

Healthy Lifestyle Change in Type 2 Diabetes: Behaviors, Barriers, and Glycemic Control Among Patients Attending the National Center for Diabetes, Baghdad

Abdullah Al-Gburi*, Ammar Isam Suhail, Zaid Shakir, Moamel A, Hala O, Mohand R, Hala N, Yasser A, Wed R, Youssef D, Yusr R, Wessam J, Nabaa N, Muhaimin K and Hadeer A

Department of Family and Community Medicine, College of Medicine, Mustansiriyah University, Baghdad, Iraq

***Corresponding author:**

Abdullah Al-Gburi,
Department of Family and Community
Medicine, College of Medicine,
Mustansiriyah University, Baghdad, Iraq

Received: 18 Sep 2026

Accepted: 26 Sep 2026

Published: 29 Sep 2026

J Short Name: ACMCR

Copyright:

©2026 Abdullah Al-Gburi. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially

Keywords:

Type 2 Diabetes Mellitus; Lifestyle Modification; Physical Activity; Diet; HbA1c; Medication Adherence; Iraq

Citation:

Abdullah Al-Gburi, Healthy Lifestyle Change in Type 2 Diabetes: Behaviors, Barriers, and Glycemic Control Among Patients Attending the National Center for Diabetes, Baghdad. Ann Clin Med Case Rep® 2026; V17(1): 1-5

1. Abstract**1.1. Background**

Diabetes mellitus is becoming an increasingly pressing health problem in Iraq. Urbanization, shifting dietary patterns, and sedentary living have all been implicated in poor diabetes control, and lifestyle modification remains a cornerstone of type 2 diabetes management.

1.2. Objective

We set out to assess lifestyle behaviours, the barriers patients face in modifying them, treatment adherence, and how these factors relate to glycaemic control among patients with type 2 diabetes attending the National Centre for Diabetes in Baghdad.

1.3. Methods

This cross-sectional study was carried out between January and February 2025 among 165 patients with type 2 diabetes at the National Centre for Diabetes, Al-Mustansiriyah University, Baghdad. A pre-tested, 40-item questionnaire was administered by direct interview, covering demographic characteristics, medical history, dietary habits, physical activity, weight management, lifestyle barriers, and HbA1c-related outcomes. Associations between variables were tested using the chi-square test.

1.4. Results

Among the 165 participants, 90.9% were over 40 years old and 55.0% were male. Close to half (49.0%) were physically inactive, exercising less than 2.5 hours a week, and just over half (51.5%) reported following a specific dietary plan. Daily fruit and vegetable intake was reported by 54.5% of patients, while only 7.8% reported drinking sugary beverages daily. Medication use was nearly universal (95.7%), and 87.8% described themselves as committed to treatment. Glycemic control, however,

left much to be desired: 35.2% of patients had poor control (HbA1c > 8%), 36.4% fell into the inadequate range (7–8%), and only 28.5% achieved good control (< 7%). Treatment compliance was significantly associated with HbA1c category ($\chi^2 = 27.71$, $df = 4$, $p < 0.001$).

1.4. Conclusion

Physical inactivity and suboptimal glycemic control were common among patients attending the diabetes centre, despite generally high rates of medication use. These findings point to a need for structured lifestyle counselling, physical-activity promotion, dietary support, and continued diabetes education. Given the cross-sectional design, none of the associations reported here should be read as causal.

2. Introduction

Type 2 diabetes mellitus (T2DM) is one of the fastest-growing chronic disease burdens worldwide, and its rising prevalence continues to strain already stretched healthcare systems. The condition arises from a combination of insulin resistance and impaired insulin secretion, and when hyperglycemia goes unmanaged for long enough, it can lead to serious complications, including cardiovascular disease, neuropathy, and retinopathy. Pharmacological treatment is, of course, central to diabetes care, but it is not the whole story: a healthier diet, more physical activity, weight management, smoking cessation, and reduced alcohol intake all matter just as much, both for managing diabetes once it has developed and for preventing it in people at high risk [1,2].

Two landmark trials, the Diabetes Prevention Program (DPP) and Look AHEAD, demonstrated that weight loss, exercise, and dietary change can meaningfully improve glycemic control and

lower the risk of complications. Yet putting this evidence into practice is difficult. Many patients struggle to sustain lifestyle changes over time, running into obstacles such as low motivation, socioeconomic constraints, limited access to healthcare, and cultural factors [2,3]. Smoking and alcohol use deserve mention too, since both worsen insulin resistance and raise the risk of cardiovascular and renal complications [4].

Iraq's diabetes burden has grown in step with rapid urbanization, dietary transition, and increasingly sedentary lifestyles. In Basrah, a population-based study found an age-adjusted diabetes prevalence of 19.7% among adults, with just over half of those cases previously undiagnosed [7]; more recently, a Baghdad-based study reported a prediabetes prevalence of 20.6% [8]. Structured lifestyle-support programs remain scarce in the country, and the health system still leans heavily toward pharmacological treatment rather than comprehensive lifestyle intervention. Socioeconomic hardship, limited health education, and weak support systems further constrain patients' ability to adopt and sustain healthier habits [5,6].

Against this backdrop, we aimed to assess lifestyle behaviors, barriers to lifestyle modification, treatment adherence, and their relationship with glycemic control among patients with type 2 diabetes attending the National Center for Diabetes in Baghdad, with a view toward informing future diabetes education and care strategies in Iraq.

3. Methods

3.1. Study Design and Setting

We conducted a cross-sectional study at the National Center for Diabetes, Al-Mustansiriyah University, Baghdad, Iraq, between January and February 2025. Responses were kept anonymous throughout to protect participant confidentiality.

3.2. Participants

Participants were recruited by convenience sampling from among patients with type 2 diabetes mellitus attending the center. Patients diagnosed less than 3 months prior were excluded. In total, 165 participants were enrolled.

3.3. Data Collection

A pre-designed, pre-tested 40-item questionnaire was administered through direct, in-person interviews, each taking roughly 15–20 minutes. The instrument was developed from prior research and WHO guidance and was reviewed by senior faculty before use. It spanned six domains: demographic characteristics; medical and family history plus medication use; dietary habits and physical activity; weight management; barriers to lifestyle change; and outcomes associated with lifestyle modification, including HbA1c-related change.

3.4. Statistical Analysis

Quantitative variables were summarized as means and standard deviations, and qualitative variables as frequencies and percentages. Associations between variables were examined using the chi-square test.

3.5. Ethical Considerations

Approval was obtained from the National Center of Diabetes via an official letter from the College of Medicine. Informed consent was obtained from all participants; where a participant was illiterate or otherwise unable to provide consent independently, guardian consent was obtained instead.

4. Results

Results are summarized in Tables 1–6, covering demographic characteristics, diabetes profile, treatment adherence, health behaviors, dietary patterns, and the association between treatment compliance and glycemic control (HbA1c, an index of average blood glucose over the preceding two to three months [26]).

The chi-square test showed a statistically significant association between treatment compliance and HbA1c category ($\chi^2 = 27.71$, $df = 4$, $p < 0.001$ vs. a tabulated critical value of 9.49 at $\alpha = 0.05$), and the null hypothesis of no association was rejected.

Table 1: Demographic characteristics of participants (N = 165)

Variable	Category	n	%
Age	<20 years	1	0.6
	20–40 years	14	8.4
	>40 years	150	90.9
Gender	Male	91	55
	Female	74	45
Education	Illiterate	22	13.3
	Read and write	25	15
	Primary	70	42
	High school	4	2
	Undergraduate	5	3
	Bachelor's degree	26	15.7
	Postgraduate	13	7
Income	Low	82	49
	Moderate	72	43
	High	11	7
Occupation	Housewife	66	40
	Free worker	32	19.3
	Retired	37	22.4
	Police / military	15	9
	Other	15	9

Table 2: Diabetes profile: route of diagnosis, family history, duration, and baseline HbA1c (N = 165).

Variable	Category	n	%
Route of diagnosis	At patient's request	103	62.4
	Accidentally	56	33
	Periodic check-up	6	3.6
Family history of diabetes	Yes	101	61
	No	64	39
Duration of diabetes	≤5 years	52	31.5
	>5–10 years	39	23.6
	>10–15 years	25	15.1
	>15 years	49	29.6
Baseline HbA1c	Good (<7%)	47	28.5
	Inadequate (7–8%)	60	36.4
	Poor (>8%)	58	35.2

Table 3: Medication adherence, smoking, and alcohol use (N = 165).

Measure	Response	n	%
Currently taking medication	Yes	158	95.7
	No	7	4.2
Committed to treatment	Yes	145	87.8
	No	20	12.1
Smoking	Yes	28	16.9
	No	137	83
Alcohol drinking	Yes	5	3
	No	160	96.9

Table 5: Dietary behaviors and knowledge (N = 165).

Measure	Response	n	%
Meals per day	One	5	3
	Two	44	26.6
	Three	93	56.3
	Four	19	11.5
	More than four	4	2.4
Sugary drinks	Daily	13	7.8
	Often	12	7.2
	Sometimes	32	19.3
	Rarely	40	24.2
	Never	68	41.2
Fruit / vegetables	Daily	90	54.5
	Often	42	25.4
	Sometimes	21	12.7
	Rarely	11	6.6
	Never	1	0.6
Fried food	Daily	10	6
	Often	16	9.6
	Sometimes	37	22.4
	Rarely	52	31.5
	Never	50	30.3
Follows a specific dietary plan	Yes	85	51.5
	No	80	48.4
Aware of glycemic index	Aware	107	64.8
	Not aware	58	35.1
Diet is balanced	Balanced	119	72.1
	Not balanced	46	27.8
Uses dietary supplements	Yes	71	43
	No	94	56.9

Table 4: Physical activity and weight management (N = 165).

Measure	Response	n	%
Physical activity	Highly active (>5 h/wk)	23	13.9
	Active (2.5–5 h/wk)	61	36.9
	Inactive (<2.5 h/wk)	81	49
Actively trying to lose weight	Yes	58	35.1
	No	107	64.8
Lost weight last year	Yes	101	61.2
	No	64	38.7
Regular weight monitoring	Yes	67	40.6
	No	98	59.3

Table 6: Association between treatment compliance and HbA1c category.

Compliance	Good HbA1c	Inadequate	Poor HbA1c	Total
Good	38	22	31	91
Moderate	9	38	24	71
Bad	0	0	3	3
Total	47	60	58	165

5. Discussion

Most participants (90.9%) were over 40, with only 8.4% aged 20–40 and a single patient under 20. This fits comfortably with what is already known about T2DM: it predominantly affects older adults, largely because of age-related insulin resistance, declining β -cell function, and years of accumulated lifestyle risk [14]. Men slightly outnumbered women in our sample (55.0% vs. 45.0%), which is broadly in line with reported sex differences in diabetes risk, including the greater visceral fat accumulation typically seen in men [15,16].

Educational attainment in this group was generally low — 42.0% had only a primary education, and 13.3% were illiterate, against just 7.0% with postgraduate qualifications. This matters clinically, since low health literacy is a well-established barrier to effective self-management and tends to undermine medication adherence [17]. Income followed a similar pattern: about half of participants (49.0%) reported low income, 43.0% moderate, and only 7.0% high income. Low income has repeatedly been linked to worse diabetes outcomes, largely through reduced access to healthcare, nutritious food, and medication [18]. By occupation, housewives made up the largest group (40.0%) — which may hint at a degree of dependence on family members for healthcare access — followed by free workers (19.3%), retirees (22.4%), and those in police/military or other work (18.0% combined); stable employment shapes insurance access, financial security, and stress levels, all of which feed back into diabetes control [19].

Interestingly, most patients (62.4%) were diagnosed after seeking evaluation on their own initiative, which may reflect growing public awareness of diabetes symptoms and risk. A third

(33.0%) were diagnosed incidentally during unrelated visits, underscoring how quietly T2DM can progress before it is caught, and only 3.6% were picked up through routine screening — a sign that periodic testing is not yet widely used here [20,21].

Glycemic control across the sample left considerable room for improvement: 35.2% of patients had HbA1c above 8%, 36.4% fell into the inadequate range (7–8%), and only 28.5% achieved good control below 7%. A family history of diabetes was reported by 61.0% of participants, consistent with the well-documented genetic contribution to T2DM [20]. Disease duration varied widely — 31.5% had been diagnosed within the past 5 years, 23.6% for 5–10 years, 15.1% for 10–15 years, and nearly 30% for more than 15 years — which speaks to how long many of these patients have already been managing the condition [20].

Medication adherence, at least, was reassuringly high: 95.7% of patients were taking medication, and 87.8% described themselves as committed to treatment. That figure stands in sharp contrast to a comparable Indian cohort, where only 34.1% reported similar commitment — a gap likely tied to differences in socioeconomic status, education, and disease awareness [21]. Physical activity told a less encouraging story: 49.0% of patients reported less than 2.5 hours of activity per week, though this was somewhat better than the 64% inactivity rate reported at a national diabetes institute in Pakistan, where leg pain and low motivation were cited as the main barriers — a difference that may partly reflect the different sample sizes involved [22]. Even so, nearly two-thirds of patients (64.8%) were not actively trying to lose weight, despite 61.2% reporting weight loss over the past year, which hints at the broader metabolic toll T2DM takes on body weight over time.

Smoking (16.9%) and alcohol use (3.0%) were both relatively uncommon in this sample. The smoking figure sits close to what has been reported in a Chinese cohort of middle-aged and elderly men with type 2 diabetes, where 15% were current smokers, while the low rate of alcohol use here almost certainly reflects local cultural and religious norms [23].

Dietary habits, on the whole, looked fairly favorable: 56.3% of patients ate three meals a day, 54.5% reported daily fruit and vegetable intake, and only 7.8% and 6.0% reported daily consumption of sugary drinks and fried food, respectively. These figures compare well with a study reporting good dietary knowledge in 67% of participants but actual healthy eating habits in only around a quarter [24] — though it is worth remembering that this sample was recruited from patients already engaged with a specialized diabetes center, which may itself select for more health-conscious individuals. A balanced diet was reported by 72.1% of patients, in keeping with guideline evidence favoring low-fat, high-fiber diets for both diabetes management and cardiovascular risk reduction [4]; even the 27.8% reporting an unbalanced diet compares favorably with adherence rates seen in some other populations, possibly reflecting the benefit of specialist dietary counseling available at the center.

Dietary supplement use was reported by 43.0% of patients. Supplements can be useful for correcting specific nutrient deficiencies, but caution is warranted here too, since excessive intake of certain vitamins can interfere with blood glucose regulation [25].

The clearest finding in this study, however, concerns treatment compliance and its relationship to glycemic control. Among the 91 patients with good compliance, 38 achieved good HbA1c control, 22 fell into the inadequate range, and 31 had poor control; among the 71 patients with moderate compliance, the picture was noticeably worse, with most falling into the inadequate (38) or poor (24) categories and only 9 achieving good control. Of the 3 patients with poor compliance, all had poor HbA1c control. This dose–response pattern echoes prior research showing that adherence to medication, diet, and physical activity together not any single factor alone drives glycemic outcomes, with shortfalls in any one domain associated with higher HbA1c [27].

6. Limitations

Several limitations should be kept in mind when interpreting these findings. The convenience sample was drawn from a single diabetes center, which limits how far the results can be generalized. The cross-sectional design means we cannot establish temporal or causal relationships between lifestyle behaviors and HbA1c. The dietary plans followed by participants were not described in enough detail to judge their nutritional quality or effectiveness, and the study did not include longitudinal follow-up or objective measurement of physical activity or dietary intake.

7. Conclusion

Among the 165 patients with type 2 diabetes attending this diabetes center in Baghdad, physical inactivity and poor glycemic control were common, even though medication use and self-reported treatment commitment were both high. Taken together, these findings support an integrated approach to diabetes care — one that combines pharmacological management with structured lifestyle education, physical-activity promotion, dietary counseling, and regular follow-up. Further multicenter, prospective studies are needed to clarify how specific lifestyle interventions affect glycemic outcomes in Iraqi patients over time.

8. Declarations

Ethics approval and consent to participate

Approval was obtained from the National Center of Diabetes through an official letter from the College of Medicine, Mustansiriyah University. Informed consent was obtained from all participants, with guardian consent obtained for participants who were illiterate or otherwise unable to consent independently.

9. Author Contributions

All authors contributed to the study design, data collection, data analysis, and drafting of the manuscript, and approved the final version for submission.

References

- World Health Organization (WHO). Global Report on Diabetes. Geneva: WHO. 2023.
- Diabetes Prevention Program (DPP) Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002; 346(6): 393-403.
- Look AHEAD Research Group. Cardiovascular effects of intensive lifestyle intervention in type 2 diabetes. *N Engl J Med*. 2013; 369(2):145–154.
- American Diabetes Association. Standards of Medical Care in Diabetes 2023. *Diabetes Care*. 2023.
- Iraqi Ministry of Health. National Diabetes Survey Report. Baghdad: Ministry of Health. 2022.
- International Diabetes Federation (IDF). IDF Diabetes Atlas. 10th ed. Brussels: IDF; 2023.
- Mansour AA, Al-Maliky AA, Kasem B, Jabar A, Mosbeh KA. Prevalence of diagnosed and undiagnosed diabetes mellitus in adults aged 19 years and older in Basrah, Iraq. *Diabetes Metab Syndr Obes*. 2014; 7: 139–144.
- Alogaili MH, Alsaffar AJ, Hamid MB. Prevalence of prediabetes among adults in Baghdad, Iraq. *Iraqi J Med Sci*. 2020; 17(4).
- American Diabetes Association (ADA). Standards of Medical Care in Diabetes—2024. *Diabetes Care*. 2024; 47(Suppl 1): –S302.
- Jamil NF, Salih AA, Sadiq MA, Shaker SH. Assessment of nutritional status of elderly people in Baghdad. *Ann Rom Soc Cell Biol*. 2021; 4457-4465.
- World Health Organization (WHO). WHO Guidelines on Physical Activity and Sedentary Behaviour for People Living with Type 2 Diabetes. Geneva: WHO; 2023.
- Perelman School of Medicine, University of Pennsylvania. Weight and Lifestyle Inventory (WALI) – Generic Version. 2017.
- Verbeek J, Oude Groeniger J, de Groot R, van der Ploeg HP. Facilitators and barriers for lifestyle change in people with prediabetes: a meta-synthesis of qualitative studies. *BMC Public Health*. 2022; 22: 12885.
- Chatterjee S, Khunti K, Davies MJ. Type 2 diabetes. *Lancet*. 2017; 389(10085): 2239–2251.
- Kautzky-Willer A, Harreiter J, Pacini G. Sex and gender differences in risk, pathophysiology and complications of type 2 diabetes mellitus. *Endocr Rev*. 2016; 37(3): 278–316.
- Mauvais-Jarvis F. Sex differences in metabolic homeostasis, diabetes, and obesity. *Biol Sex Differ*. 2015; 6: 14.
- Schillinger D, Grumbach K, Piette J. Association of health literacy with diabetes outcomes. *JAMA*. 2002; 288(4): 475–482.
- American Diabetes Association. Diabetes Care Guidelines. *Diabetes Care*. 2022; 45(1): 10–22.
- International Diabetes Federation (IDF). IDF Diabetes Atlas. Brussels: IDF. 2022.
- American Diabetes Association (ADA). Standards of Medical Care in Diabetes. 2022.
- Sahoo J, Mohanty S, Kundu A, Epari V. Medication adherence among patients of type II diabetes mellitus and its associated risk factors: a cross-sectional study in a tertiary care hospital of eastern India. *Cureus*. 2022; 14(12): e33074.
- Rashid T, Afnan BH, Baloch AA, Mughal S, Hasan M, Khan MU. Dietary patterns and physical activity levels among people with type 2 diabetes. *Nutr Metab Insights*. 2023; 16: 11786388231189591.
- Shi L, Shu XO, Li H, Cai H, Liu Q, Zheng W, Xiang YB, Villegas R. Physical activity, smoking, and alcohol consumption in association with incidence of type 2 diabetes among middle-aged and elderly Chinese men. *PLoS One*. 2013; 8(11): e77919.
- Abboud M, Nacouzi C, Chahine Z, Atallah A, Hleyhel M. Dietary knowledge and eating habits among patients with type 2 diabetes in Lebanon. *Glob Health Epidemiol Genom*. 2024; 2024: 3623555.
- Kovalenko B, as cited in: 5 Supplements People With Diabetes Should Avoid. *diaTribe Learn*. Diabetes UK. What is HbA1c?
- Mirahmadizadeh A, Khorshidsavar H, Seif M, Sharifi MH. Adherence to medication, diet and physical activity and the associated factors amongst patients with type 2 diabetes. *Diabetes Ther*. 2020; 11(2): 479-494.