

## Original Research Article

# Perceived dietary adherence and its barriers to dietary recommendations among type 2 diabetes mellitus patients in Mysuru city: a cross-sectional study

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**Received:** 18 May 2026

**Revised:** 20 June 2026

**Accepted:** 2 June 2026

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## ABSTRACT

**Background:** Type 2 diabetes mellitus (T2DM) is a major public health challenge requiring long-term lifestyle modifications. Dietary adherence is essential for effective disease management, yet many patients struggle to follow recommended dietary practices due to sociocultural, behavioral and economic barriers, especially in low- and middle-income countries. To assess perceived dietary adherence to dietary recommendations among T2DM patients in Mysuru City, identify barriers to adherence and factors associated with it.

**Methods:** A community-based cross-sectional study was conducted from April to October 2025 among 300 T2DM patients aged  $\geq 18$  years, diagnosed for more than 6 months and attending primary health centers in Mysuru. Simple random sampling was employed. Data were collected using a semi-structured questionnaire and the validated Perceived Dietary Adherence Questionnaire (PDAQ). Statistical analysis was performed using SPSS, with  $p < 0.05$  considered significant.

**Results:** The mean age was  $54 \pm 9.37$  years; 55.1% were male, 91.3% Hindu and 86% from nuclear families. Dietary adherence was poor in 27.8%, moderate in 54.2% and good in 18%. Common barriers influencing adherence included difficulty following dietary recommendations during social or work-related events, lack of dietary education, financial constraints, stress and low motivation. Significant associations were observed between dietary adherence and age, educational status, duration of diabetes, BMI, smoking and alcohol consumption.

**Conclusions:** Dietary adherence among patients with T2DM remains suboptimal and is strongly influenced by sociocultural and behavioral factors. Comprehensive, culturally appropriate and patient-centered dietary counseling along with behavioral and family support strategies are essential to improve adherence and diabetes-related outcomes.

**Keywords:** Barriers, Dietary adherence, PDAQ, Type 2 diabetes mellitus

## INTRODUCTION

Type II Diabetes Mellitus (T2DM) is a progressive metabolic disorder characterized by insulin resistance and impaired insulin secretion, leading to chronic hyperglycemia.<sup>1</sup> Globally, diabetes remains one of the most prevalent non-communicable diseases, with approximately 589 million adults aged 20–79 years living with diabetes in 2024, representing nearly 1 in 9 adults

worldwide. This number is projected to rise to around 853 million by 2050, with the greatest increase expected in low- and middle-income countries.<sup>2</sup> India bears a substantial share of this burden, with approximately 77 million cases, ranking second only to China.<sup>3</sup> The management of T2DM relies on a multifaceted approach, with dietary regulation forming a cornerstone of care alongside pharmacotherapy and physical activity.<sup>4</sup> Medical nutrition therapy has been shown to improve

glycaemic control, reduce cardiovascular risk and delay the onset of complications.<sup>5</sup> Despite widespread awareness of dietary recommendations, adherence remains suboptimal, particularly in low- and middle-income countries (LMICs).<sup>6</sup>

Multiple factors influence dietary adherence among T2DM patients. Socio-economic constraints limit access to healthy, diabetes-friendly foods, while cultural dietary patterns and traditional food preferences may conflict with medical recommendations.<sup>7</sup> Psychosocial challenges such as lack of motivation, stress and limited family support further hinder adherence.<sup>8</sup> Additionally, social events and festivals integral to Indian culture often present high-calorie, carbohydrate-rich foods, making it difficult for patients to maintain recommended diets.<sup>9</sup>

Studies have shown wide variation in adherence rates across different regions. Research conducted in Ethiopia found only 37.5% of T2DM patients adhered well to dietary recommendations, while an Iranian study reported a good adherence rate of 33.2%.<sup>10,11</sup> In India, estimates vary between 30-60%, with barriers including inadequate knowledge, cost, taste preferences and poor social support.<sup>12</sup> These findings highlight that the challenge is not limited to resource-constrained settings but is a global concern.

Self-reported tools such as the Perceived Dietary Adherence Questionnaire (PDAQ) have proven useful for quantifying dietary adherence in both clinical and community settings.<sup>13</sup> This tool captures dietary behaviors over the past week and categorizes adherence into poor, moderate and good, providing a practical measure for both research and intervention planning.

Understanding the level of dietary adherence and the underlying barriers is essential for designing targeted interventions. In India, where dietary patterns are deeply rooted in tradition and influenced by socio-cultural norms, interventions must be culturally sensitive and feasible within the socio-economic realities of patients.<sup>14</sup> Moreover, engaging families, communities and health educators is critical for ensuring sustainable dietary changes.<sup>15</sup>

## **Objectives**

### *Primary objective*

To assess the level of perceived dietary adherence to dietary recommendations among patients with type 2 diabetes mellitus in Mysuru City.

### *Secondary objectives*

To identify barriers to adherence among the study participants. To assess the socio-demographic and lifestyle factors associated with dietary adherence.

## **METHODS**

A community-based cross-sectional study was conducted among patients with T2DM attending regular outpatient services at selected primary health centers in Mysuru City. The study was carried out over a period of six months from April to October 2025. The study population included adults aged 18 years and above who had been diagnosed with T2DM for more than six months and were currently on treatment. Patients with type 1 diabetes mellitus, those who did not provide consent or expressed inconvenience in participating and individuals who were seriously ill or had cognitive impairment were excluded from the study, as they would not be able to provide reliable information during data collection. The sample size was calculated to be 300 participants based on the findings of Halali et al which reported a dietary adherence prevalence of 33.2% among patients with T2DM, considering a 95% confidence level and an absolute precision of 6 units. A simple random sampling technique was employed for participant recruitment. A sampling frame consisting of all eligible T2DM patients attending the outpatient departments of the selected primary health centers during the study period was prepared using OPD registers. Each eligible participant was assigned a unique identification number and study participants were selected using computer-generated random numbers until the required sample size was achieved. This ensured that every eligible individual had an equal probability of being included in the study.

Data collection was carried out using a pre-validated semi-structured questionnaire administered through face-to-face interviews. The questionnaire consisted of two sections. The first section collected information regarding sociodemographic and lifestyle characteristics, including age, gender, religion, marital status, educational status, socioeconomic status, family type, body mass index (BMI), fasting blood sugar (FBS) and postprandial blood sugar (PPBS) levels. The second section assessed dietary adherence using the validated self-reported Perceived Dietary Adherence Questionnaire (PDAQ) for diabetes mellitus patients. The PDAQ consists of nine items assessing dietary behaviors practiced over the previous seven days, including intake of fruits and vegetables, consumption of foods high in sugar and fat, meal regularity and adherence to recommended dietary practices. The total score ranged from 0 to 63, with higher scores indicating better adherence to dietary recommendations. Based on the obtained scores, participants were categorized as having poor adherence (0-20), moderate adherence (21-41) or good adherence (42-63).<sup>13</sup>

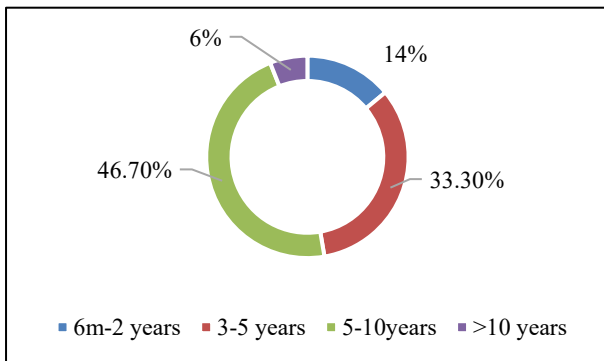
The collected data were entered into Microsoft Excel 2019 and analyzed using the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to summarize the data. Appropriate inferential statistical tests were applied to determine the

association between dietary adherence and sociodemographic and lifestyle variables. A p value of less than 0.05 was considered statistically significant.

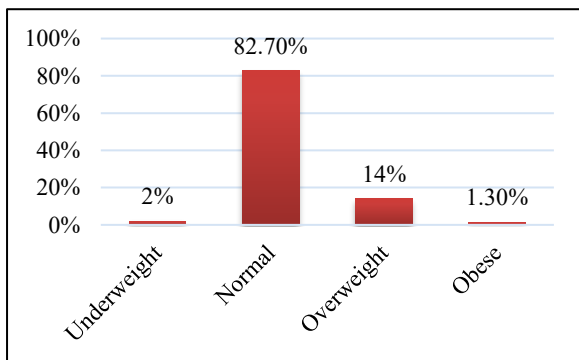
**RESULTS**

A total of 300 patients with type 2 diabetes mellitus participated in the study. The majority of the participants belonged to the age group of 51–70 years, with a mean age of 54±9.37 years. Males constituted 55.1% of the study population. Most participants were Hindus (91.3%), belonged to nuclear families (86%) and were from the upper middle socioeconomic class (41%). A majority of the participants were married (67.7%) and 38% had completed middle school education.

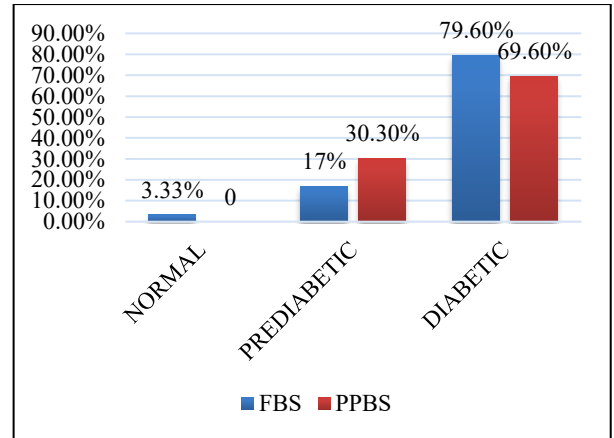
The duration of diabetes mellitus among the study participants is presented in figure 1. Nearly half of the participants (46.7%) had diabetes for 5–10 years, followed by 33.3% with a duration of 3–5 years. Participants with a duration of less than 2 years accounted for 14%, whereas only 6% had diabetes for more than 10 years. The mean body mass index (BMI) of the study participants was 25.5±3.33 kg/m<sup>2</sup>. The BMI distribution of the study population is depicted in figure 2. Most participants had normal BMI according to the Asia-Pacific classification criteria (82.7%), while 14% were overweight. A small proportion of participants were underweight (2%) and obese (1.3%).



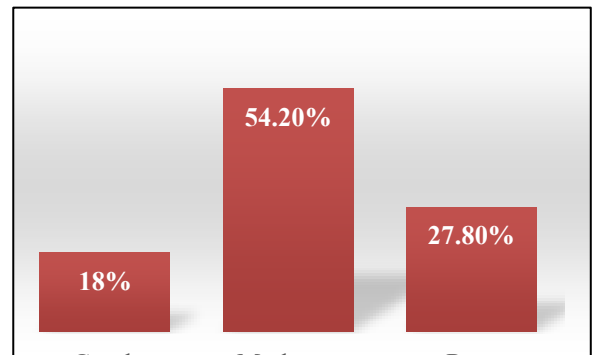
**Figure 1: Duration of diabetes mellitus among the participants (n=300).**



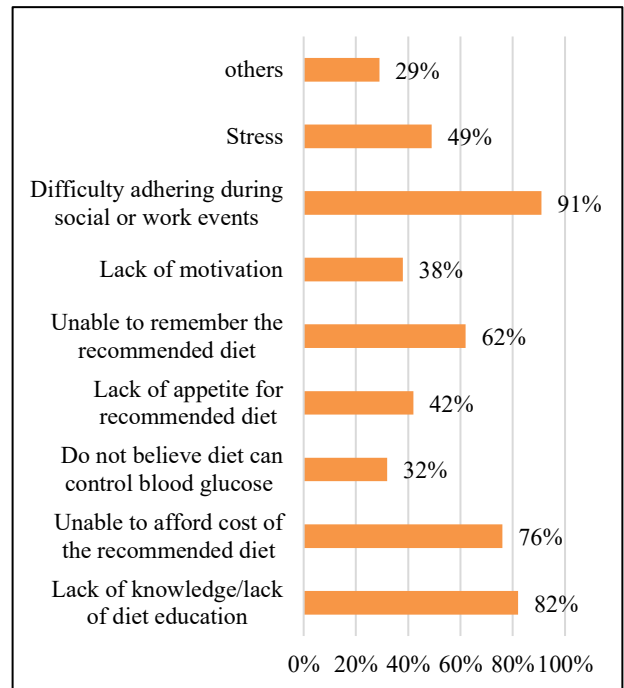
**Figure 2: Body mass index distribution of study population (n=300).**



**Figure 3: FBS and PPBS (WHO) patterns among the study participants (n=300).**



**Figure 4: Level of dietary adherence among T2DM patients (n=300).**



**Figure 5: Barriers influencing adherence to recommended dietary practices among the study participants (n=300).**

The mean fasting blood sugar (FBS) level was 146.57±20.63 mg/dl, while the mean postprandial blood sugar (PPBS) level was 222.3±27.54 mg/dl. Figure 3 illustrates the fasting and postprandial blood glucose patterns among the study participants according to WHO classification. Based on FBS values, 79.6% of the participants were diabetic, 17% were prediabetic and 3.3% had normal blood sugar levels. According to PPBS values, 69.6% were diabetic and 30.3% were prediabetic, while none had normal PPBS levels.

The level of dietary adherence among the participants is shown in Figure 4. More than half of the participants (54.2%) demonstrated moderate dietary adherence, whereas 27.8% had poor adherence. Only 18% of the participants exhibited good adherence to dietary recommendations. The barriers influencing adherence to recommended dietary practices are presented in figure 5. Difficulty adhering to dietary recommendations during social or work events was the most commonly reported barrier (91%), followed by lack of knowledge or dietary

education (82%) and inability to afford the cost of the recommended diet (76%). Other reported barriers included inability to remember the recommended diet (62%), stress (49%), lack of appetite for the recommended diet (42%), lack of motivation (38%), disbelief that diet can control blood glucose levels (32%) and other miscellaneous factors (29%).

The association between sociodemographic and lifestyle variables and dietary adherence is shown in Table 1. A statistically significant association was observed between dietary adherence and age, gender, educational status, duration of diabetes mellitus, BMI, smoking status and alcohol consumption (p<0.05). Moderate adherence was found to be predominant across all age groups and categories. Participants with a shorter duration of diabetes mellitus (<5 years) demonstrated relatively better adherence compared to those with longer duration of illness. Similarly, participants with normal BMI, absence of smoking habits and no alcohol consumption showed comparatively better adherence levels.

**Table 1: Association between sociodemographic , lifestyle factors and perceived dietary adherence among the study participants (n=300).**

Variable	Category	Dietary adherence			Chi-square/Fisher's Exact value	P value
		Good N (%)	Moderate N (%)	Poor N (%)		
Age (in years)	18–30	5 (5.2%)	80 (83.3%)	11 (11.5%)	162.581	0.003
	31–50	3 (2.3%)	90 (90.0%)	7 (7.7%)		
	51–70	2 (1.8%)	100 (89.3%)	10 (8.9%)		
	>70	0 (0%)	20 (95.2%)	1 (4.8%)		
Gender	Male	2 (2.5%)	160 (90.9%)	5 (6.6%)	302.150	0.000
	Female	3 (3.3%)	140 (92.1%)	4 (4.6%)		
Education	Middle school	1 (1.1%)	110 (95.6%)	4 (3.3%)	312.103	0.000
	High school	3 (4.8%)	80 (87.0%)	9 (8.2%)		
	Illiterate	1 (2.9%)	30 (88.2%)	3 (8.9%)		
Duration of DM	<5 years	1 (1.1%)	90 (94.7%)	4 (4.2%)	306.259	0.000
	5–10 years	2 (2.0%)	100 (90.1%)	9 (7.9%)		
	>10 years	2 (4.3%)	110 (86.0%)	16 (9.7%)		
BMI	Underweight	1 (2.9%)	30 (88.2%)	3 (8.9%)	304.303	0.000
	Normal	2 (1.9%)	230 (91.3%)	10 (6.8%)		
	Overweight	3 (4.5%)	70 (87.5%)	7 (8.0%)		
	Obese	0 (0%)	50 (89.3%)	6 (10.7%)		
Smoking	No	4 (2.5%)	220 (91.3%)	7 (6.2%)	157.911	0.000
	Yes	1 (2.8%)	40 (87.0%)	5 (10.2%)		
Alcohol	No	3 (1.9%)	230 (91.3%)	9 (6.8%)	202.428	0.000
	Yes	2 (5.0%)	60 (85.7%)	8 (9.3%)		

A p value <0.05 was considered statistically significant.

## DISCUSSION

The present study assessed perceived dietary adherence and its barriers among patients with T2DM attending primary health centers in Mysuru city. The findings revealed that the majority of participants demonstrated moderate dietary adherence, while only a small proportion achieved good adherence to recommended dietary practices. This suggests that although awareness regarding dietary recommendations may exist,

maintaining long-term adherence in everyday life remains challenging. Similar findings were reported by Selvam et al, in Tamil Nadu, where dietary non-adherence was common among T2DM patients attending an urban health center, observed that dietary modifications are often difficult to sustain because they require continuous behavioral changes and restrictions in routine eating habits.<sup>16</sup> The mean age of participants in the present study was 54±9.37 years, with the majority belonging to the 51–70 years age group. Similar age distributions have

been reported in studies conducted among diabetic populations in India and other developing countries.<sup>17</sup> Increasing age is known to be associated with reduced insulin sensitivity, sedentary lifestyle and prolonged exposure to metabolic risk factors, thereby increasing the prevalence of T2DM. Male predominance observed in the present study was also comparable to findings from previous studies.<sup>16,18</sup> This may be attributed to greater healthcare-seeking behavior among males in urban settings and higher exposure to behavioral risk factors such as smoking, alcohol consumption and occupational stress.

The present study observed that more than half of the participants had moderate dietary adherence, while a substantial proportion demonstrated poor adherence. Similar observations were reported by Mostafavi-Darani et al, who identified inadequate adherence to dietary recommendations among Iranian diabetic patients and emphasized the role of social and cultural influences on food habits.<sup>18</sup> Likewise, studies conducted in India have reported that adherence to diabetic diets is often compromised by traditional food practices, irregular meal patterns and difficulty maintaining dietary restrictions during social gatherings.<sup>19</sup> The similarities between these findings and the present study indicate that sociocultural influences significantly affect dietary behavior among individuals with T2DM.

One of the most commonly reported barriers in the present study was difficulty adhering to dietary recommendations during social or work-related events. This finding can be explained by the Indian sociocultural environment, where festivals, family gatherings and workplace events frequently involve calorie-dense and carbohydrate-rich foods. Similar findings were documented by Gopichandran et al who reported that social obligations and family food practices strongly influence dietary compliance among diabetic patients in South India.<sup>19</sup> Such cultural practices may make strict adherence to prescribed diets difficult despite adequate knowledge regarding diabetes management.

Lack of dietary knowledge and insufficient nutritional education were also identified as important barriers in the present study. Similar findings were reported by Shrivastava et al, who emphasized that inadequate awareness regarding self-care practices significantly affects diabetes management outcomes.<sup>15</sup> Patients with lower educational status may experience difficulty understanding dietary recommendations, portion control and meal planning, thereby contributing to poor adherence. This observation is further supported by the significant association between educational status and dietary adherence observed in the present study. Financial constraints emerged as another major barrier affecting dietary adherence. Many participants perceived healthy diabetic diets as expensive and difficult to maintain over long periods. Similar observations have been reported in developing countries where affordability and accessibility

of healthy food options remain limited.<sup>15,18</sup> In addition, stress and lack of motivation identified in the present study highlight the importance of psychological and behavioral factors in diabetes self-management. Chronic disease management often leads to treatment fatigue, reducing long-term adherence to lifestyle modifications.

The present study also demonstrated significant associations between dietary adherence and variables such as age, duration of diabetes, BMI, smoking and alcohol consumption. Participants with healthier lifestyle practices and shorter duration of illness demonstrated comparatively better adherence. Similar associations have been reported in previous literature, suggesting that positive lifestyle behaviours contribute significantly to improved self-care and glycaemic management.<sup>15</sup>

Overall, the findings of the present study emphasize that dietary adherence among T2DM patients is influenced by a complex interaction of sociocultural, educational, economic and behavioural factors. Therefore, effective diabetes management should focus not only on providing dietary advice but also on individualized counselling, culturally acceptable meal planning, behavioural support and family involvement to improve long-term adherence and health outcomes.

## CONCLUSION

Dietary adherence among patients with type 2 diabetes mellitus remains a significant challenge despite ongoing treatment and awareness regarding the importance of diet in glycaemic control. The findings of the present study indicate that sociocultural practices, behavioral factors and economic limitations continue to hinder the effective implementation of recommended dietary modifications in daily life. Improving dietary adherence therefore requires a multidimensional approach that extends beyond routine medical advice.

Strengthening patient-centered dietary counselling, promoting culturally appropriate and affordable meal plans and incorporating behavioral and family support strategies into diabetes care may help achieve sustainable lifestyle modifications. Integrating regular nutritional education and psychosocial support at the primary healthcare level could play a crucial role in enhancing adherence and ultimately improving long-term diabetes outcomes and quality of life among patients with T2DM.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Joy J, Mathamveed SK, Pious A, Dash A, Manjunath R. Perceived dietary adherence and its barriers to dietary recommendations among type 2 diabetes mellitus patients in mysuru city: a cross-sectional study. *Int J Community Med Public Health* 2026;13:3861-6.