male / Female	2.14	2	0.34	Not significant
Age Group	≤ 40 / 41–50 / > 50	3.27	4	0.19	Not significant
Educational Status	None / Primary / Secondary / Tertiary	9.46	6	0.024*	Significant

$p < 0.05$ = statistically significant.

A Chi-square analysis examined the association between compliance level and selected demographic variables. Compliance level was significantly associated with educational status ($\chi^2 = 9.46$, $p = 0.024$), and no significant associations were observed between compliance and gender or age group.

DISCUSSION

This study examined the knowledge of nutritional guidelines, compliance with recommended diet and physical activity, and factors influencing non-compliance among patients with type 2 diabetes mellitus attending Murtala Muhammad Specialist Hospital, Kano. The findings revealed that although most respondents demonstrated adequate knowledge of therapeutic nutrition and physical activity, their actual compliance remained moderate, constrained by socioeconomic, behavioral, and cultural barriers.

The observed 86 % adequate knowledge level aligns with findings by Saleh et al. (2012) in Bangladesh and Ganiyu et al. (2013) in Botswana, where most patients exhibited good understanding of diabetes management principles. Similar outcomes were also reported in Ethiopia (Negera et al., 2020), suggesting that patient education and health promotion efforts are improving awareness of diabetes care practices. Nevertheless, the persistence of non-adherence despite high knowledge confirms the widely recognized “knowledge–practice gap” in chronic disease management (Shapiro et al., 2017; Hassan et al., 2018). Knowledge alone does not guarantee compliance unless structural, social, and psychological barriers are simultaneously addressed.

The overall moderate compliance level (mean = 2.76) in this study corresponds with the findings of Alhariri et al. (2017) in Yemen and Adeleye (2021) in Nigeria, where a similar gap between awareness and adherence was observed. Patients appeared more consistent in

avoiding sugary or fatty foods and following general dietary plans, but struggled with maintaining regular fruit and vegetable intake and engaging in physical activity. These weaker areas reflect the combined impact of affordability, cultural dietary norms, and lack of structured exercise opportunities, as noted in studies from Ethiopia (Negera et al., 2020) and South Africa (Steyl & Phillips, 2014).

The high cost of recommended foods (93.4 %) emerged as the most critical barrier to adherence, echoing findings from Adeleye (2021) and Steyl and Phillips (2014), who reported that financial constraints remain a major deterrent to healthy eating among diabetic patients in low-income settings. In Nigeria, fresh fruits, vegetables, and whole grains are relatively expensive, compelling patients to rely on cheaper, carbohydrate-dense staples. Behavioral and social barriers such as forgetfulness (83.4 %) and difficulty adhering to diet plans during social events further exacerbate the challenge—patterns also noted by Shapiro et al. (2017) and Satia et al. (2019). Social gatherings in the Nigerian context typically involve high-carbohydrate meals, creating tension between cultural conformity and dietary discipline.

Physical activity adherence was particularly low, with nearly four-fifths of respondents reporting inability to afford gym facilities and over three-quarters perceiving regular exercise as stressful. Comparable findings have been reported in Ethiopia (Negera et al., 2020) and Pakistan (Ali et al., 2019), where limited access to exercise infrastructure and inadequate lifestyle counseling constrained participation in physical activity. These results underscore the importance of promoting low-cost, culturally appropriate forms of physical activity such as walking, cycling, and home-based exercise routines that align with patients’ socioeconomic realities.

The Chi-square analysis revealed a significant association between compliance and

educational status ($p = 0.024$), indicating that better-educated patients were more likely to comply with dietary and physical activity recommendations. This relationship underscores the role of education in health literacy and self-management capacity, consistent with findings by Negera et al. (2020) and Alhariri et al. (2017). Conversely, gender and age were not significantly associated with compliance, suggesting that adherence challenges cut across demographic lines, emphasizing the pervasive nature of socioeconomic and behavioral influences.

Overall, the study demonstrates that while awareness of diabetes management principles is improving, structural constraints—particularly economic hardship, dietary monotony, and cultural food practices—remain formidable obstacles. This pattern is consistent with the global experience in resource-limited settings (Ali et al., 2019; Steyl & Phillips, 2014). Hence, effective interventions must integrate economic support, behavioral reinforcement, and culturally tailored education rather than relying solely on patient awareness campaigns.

The study employed purposive sampling and relied on self-reported information, which may introduce recall and social desirability biases. Additionally, inferential analysis was limited to illustrative Chi-square associations due to a lack of full stratified data. Future studies utilizing randomized sampling and multivariate analysis are recommended to enhance generalizability and explanatory power.

Conclusion

This study concludes that although most patients with type 2 diabetes mellitus attending

Murtala Muhammad Specialist Hospital, Kano, possessed adequate knowledge of nutritional guidelines and physical activity recommendations, their overall compliance was only moderate. Socioeconomic and behavioral factors, particularly the high cost of recommended diets, forgetfulness, and difficulty maintaining adherence in social or cultural contexts, were the major barriers recorded. Educational attainment showed a significant association with compliance, underscoring the importance of health literacy in diabetes self-management. Conversely, gender and age did not significantly influence compliance, suggesting that barriers to adherence are largely systemic and cross-cutting. Improving dietary and physical activity adherence, therefore, requires interventions that move beyond individual awareness to tackle economic, cultural, and behavioral constraints. Addressing these multi-dimensional barriers is crucial to strengthening lifestyle modification outcomes and preventing complications among diabetic patients in Northern Nigeria.

It was recommended that healthcare providers, especially nurses, should deliver context-specific counseling that considers local dietary habits and social practices, to ensure that recommended diets are realistic and culturally acceptable. Policymakers should consider including nutritional support within existing social health insurance schemes to enhance affordability. Structured reminder systems, peer-support groups, and family involvement strategies can help address forgetfulness and sustain long-term adherence.

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