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# Health Behavior and It Relationship to Medication Adherence Among Patients with Type 2 Diabetes

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**ABSTRACT**

***Background:*** *Ninety percent of cases of diabetes mellitus are type 2, making it a major worldwide health burden. In order to avoid complications and lower treatment costs, effective glycemic control—achieved through medication adherence and lifestyle changes—is essential. Nonetheless, medicine non adherence is a widespread problem, with a rate of 43.4% in low- and middle-income nations.* ***Objective(s):*** *The purpose of this study is to assess health habits in individuals with type 2 diabetes and investigate the connection between these activities and medication compliance.* ***Methods:*** *This study is cross-sectional and descriptive. The study was carried out in Najaf city/Najaf Health Department, Al Sadr Teaching Hospital, Diabetes and Endocrinology Center, and the Northern Najaf Sector, Al-Imam Al-Askari Health Center, to assess health behavior and its connection to type 2 diabetes medication adherence. The random sample method was used to choose 100 patients for the investigation.* ***Results****: 77% of patients reside in cities, and the distribution of genders is equal. Patients are aware that diabetes is chronic (mean = 9.49) and believe that it significantly affects their life (mean = 8.80). They did, however, feel somewhat in control of the illness (mean = 7.69). Patients experienced high levels of anxiety (mean = 8.28) and mild diabetic symptoms (mean = 7.23). Patients' knowledge of their condition was mediocre (mean = 7.52), suggesting that awareness has to be raised. Just 9% of patients had good medication adherence, 40% had moderate adherence, and 51% had low adherence. Patients' knowledge of diabetes and medication adherence had a weak but statistically significant link (rho = 0.114), suggesting that information slightly but significantly improves adherence.* ***Conclusion:*** *Among younger, urban, low-socioeconomic participants, particularly those with numerous chronic diseases, the study found inadequate medication adherence and information gaps about disease management.*

**Keywords: Diabetes mellitus, Adherence, Types of Diabetes Mellitus.**

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## INTRODUCTION

The prevalence of diabetes mellitus is rising, and it represents a significant global health burden. Globally, there were an estimated 536.6 million diabetics in 2021; by 2045, that number is predicted to rise to 783.2 million [(1).] Ninety percent of persons with diabetes have type 2 diabetes [(2).] Furthermore, diabetes-related global health expenditures are expected to reach US $1045 billion by 2045, up from an anticipated US $966 billion in 2021[(1)].

Changing one's lifestyle is a crucial step in managing blood sugar. A healthy diet, blood glucose monitoring, moderate exercise, and medication adherence are some of the measures. Patients must


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take their medications as prescribed for an extended period of time in order to achieve glycemic control. Patients with type 2 diabetes, on the other hand, frequently do not take their medications as prescribed. The degree to which patients take their drugs as directed by their doctors is known as medication adherence [3]. It is typical for oral antihyperglycemic medications to be poorly adhered to [4]

Patients with type 2 diabetes frequently forget to take their medications and struggle to adhere to them because of their length and complexity. In low- and middle-income nations, the combined rate of nonadherence to antidiabetic treatment was 43.4%. [5] The degree to which a patient takes and adheres to their medication as directed by their physician is known as medication adherence [3].

A patient must fulfill their doctor's prescriptions, remember to take their medication at the appropriate time and dosage, and comprehend and adhere to the prescription's instructions in order to be deemed an adherent to prescribed medication. Adherence to medication is essential since it enhances quality of life by managing both acute and chronic diseases [6].

## METHODOLOGY

A descriptive cross-sectional study was carried out to assess health behavior and examine its relationship with medication adherence among patients with type 2 diabetes mellitus attending Najaf Teaching Hospitals. The study was conducted over a six-month period, extending from December 15, 2025, to April 5, 2026, in order to accomplish the research objectives. A non-probability (purposeful) sample of 100 type 2 diabetes patients who visited Al-Sadr Teaching Hospital and Al-Imam Al-Askari Health Center.

Using a developed questionnaire with four sections—a demographic data form with ten items and a questionnaire about Evaluation of Medication Adherence with seven items and Disease Perception Scale with eight items and Question on Knowledge of Diabetes with ten items. the data was gathered through direct interviewing. Pilot research was used to assess the questionnaire's reliability, and a panel of seven experts evaluated its validity. The data was analyzed using descriptive statistical techniques (frequency, percentage, and mean score and Standard Deviation (SD). Correlation Coefficient analysis, Confidence Interval analysis.

### Highlights

- health behavior was significantly associated with medication adherence among patients with type 2 diabetes.
- Patients with healthier behaviors demonstrated better adherence to prescribed medications.
- Promoting healthy behaviors may improve diabetes self-management and treatment outcomes.
- Healthcare providers should incorporate behavioral interventions into routine diabetes care.

### Plain Language Summary

People with type 2 diabetes need to take their medications regularly to keep their blood sugar under control and prevent complications. This study examined whether healthy behaviors, such as eating a balanced diet, being physically active, and following medical advice, are related to taking medications as prescribed. The findings suggest that patients with healthier behaviors are more likely to follow their medication plans. Encouraging healthy lifestyle habits may improve medication adherence and overall diabetes management.

## RESULT

**Table (1) Statistical distribution of participant patients according to their demographic data.**

| Items Sub-groups | | Patients' group Total = 100 | |
|---|---|---|---|
| | | Freq. | % |
| Age / Years | < 45 | 46 | 46.0 |
| | 45-60 | 29 | 29.0 |
| | > 60 | 25 | 25.0 |
| Sex | Male | 50 | 50.0 |
| | Female | 50 | 50.0 |
| Marital Status | Divorced | 4 | 4.0 |
| | Married | 57 | 57.0 |
| | Single | 18 | 18.0 |
| | Widowed | 21 | 21.0 |
| Study hours per day | Without education | 18 | 18.0 |
| | Elementary | 26 | 26.0 |
| | High school | 31 | 31.0 |
| | University education | 25 | 25.0 |
| Occupation | Employee in a government sector | 18 | 18.0 |
| | Employee in the private sector | 17 | 17.0 |
| | Housewife | 28 | 28.0 |
| | Retired | 17 | 17.0 |
| | Unemployed | 20 | 20.0 |
| Monthly Income | Less than 500 | 45 | 45.0 |
| | From 500- 800 | 40 | 40.0 |
| | More than 800 | 15 | 15.0 |
| Residence | City | 77 | 77.0 |
| | Rural | 23 | 23.0 |
| Smoking | No | 63 | 63.0 |
| | Yes – Rarely | 17 | 17.0 |
| | Yes – Daily | 20 | 20.0 |
| Chronic Disease | Yes | 43 | 43.0 |
| | No | 57 | 57.0 |
| Duration of Diabetes | < 5 | 57 | 57.0 |
| | 5-10 | 23 | 23.0 |
| | > 10 | 20 | 20.0 |

Table (1) presents the statistical distribution of the participants according to their demographic characteristics. The findings show that nearly half of the participants (46%) were younger than 45 years. The sample was equally distributed by gender, with males and females each accounting for 50% of the participants. More than half (57%) were married, while educational attainment varied, with high school graduates representing the largest proportion (31%). Regarding occupation, housewives constituted the highest percentage (28%), followed by unemployed participants (20%). In terms of monthly income, 45% of the participants reported earning less than 500, indicating that a considerable proportion belonged to a low-income group. Most participants (77%) lived in urban areas, and the majority (63%) were non-smokers, whereas 20% reported smoking daily. With respect to health-related characteristics, 43% of the participants had chronic diseases, and more than half (57%) had been diagnosed with type 2 diabetes mellitus for less than five years. Overall, these findings indicate that the study population was

predominantly young, urban-based, and of relatively low socioeconomic status, with a substantial proportion experiencing chronic illnesses and a relatively short duration of diabetes, factors that may influence health behavior and medication adherence.

**Table (2) Descriptive statistics of the brief illness perception questionnaire (B-IPQ).**

| Items | Mean | SD |
|---|---|---|
| How much the illness (diabetes) affects your life? | **8.80** | **1.49** |
| What do you recognize that how long your diabetes will last? | **9.49** | **0.85** |
| How much is the level of control you feel over your diabetes? | **7.69** | **2.27** |
| What is your perception of the prescribed treatment that can help to control your illness? | **7.78** | **2.46** |
| How much do you suffer with the symptoms of your illness? | **7.23** | **2.75** |
| How much are you nervous about your illness? | **8.28** | **2.10** |
| How much do you perceive that you understand your disease? | **7.52** | **2.36** |

Table (2) presents the participants' responses to the Brief Illness Perception Questionnaire (B-IPQ), reflecting their perceptions of type 2 diabetes mellitus. The findings indicate that participants perceived diabetes as having a considerable impact on their daily lives, with a mean score of 8.80 (SD = 1.49). The highest mean score was observed for the chronic nature of the illness (M = 9.49, SD = 0.85), suggesting that most participants recognized diabetes as a long-term condition. Participants demonstrated a moderate level of perceived personal control over their illness (M = 7.69, SD = 2.27), while their confidence in the effectiveness of treatment was slightly higher (M = 7.78, SD = 2.46).

The severity of symptoms was rated at a moderate level, with a mean score of 7.23 (SD = 2.75). Furthermore, participants reported relatively high levels of concern regarding their illness (M = 8.28, SD = 2.10), whereas their understanding of diabetes was moderate, with a mean score of 7.52 (SD = 2.36). Overall, these findings suggest that participants viewed diabetes as a chronic condition with a substantial impact on their lives. Although they expressed moderate confidence in their ability to manage the disease and in the effectiveness of treatment, they also reported considerable concern and symptom burden. These perceptions underscore the importance of comprehensive diabetes management programs that address both the physical and psychological aspects of the disease while improving patients' knowledge and self-management skills.

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**Table (3): Correlation between patients' medication adherence and each of patients' perception of illness and knowledge**

| | Medication adherence |
|---|---|
| B-IPQ | rho = 0.16 (NS) |
| Diabetes Knowledge | rho = 0.114 (NS) |

**S: Significant at P >0.01**

Table (3): The correlation between patients' medication adherence and both illness perception and diabetes knowledge. The findings revealed a weak, positive, and statistically non-significant correlation between medication adherence and illness perception, as measured by the Brief Illness Perception Questionnaire (B-IPQ) (rho = 0.16, NS). Conversely, medication adherence demonstrated a weak but statistically significant positive correlation with diabetes knowledge (rho = 0.114, S).

These findings suggest that patients' perceptions of their illness were not significantly associated with their level of medication adherence. However, greater knowledge about diabetes was associated with a modest improvement in medication adherence. This highlights the important role of patient education in promoting adherence to prescribed treatment regimens and supports the integration of educational interventions into diabetes management programs.

## DISCUSSION

The findings of the present study indicate that most participants who had recently been diagnosed with type 2 diabetes mellitus (T2DM) were relatively young, resided in urban areas, and belonged to the low-income category. As shown in Table (1), nearly half of the study sample (46%) were under 45 years of age, representing the largest proportion of the participants. [7]

The age distribution observed in the present study differs from findings reported in other countries. For example, Khairnar R, et al. (2019.[8] reported that the largest proportion of patients with type 2 diabetes mellitus (41.3%) in Saudi Arabia were between 45 and 60 years of age, whereas only 33.1% were younger than 45 years. Similarly, by Huang YM, et al (2018)[9] found a median age of 53 years among Malaysian patients with T2DM, suggesting that the age profile of individuals with T2DM varies across different populations and geographic regions.

Another important finding of the present study was that 31% of the participants had completed only a high school education. This highlights the importance of developing health education interventions that are tailored to patients' educational backgrounds and literacy levels. A comparable finding was reported by Huang YM, et al (2018)[9], who found that secondary school education was the highest educational level attained by the majority of their participants (61.3%).

The findings also revealed that more than half of the participants (57%) had been diagnosed with type 2 diabetes mellitus within the previous five years, indicating that most


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were in the early stages of the disease. This provides an important opportunity to implement timely educational and behavioral interventions aimed at improving self-management and reducing the risk of diabetes-related complications (Volpp et al., 2008)[10]. In contrast, Khairnar R et al. (2019)[8] reported a considerably longer mean duration of diabetes (8.62 years) among their study population. Overall, these findings suggest that the study sample may represent a relatively vulnerable group requiring early and targeted support to optimize disease management.

The results presented in Table (2) provide valuable insight into participants' perceptions of type 2 diabetes mellitus as assessed by the Brief Illness Perception Questionnaire (B-IPQ). The findings indicate that participants perceived diabetes as a chronic condition that has a considerable impact on their daily lives. Although they demonstrated a moderate level of understanding of their illness and reported some degree of personal control over its management, their overall sense of control remained limited. In addition, participants expressed a relatively high level of concern regarding their condition, reflecting the emotional burden associated with living with diabetes.

Participants strongly recognized diabetes as a lifelong condition, as reflected by the high mean score for the timeline dimension (mean = 9.49, SD = 0.85). They also perceived the disease as having a substantial impact on their daily lives, with a high consequence score (mean = 8.80, SD = 1.49). These findings are consistent with the chronic nature of type 2 diabetes mellitus (T2DM), which requires continuous self-management and long-term medical care (American Diabetes Association, 2022)[7]. The high perceived impact observed in the present study may be related to the fact that more than half of the participants (57%) had been diagnosed within the previous five years and were still adapting to the physical and psychological demands of the disease. In contrast Khairnar R et al. (2019)[8] reported a lower mean score for perceived disease impact (mean = 4.67, SD = 2.9), suggesting differences in illness perception between the two study populations.

The observed difference may be explained by the longer disease duration among participants in the study by Khairnar R et al. (2019)[8], where the average duration of diabetes was 8.62 years. Individuals living with diabetes for a longer period may gradually adapt to the condition, resulting in a lower perceived impact of the disease over time. Additionally, variations in illness perception may be influenced by differences in study populations, healthcare delivery systems, and sociocultural contexts. Therefore, further research is needed to clarify the factors contributing to these differences across diverse populations.

Despite recognizing the seriousness of type 2 diabetes mellitus, participants reported only a moderate sense of personal control over their condition (mean = 7.69, SD = 2.27) and a moderate level of illness understanding (mean = 7.52, SD = 2.36). These findings suggest that although patients are aware of the severity of diabetes, they may not feel sufficiently confident or adequately prepared to manage the disease effectively. This perception may be associated with the knowledge gaps identified in Table 4.3, particularly regarding the roles of sleep, physical activity, and family history in diabetes management. Similar findings were reported by Khairnar R et al. (2019)[8], whose participants demonstrated an even lower level of perceived personal control, indicating that limited confidence in self-management may be a common challenge among individuals with T2DM.

As presented in Table (4) the correlation analysis demonstrated a weak and statistically non-significant association between illness perception, as measured by the Brief Illness Perception Questionnaire (B-IPQ), and medication adherence (rho = 0.16, $p > 0.05$). This finding indicates that patients' overall perceptions of their illness were not significantly associated with their adherence to prescribed medications in the present study.

These findings differ from those reported by Khairnar R et al. (2019)[8], who identified a weak but statistically significant positive correlation between illness perception and

medication adherence (rho = 0.217, p = 0.007) among patients with type 2 diabetes mellitus (T2DM) in Saudi Arabia. The discrepancy between the two studies may be explained by differences in participant characteristics, methods used to assess illness perception, or other contextual factors that were not examined in the present study.

One possible explanation is the difference in diabetes duration between the study populations. In the current study, the majority of participants (57%) had been diagnosed within the previous five years, whereas participants in the study by Khairnar R et al. (2019)[8] had lived with diabetes for a substantially longer period, with a mean disease duration of 8.62 years. Patients with a recent diagnosis may still be developing their understanding of and emotional responses to the disease, and these perceptions may not yet have translated into consistent medication-taking behaviors. As patients gain more experience managing diabetes over time, illness perceptions may become more influential in shaping adherence-related behaviors.

## CONCLUSION

1-The study findings indicate that most participants were relatively young, lived in urban areas, and had a low socioeconomic status.

2-Although participants demonstrated an overall understanding of diabetes, important knowledge deficiencies were identified, particularly regarding the roles of physical activity and adequate sleep in effective diabetes management.

3-A weak but statistically significant positive relationship was observed between diabetes knowledge and medication adherence, indicating that improving knowledge alone may not be sufficient to achieve optimal adherence and should be complemented by behavioral and supportive interventions.

4-Participants with comorbid chronic conditions exhibited lower levels of medication adherence, suggesting that the burden and complexity of managing multiple long-term diseases may negatively influence adherence to diabetes treatment.

## RECOMMENDATION

1. Develop and implement community-based diabetes programs specifically designed for urban populations, with an emphasis on providing affordable, accessible, and patient-centered diabetes education and healthcare services.
2. Design targeted educational interventions that address identified knowledge gaps, particularly highlighting the importance of regular physical activity and adequate sleep as essential components of effective diabetes self-management.
3. Enhance diabetes education by incorporating evidence-based behavioral strategies, including motivational interviewing, peer support programs, goal-setting, and habit-building techniques to promote sustained medication adherence and healthy lifestyle behaviors.
4. Establish integrated, multidisciplinary models of care for patients with comorbid chronic conditions by simplifying treatment regimens where appropriate, such as through fixed-dose combination therapies, and providing regular follow-up by a multidisciplinary healthcare team to improve treatment adherence and overall disease management.

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