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**Original Research Article**

# Barriers and facilitators to medication adherence among type-2 diabetes mellitus patients in rural Nagpur: a qualitative study

**Riddhi Hanish Lalan*, Shrinal Chavan, Uday Narlawar, Sonali Patil, Anupama J. S.**

Department of Community Medicine, Government Medical College, Nagpur, Maharashtra, India

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***Correspondence:**
Dr. Riddhi Hanish Lalan,
E-mail: riddhi.lalan(@gmail.com



## ABSTRACT

**Background:** Type 2 diabetes mellitus (T2DM) is a growing public health concern in India, with rural populations disproportionately affected by poor glycaemic control. Medication adherence is essential to prevent complications, yet adherence rates remain low in rural settings due to multi factorial barriers. This study aimed to explore the barriers and facilitators influencing medication adherence among T2DM patients in rural Nagpur.
**Methods:** A qualitative study was conducted at the Rural Health Training Centre, Nagpur. Sixteen T2DM patients on oral hypoglycemic agents (OHAs) were recruited via convenience sampling. In-depth interviews were conducted using a semi-structured guide. Data were audio-recorded, transcribed, and analysed through manual thematic analysis. Themes and subthemes were generated to capture key barriers and facilitators.
**Results:** Barriers to medication adherence included knowledge deficits (misunderstanding diabetes and consequences of non-adherence), fear and cultural beliefs (fear of side effects, peer influence), forgetfulness (missed doses or medication purchase), financial constraints, and health system limitations (inadequate follow-up). Facilitators included: family support (emotional and practical), effective healthcare communication (doctor advice, IEC materials), and self-motivation (desire to maintain health, awareness of disease complications), trust in healthcare system (Faith in Government Healthcare Services, Positive Experience) and habit formation and routine integration (medication as daily ritual, use of reminders).
**Conclusions:** Improving medication adherence in rural T2DM patients requires multifaceted interventions. Enhancing patient education, strengthening healthcare communication, and fostering family and community support can significantly improve adherence and health outcomes in underserved rural settings.

**Keywords:** Type 2 diabetes mellitus, Medication adherence, Rural health, Qualitative study, Barriers, Facilitators

## INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder that poses a serious threat to public health across the globe. Among its various forms, type 2 diabetes mellitus (T2DM) accounts for over 90% of all diagnosed diabetes cases and is strongly associated with lifestyle, dietary habits, and genetic predisposition.[1] India currently harbours the second-largest population of individuals with diabetes, with an estimated 77 million adults affected a number expected to surpass 100 million by 2040.[2] Despite significant advancements in pharmacological treatments, suboptimal adherence to prescribed medications remains a key barrier to achieving glycaemic control, especially in rural settings.[3]

Medication adherence-defined by the World Health Organization as the degree to which the person's behavior corresponds with agreed recommendations from a healthcare provider-is crucial in T2DM management to prevent complications like nephropathy, retinopathy, cardiovascular disease, and early mortality.[4] However, multiple studies have shown that in low-resource settings, particularly in rural India, adherence rates are alarmingly low, sometimes falling below 40%.[5] This raises concern not only for individual patient outcomes but also for the broader public health burden and healthcare system sustainability.

This study is being conducted in rural Nagpur, a representative area facing multiple health inequities. Rural populations often contend with lower literacy levels, reduced healthcare access, traditional belief systems, and weaker health infrastructure-all of which are known to affect treatment continuity and disease self-management.[8] Furthermore, most existing adherence research is urban-centric, failing to address the unique barriers faced by rural patients such as transportation problems, long waiting times, lack of trained professionals, and limited culturally appropriate health communication.[9]

In rural Nagpur, informal healthcare providers, faith-based healing practices, and self-medication are commonly used alternatives to allopathic care. These contextual factors, when not addressed adequately, result in treatment gaps and a high risk of complications.[10]

Despite the availability of cost-effective oral hypoglycaemic agents (OHAs), many patients either forget to take their medication, stop it due to side effects, or avoid it due to financial constraints and cultural beliefs.[6] While quantitative surveys have identified key trends, there is limited in-depth qualitative research that captures the lived experiences, attitudes, and local context of patients-especially in semi-urban and rural communities.[7] A qualitative approach is well-suited to unpack the "why" behind non-adherence, rather than just "how much.

Understanding the perspectives of patients within their own sociocultural framework can guide the development of more context-specific interventions. Patients' perceptions towards facilitators and barriers to medication adherence is pivotal to be known by every healthcare professional. This study aims to explore the barriers and facilitators of medication adherence among T2DM patients through a qualitative lens.

## METHODS

### *Study design*

This qualitative study involved conducting in-depth interviews using a semi-structured interview guide, after obtaining informed consent, at the Rural Health Training Centre in Nagpur.

### *Study population*

The study population were type-2 diabetes mellitus patients taking oral hypoglycemic drugs.

### *Sample size and sampling technique*

A convenient sample size of 16 participants were selected for this study. The sample size was based on data collected by in-depth interview until when there was no repetition of data.

### *Study duration*

1 month (January 2023- February 2023).

### *Inclusion criteria*

Patients included in the study were those diagnosed with type 2 diabetes by the attending physician according to the World Health Organization (WHO) criteria, patients had been diagnosed with type 2 diabetes for at least one year and were currently on oral hypoglycemic medication as prescribed by their attending physician, those patients who were attending the Rural Health Centre and had provided informed consent.

### *Exclusion criteria*

Participants on insulin therapy, those with type 1 diabetes, Gestational diabetes or having other serious co-morbidities requiring immediate care were excluded from the study.

### *Data collection method*

In-depth interviews were conducted with patients diagnosed with type 2 diabetes attending the Rural Health Centre in Nagpur, using a pre-designed semi-structured interview guide. After obtaining informed consent, each interview lasted between 30 to 40 minutes. The interviews began with open-ended questions, with probing done as needed to elicit detailed responses. All interviews were audio-recorded with the patients' permission and later transcribed. Data collection continued until saturation was achieved, which occurred after interviewing 16 patients. The barriers to medication adherence identified from the interviews were categorized into ten sub-themes, from which five main themes emerged

### *Data management and analysis*

The transcripts were double checked, analyzed by Manual Thematic Analysis, subthemes were extracted from which themes were generated.

## RESULTS

### *Barriers to diabetic medication adherence*

There are several key barriers that hinder diabetic patients from adhering to their medication regimen.

### *These barriers can be grouped into five major themes*

*Knowledge* related barriers arise due to a lack of understanding about diabetes and the consequences of not following the prescribed treatment. Many patients are unclear about the role of medication in managing diabetes, often believing it to be a cure rather than a means of controlling blood sugar levels. One patient expressed this misconception, saying, "*I think we can stop tablets after taking for some period as sugar will be cured by that time*." Additionally, patients feel inadequately informed about the effects of non-adherence to medication. They report that healthcare providers have not clearly explained the potential consequences of skipping doses. As one patient noted, "*No doctor has clearly told me what would happen if I skip tablets for some days*."

**Table 1: Barriers to diabetic medication adherence.**

| Themes | Subthemes | Verbatims |
|---|---|---|
| **Knowledge** | Misunderstanding about diabetes | "I thought once my sugar became normal, I don't need these tablets anymore." |
| | | "I believed diabetes is a temporary problem and will go away with some home remedies." |
| | | "People in my village say if you control diet well, you can stop the medicine." |
| | Lack of knowledge on consequences of non-adherence | "No one explained what will happen if I skip medicines for 1–2 days." |
| | | "I thought missing tablets sometimes is okay if I feel fine." |
| | | "I was never told that irregular medicine intake can cause serious problems." |
| **Fear and beliefs** | Fear of side effects | "I heard that diabetes tablets can cause kidney failure, so I am scared." |
| | | "My neighbour told me that taking tablets daily will make me weaker." |
| | | "I am afraid if I take tablets for many years, I will get liver problems." |
| | Cultural beliefs / Peer opinion | "People in our village say herbal medicines are better than these tablets." |
| | | "Many say taking tablets for life is not good and will spoil the body." |
| | | "I was advised to use bitter gourd juice instead of tablets." |
| **Forgetfulness** | Forgetting to take medication | "I often forget to take tablets when I go for weddings or to the market." |
| | | "When I am working in the fields, I don't remember to take my medicines." |
| | | "During festivals and busy days, I skip taking tablets." |
| | Forgetting to purchase medication | "Sometimes I forget to go to the shop and buy my tablets. |
| | | "I miss follow-up dates, so I run out of medicines at home." |
| | | "When busy with housework, I forget to buy the next month's supply." |
| **Financial constraints** | Cost of medications | "It is difficult to spend money every month on these medicines." |
| | | "When there is less money at home, I stop buying the tablets." |
| | | "I can't afford both family needs and medicines, so I skip sometimes." |
| **Health system factors** | Inadequate follow-up by healthcare providers | "After giving tablets once, the doctor never asks if I am taking them." |
| | | "I wish someone would check whether I am following the medicine schedule." |
| | | "No one reminds us about follow-ups or tests after giving tablets." |

*Fear* is another significant barrier, with sub-themes including fear of side effects and fear of peer-group opinions. Patients often worry about the side effects of regular medication use, particularly the risk of renal failure. A common concern was voiced by a patient who said, "*I think taking diabetic tablets daily will cause side effects like kidney failure*." Moreover, societal perceptions and peer influence also contribute to non-adherence. Some patients fear that continuous medication use might harm their health, as influenced by the opinions of those around them. One patient remarked, "*Some of my known persons told I would become weaker if I take tablets daily*."

*Forgetfulness* plays a practical role in medication non-adherence. Patients frequently forget to take their medications, especially when they are away from their usual routine due to travel or special occasions. One patient admitted, "*I usually forget to take tablets when I go out for any work or events*." Another related challenge is forgetting to buy medications on time. Patients often become preoccupied with other tasks and forget important

dates for purchasing the next month's supply of medication, leading to unintentional gaps in their treatment. One patient explained, "*I often forget the date of follow-up and due date to buy diabetic tablets*."

*Financial constraints*

Financial challenges emerged as a significant barrier to medication adherence among patients with type 2 diabetes mellitus. Many participants highlighted the recurring cost of diabetes medications as a burden, particularly when household income is limited or irregular. One participant remarked, "*It is difficult to spend money every month on these medicines*," reflecting the strain of long-term treatment costs on the family budget. In times of financial hardship, medications are often deprioritized, as stated by another participant: "*When there is less money at home, I stop buying the tablets*." This tension between healthcare needs and daily survival was echoed by a respondent who shared, "*I can't afford both family needs and medicines, so I skip sometimes*." These narratives illustrate how economic insecurity forces individuals to make difficult choices, often at the expense of their health.

**Table 2: Facilitators to diabetic medication adherence.**

| Themes | Subthemes | Verbatims |
|---|---|---|
| **Family support** | Emotional support | "My son always reminds me to take my tablets daily." |
| | | "My husband motivates me to take medicines regularly." |
| | | "My daughter-in-law keeps track of my medicine time." |
| | Practical help | "My daughter takes me to the hospital for check-ups." |
| | | "Family members help me buy medicines from the town." |
| | | My brother accompanies me for doctor visits." |
| **Effective communication** | Advice from doctors | Doctor explained why I should never skip tablets." |
| | | "I follow the medicine routine because the doctor told me clearly." |
| | | "Doctor said if I stop medicines, sugar will go high and cause damage. |
| | Health education through iec materials | "I saw posters at PHC that said diabetes needs lifelong treatment." |
| | | "Health worker showed me a leaflet about importance of regular medicine." |
| | | "In health camp, they taught us why we must take medicines without fail." |
| **Self-motivation** | Desire to stay healthy for family | "I want to stay healthy and look after my grandchildren." |
| | | "I must remain fit to help my family, so I take my tablets daily." |
| | | "I take medicines to avoid being a burden on my children." |
| | Awareness of disease consequences | Now I know that stopping tablets can cause serious complications." |
| | | "Doctor explained that if I don't take medicine, my sugar will damage my eyes and kidneys." |
| | | "I am scared that if I skip tablets, I may end up in hospital." |
| **Trust in healthcare system** | Faith in government healthcare services | "I believe the government doctor gives the right medicine, so I follow it." |
| | | "They give the medicines free of cost; I go every month and don't miss." |
| | | "I trust the PHC doctor. He knows my sugar problem well." |
| | Positive experience | "Since taking tablets regularly, I don't feel tired like before." |
| | | "When I check my sugar, it is normal now—that's why I continue." |
| | | "Earlier, my legs would swell. Since I started the medicine, it has reduced." |
| **Habit formation and routine integration** | Medication as daily ritua | "I take my medicine after brushing teeth, just like chai." |
| | | "As soon as I eat breakfast, I remember the tablet automatically." |
| | | "It has become part of my day, like eating or praying." |
| | Use of reminders | "I have set an alarm on my phone—it rings, and I take it." |
| | | "My wife asks me at 9 every night, 'Did you take the tablet?'" |
| | | "It has become part of my day, like eating or praying." |

*Health system factors*

Patients reported poor follow-up and lack of support from healthcare providers after receiving initial prescriptions. One shared, "*After giving tablets once, the doctor never asks if I am taking them*." Many felt there was no one checking on their progress or reminding them about tests. "*No one reminds us about follow-ups or tests*," noted another. This points to a need for more continuous and patient-centered care.

***Facilitators to diabetic medication adherence***

Several factors help promote adherence to diabetic medication among patients.

***These facilitators can be grouped into five major themes***

*Household* support plays an important role in encouraging patients to take their medications consistently. Patients reported that their family members often insist that they take care of their health, which motivates them to follow their medication regimen. Additionally, family members also assist by accompanying them to medical consultations and helping purchase medications, which further supports adherence.

*Communication* is another key facilitator. Patients felt that communication from doctors had a positive impact, as doctors frequently advise and insist on regular medication use, which encourages patients to comply. Furthermore, communication through Information, Education, and Communication (IEC) materials such as posters and health education programmes reinforces the importance of treating diabetes with medications. This consistent messaging helps patients understand the necessity of taking their medications regularly.

*Self-care* motivations also drive adherence. Patients expressed a desire to stay healthy and believed that taking their medications consistently would help them remain free of disease. Moreover, they recognized that staying confident about life required them to manage their diabetes effectively. Patients understood that failure to take medications could worsen their condition or even lead to death, so they motivated themselves to adhere to their treatment regimen to maintain their quality of life.

*Trust in the healthcare system*

Patients expressed strong faith in government healthcare services, especially due to free medication availability and familiarity with doctors. One said, "*I trust the PHC doctor. He knows my sugar problem well*." Positive health outcomes, like reduced tiredness and better sugar control, reinforced this trust. Many continued their treatment because they noticed visible improvements. This belief in care quality fostered consistent adherence.

*Habit formation and routine integration*

Adherence was easier when medication became part of daily routines, like brushing teeth or having tea. One shared, "*It has become part of my day, like eating or praying*." Reminders whether phone alarms or help from family played a key role. For example, "*My wife asks me at 9 every night, 'Did you take the tablet*?'" These routines helped turn adherence into an effortless habit.

## DISCUSSION

The current study aimed to explore the barriers and facilitators to medication adherence among patients with type 2 diabetes mellitus (T2DM) in a rural region of Nagpur through a qualitative approach. The findings revealed multifaceted factors influencing adherence, including patient-related, health system-related, medication-related, and sociocultural aspects. These results resonate with findings from similar qualitative studies conducted in other parts of India and internationally.

One of the predominant barriers identified in our study was a lack of awareness and understanding about the disease and its long-term complications, particularly among elderly and illiterate participants. This finding aligns with the work of Nagpal et al in rural Uttar Pradesh, where limited health literacy contributed significantly to non-adherence.[11] Patients often considered diabetes a temporary condition and discontinued medication once symptoms subsided. Similarly, Shrivastava et al emphasized the role health literacy in a non-adherence.[12] Patients often considered diabetes a temporary condition and discontinued medication once symptoms subsided. Shrivastava et al also emphasized the role of health literacy in a South Indian cohort, reporting that poor knowledge about the asymptomatic progression of diabetes led to erratic medication use.[12]

Another consistent theme was the economic burden of lifelong treatment, especially in households with irregular income. Several participants in the current study mentioned prioritizing family needs over personal medication. These financial constraints have been widely reported in literature. Chowdhury et al in a study from Bangladesh, highlighted that the cost of medications and the absence of health insurance significantly limited adherence among rural patients.[13] Similar findings are found in Gopichandran et al also found that low-income individuals often relied on traditional remedies or delayed care due to affordability issues, which was mirrored by our participants opting for herbal or home remedies.[14]

Health system-related barriers also emerged as a prominent factor. Infrequent availability of medications in primary health centers and long travel distances to the nearest health facility contributed to non-adherence. Participants expressed dissatisfaction with overcrowded government hospitals and preferred visiting private providers, when possible, despite the higher cost. These barriers are comparable to the observations of Patel et al who reported logistical and supply chain issues in rural Gujarat affecting continuous medication availability.[15] Mishra et al noted similar complaints in Odisha, where participants cited poor provider-patient communication and overburdened government facilities as discouraging factors in adherence behavior.[16]

Sociocultural and psychological influences, including stigma, fatalism, and family dynamics, played an influential role in adherence. In the current study, some women were reluctant to disclose their illness to in-laws or husbands and skipped medications during social functions. This finding echoes Rani et al who documented that social stigma and gendered health dynamics were

major obstacles for women in rural Tamil Nadu.[5] Additionally, our study participants often expressed fatalistic attitudes, such as "*what is meant to happen will happen*," discouraging proactive disease management. Balasubramanian et al found a similar fatalistic belief system prevalent among rural patients, which undermined the motivation to adhere to medical advice.[18]

On the other hand, several facilitators of medication adherence were also noted. The presence of family support-particularly from spouses or children-was strongly associated with better adherence. Participants whose family members reminded them to take medicines or accompanied them to health centres were more likely to adhere regularly. This positive influence of familial support is well documented in Kalyango et al who showed that household support in rural Uganda was significantly correlated with better glycaemic control.[19] Similarly, Murugan and Ramaswamy in a qualitative study in Tamil Nadu, found that emotional and instrumental support from family members helped improve treatment-seeking behavior.[20]

Another key facilitator was positive reinforcement from healthcare providers, especially when patients received clear explanations, consistent counselling, and empathetic communication. Participants reported that when doctors explained the importance of regular medication and blood sugar monitoring in simple language, they felt more motivated. This highlights the value of communication in primary care settings. Khan et al in a study conducted in rural Pakistan, also underscored the role of trust and empathy in healthcare delivery, noting that strong patient-provider rapport enhanced compliance.[21] Similarly, Thirunavukkarasu et al emphasized that regular follow-ups and individualized counseling improved medication adherence significantly.[22]

Mobile phone reminders and community health worker visits were additional enablers mentioned by a few participants. These forms of technology-based and community-based support have gained recognition in recent years. For instance, Faruque et al in Bangladesh reported that mHealth interventions, including SMS reminders, significantly improved adherence among rural diabetics.[23] Our findings support the feasibility of such strategies in rural Indian settings as well, especially given increasing mobile penetration. Lastly, internal motivation-particularly among patients who had experienced acute complications or hospitalizations in the past-was a powerful driver of adherence. Participants who had previously been hospitalized due to uncontrolled diabetes appeared more committed to regular medication use. This is consistent with the findings of Khatib et al who noted that "*experiential learning*" (e.g., experiencing complications firsthand) was a strong trigger for long-term behavior.[24]

### *Limitations*

This small sample limits the generalizability of findings to other rural settings, urban areas, or even to the broader population of rural Nagpur.

The data is based entirely on self-reported interviews, which can be influenced by recall bias, social desirability bias, or misreporting.

## CONCLUSION

This study exposed the lacuna in patients' knowledge regarding impact of non- adherence to medication, their misconceptions about adverse effects of medications and their forgetfulness being the barriers to medication adherence. The facilitators to medication adherence explored by this study were support from family, better communication from doctors and the patients' care for themselves.

### *Recommendations*

The barriers explored from this study clearly suggests that the existing lacuna in patients' knowledge about medication adherence need to be addressed with more effective health education. Further studies regarding development of technologies and their effectiveness to create reminders through text messages or other modes for taking medications for diabetic patients in future are needed to overcome unintentional non-adherence to medications. Future studies with longitudinal designs, objective measures are recommended to validate these findings and explore underlying cause.

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