
Exploring the Role of Medication, Diet and Exercise in Treatment Adherence: A Qualitative Study of Patients with Type II Diabetes in Pakistan

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Abstract

Adherence to medication, diet, and physical activity is essential for effective diabetes management, yet patients often struggle to maintain consistency. This study aimed to explore the perceptions, barriers, and facilitators of treatment and lifestyle adherence among patients with type II diabetes in Pakistan through a thematic analysis of semi structured interviews. Using a qualitative descriptive approach, semi-structured interviews were conducted till saturation from patients diagnosed with T2DM. Findings revealed multiple challenges, including dizziness and weakness caused by medication, financial strain in purchasing insulin, transportation difficulties for medical checkups, and cultural pressures to consume sweets during social events. At the same time, participants highlighted significant strengths that supported adherence, such as family reminders, shared dietary practices, incorporating walking and stretching into daily routines, and personal strategies like recording sugar levels and meals in diaries. A central theme capturing the dynamic interplay between barriers and resilience in type II diabetes self-management. These findings underscore that adherence is not a static behavior but a fluctuating process shaped by personal, familial, cultural, and economic influences. The study suggests that healthcare providers should recognize both struggles and strengths when designing patient centered interventions. Tailored counseling, family centered care, and community-based education may enhance adherence and improve long term health outcomes.

Keywords: Diabetes Self-Management, Treatment Adherence, Thematic Analysis, Medication, Social Determinants, Life Style Modification

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1. Introduction

One of the key public health issues is the growing prevalence of Type 2 diabetes mellitus (T2DM) in the world. To manage the complications, medication, diet, and exercise are needed to manage diabetes effectively and enhance the quality of life (American Diabetes Association, 2020). Nevertheless, socioeconomic, literacy, and psychological factors usually act as barriers to the adherence to this treatment plan (Bekele et al., 2020; Rezaei et al., 2019). Lack of adherence enhances the severity of diseases and susceptibility to diseases such as heart diseases and renal failure (World Health Organization, 2021). Effective disease control relies on better compliance (WHO, 2021).

T2DM is a metabolic disease characterized by insulin resistance, which causes rise in level of blood glucose. The disease is normally treated using medications i.e., metformin and insulin, diets and exercise to control glucose levels (American Diabetes Association, 2020). Nevertheless, difficulties in treatment adherence are experienced by many patients due to psychological, social, and environmental reasons, including stress, insufficient support, and poor health literacy (Menezes et al., 2020). Inadequate compliance results in a lack of glycemic regulation and predisposes to the possibility of developing complications like cardiovascular disease and renal failure (WHO, 2021). Thus, such barriers should be taken into consideration to promote adherence and avoid complications.

Over the past few decades, the prevalence of diabetes has grown exponentially, with more than 537 million adults in the world having the disease in 2021 and the figure is set to rise (IDF, 2021). South Asia, especially such countries as Pakistan, is increasing the burden of the disease, and almost 30 percent of the adult population is ill with it, about 33 million individuals (Saeed et al., 2020). There are also other influences that lead to the increase in the prevalence of Type 2 diabetes in such areas including, an increasing level of urbanization, sedentary lifestyle and inadequate dietary practices (Kalra et al., 2015). Moreover, the access to the uniform care, diabetes management education, and support is hindered by the problem of healthcare infrastructure, which worsens the situation (Kalra et al., 2020). Consequently, specific programs aimed at the enhancement of treatment adherence assume a significant role in the treatment of diabetes, especially in the regions with scarce medical services (Sohal et al., 2015).

The adherence of treatment to Type 2 diabetes does not only mean taking medication but also observing the diet and performing exercises on routine basis. Nevertheless, cultural beliefs, low motivation, and alternative and competing priorities of life are some of the obstacles to adherence to such elements among many patients (Siddiqui et al., 2019). The socio-economic factors such as income and access to healthcare services also make it even more difficult to stick to treatment prescription (Ong et al., 2018). Moreover, the adverse effects of medications may reduce the motivation of patients to keep taking them (Jackson et al., 2015). These are the personal and environmental factors that need to be understood in order to create better-focused interventions with a more patient-centered nature (Huang et al., 2019). These barriers need to be addressed, making it possible to provide better care regarding Type 2 diabetes over the long run and support patients to live better lives, which eventually reduces the cost of diabetes-related complications (Jackson et al., 2015).

There are numerous risk factors that cause Diabetes, both Type 1 (T1D) and Type 2 (T2D). In the case of T2D, obesity, unhealthy lifestyle, including the lack of physical activity and unhealthy diet play an essential role (Azarova et al., 2023; Lone and Iraqi, 2022). Also, the prevalence of diabetes is greatly affected by genetics, age, and ethnicity

(Singer et al., 2022). T1D, on the contrary, is mostly genetically determined; particularly, the HLA-DR and HLA-DQ alleles are factors that affect the autoimmune process of the disease causing the destruction of the insulin-producing cells (Belli et al., 2023). Additionally, the interrelation between genetics and conditions is supported by increased maternal age and a family history of diabetes leading to gestational diabetes mellitus (GDM), which is also demonstrated by the multifaceted nature of diabetes prioritization and shaping by environmental factors (Lowe et al., 2023).

Psychological, cultural, and social factors are the major determinants of how well diabetic patients adhere to treatment. Another consideration is the knowledge of a patient towards his treatment plan, which is influenced by the beliefs about diabetes and cultural practices and his emotional support (Świątoniowska-Lonc et al., 2022). Cultural food preferences and socioeconomic barriers may also make adherence to dietary recommendations a difficult task (Shahin et al., 2019). One of the reasons that prevents physical activity adherence is time and lack of motivation, as well as physical constraints, which should be addressed on an individual basis (Basu & Garg, 2017). Adherence can also be decreased by psychological reasons, such as depression, anxiety, and distress resulting from diabetes (Ung, 2017). Hence, individuals need to be granted sufficient support, education, and resources to facilitate better compliance and management of diabetes.

Numerous studies have been conducted on medication adherence, glycemic control, and disease-related knowledge in Pakistan that have examined diabetes management (Taimur et al., 2024; Nazir et al., 2020). Nevertheless, none have specifically discussed the role of medication, diet, and exercise adherence among insulin-dependent patients, especially in such areas as Islamabad and Swabi. Type 2 diabetes (T2D) has become a rising societal health concern across the world, and the World Health Organization (WHO) shows a steep increase in the prevalence (Saher et al., 2022). Researchers across the world note that medication adherence is a problem, particularly in the low- and middle-income nations (Azharuddin et al., 2021; Mahmood et al., 2021). The research paper intends to bridge this gap in Pakistan by contributing comprehensive qualitative research on the psychosocial aspects that determine the acquisition of adherence to diabetes treatment.

2. Method

2.1 Population & Sample

Type-II diabetic patients of Swabi and Islamabad were the population of the study, where 14 participants (7 male, and 7 female) on insulin were selected through purposive sampling till saturation (Palinkas, et al., 2015), to garner rich information rather than what is statistically representative (Etikan et al., 2016). In order to maintain the homogeneity of the sample, the patients injecting insulin at Islamabad and Swabi were sought, where their age was 18-60 years). All patients on average had been on insulin for three months and injecting insulin two times a day (see Table 1).

2.2 Instrument

Semi-structured interviews (Braun & Clark, 2006, 2013, 2021) provided themes on the collected data. Thematic analysis is a sensitive and insightful method that explores transcribed text for structure and patterns and organizes analysis and its presentation (Attride-Stirling, 2001). The interview was presented in a non-directive manner, where efforts are made to develop a rapport with patients with nonjudgmental acceptance (not to upset or irritate them), openness, and empathetic attention. Our semi-structured interview schedule consisted of three simple open-ended questions based on type II diabetes literature and

was based on guidelines (Braun & Clarke, 2006). The questions were followed with prompt or sequential questions to explore if answers to main questions needed clarity or verifications. These questions were sensitive to the personal experience of type II diabetes patients and provided perceptions of patients about psychosocial factors of behavior adherence in detail.

Main questions of the interview consisted of:

1. How do patients with type II diabetes adhere to medication?
2. How do patients with type II diabetes adhere to diet?
3. How do patients with type II diabetes adhere to physical activity?

2.3 Design and Procedure

A qualitative research design using thematic analysis was used to systemize textual data disclosing thoughts and views of type II diabetes patients. Permission was sought from the participants and willing participants were recruited for individual interviews. Participants were informed about the purpose of the study and informed consents were obtained. Each participant was assured that recorded and transcribed data would be kept confidential and anonymous, and all materials associated with the interview will be treated as sensitive. Acronyms for pseudo-names given to patients were used to ensure patients were not identified in any way. Participants had the right to withdraw from the study at any time without providing any reason for it. The interviews were carried out in Urdu and prompts were used when necessary to elaborate the questions. The participants were encouraged to give detailed information in their way. Duration of interviews ranged from 45 to 60 minutes and each participant narrated their experiences in a single session, which were recorded and transcribed. Interviews with patients took a month to complete and were recorded using a portable voice recorder. Once the interview was complete, participants were debriefed and encouraged to ask questions. All relevant regulations have been adhered to throughout the study. A brief therapeutic counseling session was also provided if the participants needed it at the end of the interview.

3. Results

We conducted this study to assess the role of medication, diet and exercise to treatment adherence of type-II diabetic patients. Patients described how medication offered relief (e.g., reduced pain, better sleep) but also led to side effects such as weakness, craving, and digestive discomfort. Lifestyle modification was facilitated through accessible physical activities (e.g., home-based routines, indoor games) and emotional support from family. Self-efficacy emerged from personal strategies like scheduling, monitoring sugar intake, and staying motivated. However, several patients faced cultural sensitivity challenges (e.g., food pressure at gatherings), stigma around insulin, peer/social pressure, and logistical barriers such as travel difficulty and financial constraints. The analysis was divided into three stages of breakdown, exploration, and integration of text (Attride-Strilling, 2001). Interviews were transcribed by the researcher to an appropriate level of detail and for accuracy, the transcripts were checked against the recordings. Reading and re-reading of the data were done by noting down initial ideas. In the second phase coding of prominent, interesting components of the entire data were systematically carried out by collating relevant code to other similar codes and were counted. Efforts were made to ensure that the coding process was thorough, inclusive, and comprehensive. In the third phase, codes were converted into potential themes that were internally coherent, consistent and distinctive and consolidated into sub-themes, which were

synthesized into a singular supra theme, *treatment adherence* (see Table 2).

Adherence to Medication, Diet and Physical Activity

For most patients following the prescribed medication, diet and physical activity led to better management of the condition. As one patient stated:

“Ever since I started medication, diet and physical activity, I can sleep through the night. Before that, I used to wake up 5-6 times to urinate. The pain in my legs has reduced. I can do small chores again, which makes me feel independent.....” (KK, AU & TA).

The above extract from a patient, illustrates how adherence to medical treatment and lifestyle adjustments brought tangible improvements in daily life. The participant emphasized better sleep quality after reducing night-time urination, which suggests a positive shift in overall physical comfort. Relief from leg pain allowed them to engage in routine household activities, restoring a sense of independence and self-worth. Such experiences highlight how consistent medication use, dietary management, and physical activity not only improved health outcomes but also enhanced functional ability and psychological well-being.

“Medication and diet sometimes makes me feel weak or dizzy. I just sit down and wait for it to pass. I often crave sweets even more, which is difficult for me to control. At times, I also worry about gaining weight or developing heart problems because of these changes. Managing all this feels challenging, but I know it is part of living with my condition.....” (RB & AK).

The above excerpt reflects the physical and emotional challenges that accompany treatment adherence. The participant described side effects such as dizziness and weakness, which interfered with daily routines and required rest. Cravings for sweets following insulin intake created additional struggles with dietary control, while concerns about weight and potential heart complications added to the psychological burden. Such experiences demonstrate how, despite following medical advice, individuals may encounter new difficulties that influence both physical well-being and emotional stability. These reflections highlight the importance of providing ongoing support to help patients manage not only the treatment itself but also its unintended consequences.

“I don't have time for gym, but I walk after meals and stretch during prayer times. I play indoor games with my family to keep my body active.....” (RK & TA).

This reflection illustrates how participants adapted physical activity into their everyday routines, even without access to formal exercise settings such as gyms. By integrating walking after meals, stretching during prayer, and engaging in family games, the participant highlighted practical strategies for maintaining physical activity within cultural and household contexts. Such accounts demonstrate that lifestyle modification can be sustained when individuals tailor physical activity to their schedules and social environments. This adaptation not only supports physical health but also fosters family bonding and a sense of shared responsibility toward well-being.

“My family sets an alarm for my medication, diet and physical activity. Family support keeps me regular and disciplined. We all eat the same food now less sugar and less oil it helps me stay on track and makes it easier to follow the plan” (DS & OZ).

This excerpt indicates the crucial role of family support in sustaining treatment adherence. The participant highlighted how reminders from family members promoted consistency in medication intake, diet, and physical activity. Shared dietary changes within the household not only reduced the burden of managing food choices but also created a supportive environment for lifestyle modification. Such narratives illustrate that collective involvement strengthens individual commitment, reinforcing the idea that health management is more sustainable when it becomes a family practice rather than an isolated responsibility.

“I followed the doctor’s instructions exactly: I never skip my insulin dose, I check my sugar levels regularly, and I make sure I don’t miss any of my medicines. To understand my condition better, I also read about what foods are healthy and what to avoid on the internet. This extra information has helped me manage my diet more carefully and given me confidence that I am doing the right things for my health.....” (MB & HN).

This narrative demonstrates the participant’s commitment to medical guidance and self-education. By adhering strictly to prescribed instructions, such as regular sugar monitoring and timely insulin use, the participant displayed a strong sense of responsibility toward treatment. In addition, seeking information online reflects proactive behavior and a desire to enhance personal understanding of diabetes management. These efforts not only supported adherence but also empowered the participant with knowledge, thereby fostering self-confidence and greater control over their condition.

“Whenever I feel like giving up, I think about my children and that thought gives me the strength to continue. They depend on me, and I want to stay healthy for them. To keep myself disciplined, I maintain a diary where I record everything my sugar levels, the timing of injections, and the meals I eat. Writing it down helps me stay accountable and makes me feel more in control of my condition.....” (NM & MK).

Similarly, the above extract presents the patient’s personal motivation and self-regulation strategies contribute to treatment adherence. The participant emphasized the role of family responsibility, particularly the desire to remain healthy for their children, as a powerful source of motivation. In addition, the use of a diary for recording daily routines reflects structured self-monitoring, which enhanced accountability and a sense of control. These reflections suggest that adherence is strengthened when emotional commitments are combined with practical strategies that support consistency and discipline.

“It becomes very difficult to manage my condition during social gatherings like weddings. People keep insisting that I eat sweets, and it is not easy to refuse because they take it personally. At the same time, I often hear comments that using insulin means I am at the last stage of illness. Such remarks scare me and make me feel anxious, as if I am doing something harmful by following the doctor’s advice. These

social pressures sometimes make it harder to stay consistent with my treatment.....” (RB, HM & HK).

This account highlights the impact of social expectations and stigma on treatment adherence. The participant described how cultural practices, such as offering sweets at weddings, created pressure to compromise dietary restrictions. Additionally, misconceptions about insulin use contributed to fear and anxiety, undermining confidence in prescribed treatment. These experiences suggest that beyond medical challenges, individuals face significant social barriers that influence their ability to remain consistent with health behaviors. Addressing such issues requires not only patient education but also broader community awareness to reduce stigma and promote supportive environments.

“Sometimes I miss my regular checkups because of transport difficulties, as the hospital is far and traveling is not always possible. Managing the cost of treatment is also a challenge buying insulin every month puts a heavy strain on my budget. To afford it, I have to cut down on other household needs and expenses. It feels like a constant struggle to balance my health with financial pressures. I skip other things for it.....” (OZ, DS & TA).

This account reflects the economic and logistical barriers that hinder consistent treatment adherence. The participant described how limited access to transport restricted regular medical visits, while the recurring cost of insulin placed a significant financial burden on the household. Such circumstances forced difficult trade-offs between essential needs and health expenses, creating stress and insecurity. These findings highlight that adherence is not only influenced by individual motivation but also by broader structural factors such as affordability and healthcare accessibility. Addressing these challenges requires system-level interventions, including financial support and improved healthcare infrastructure.

“Everyone makes an effort to manage diabetes, and I also try my best. But there are times when it feels overwhelming, and I start to doubt whether I will be able to follow through in the long run. I have the intention to stick to my treatment plan, but on some days I give in to cravings or simply forget to take my medication. These lapses make me feel guilty, yet it is difficult to stay consistent all the time. It’s hard to stay consistent...” (HN, AK & KK).

The above quote presents the tension between motivation and the practical challenges of long-term adherence. The participant expressed strong intentions to manage the illness but also admitted to lapses caused by cravings or forgetfulness. These moments of inconsistency generated feelings of self-doubt and guilt, highlighting the psychological burden of sustaining treatment routines. Such experiences suggest that adherence is not a linear process but a fluctuating journey shaped by personal discipline, emotional resilience, and external circumstances. These findings underline the need for continuous reinforcement and supportive strategies to help individuals sustain their commitment over time.

Table 1
 Demographic Factors of Patients (N=14)

PN	Gender	Age Years	MaritalStatus	Education	Monthly Income in thousands	Insulin (Years)	Co morbidity
DS	Female	31	Married	Grade 08	28	7	HT & CD
RB	Female	48	Married	Uneducated	30	5	CD
TA	Female	52	Married	BS	40	8 M	Arthritis
MB	Female	27	Married	Grade 12	50	11M	PCO
AK	Female	22	Unmarried	BS	80	1	-
HN	Female	27	Unmarried	Uneducated	35	6	Retinopathy
NM	Female	58	Married	MA	38	11	HT
Average		37.8			43	4.5	
MK	Male	45	Married	Grade 10	45	5	CD
HM	Male	37	Married	Grade 08	85	14	HT & RP
HK	Male	22	Unmarried	BS	28	6	-
AU	Male	29	Married	Mphill	90	2	HT
RK	Male	21	Unmarried	BS	40	4	-
OZ	Male	32	Married	Uneducated	130	3	-
KK	Male	59	Married	HSSC	35	7 M	CD
Average		35			64	4.92	

Note. PN = Pseudonym Name of the patient; HT = Primary Hypertension, CD = Cardio Vascular Disease, PCO = Polycystic Ovary Syndrome

Table 2
 Codes, Sub themes and Theme (N=14)

Meaning Unit	Code	Frequency	Sub- theme	Theme
"...followed the doctor's instructions exactly: I never skip my insulin dose, I check my sugar levels regularly, and I make sure I don't miss any of my medicines " (TA)	Health literacy	9	Evaluation about adherence	Behaviour adherence
".....To keep myself disciplined, I maintain a diary where I record everything — my sugar levels, the timing of injections, and the meals I eat. Writing it down helps me stay accountable and makes me feel more in control of my condition..... " (NB & DZ)	Personal strategies	7		
".....difficult to manage my condition during social gatherings like weddings. People keep insisting that I eat sweets, and it is not easy to refuse because they take it personally..... " (AN, RK & RB)	Culture sensitivity	8	Social influence	
".....miss my regular checkups because of transport difficulties, as the hospital is far and traveling is not always possible. Managing the cost of treatment is also a challenge — buying insulin every month puts a heavy strain on my budget " (NB, HN & FK)	Resource navigation	7		
".....can sleep through the night. Before that, I used to wake up 5-6 times to urinate. The pain in my legs has reduced " (HN, NK & TA)	Positive effects	8	Behavior control	
".....Medication and diet sometimes makes me feel weak or dizzy. I often crave sweets even more, which is difficult for me to control " (RB & AK)	Potential side effects	6		
".....I walk after meals and stretch during prayer times. I play indoor games with my family to keep my body active..... " (RK & TA)	Physical activity	7	Planning about adherence	
"...My family sets an alarm for my medication, diet and physical activity. Family support keeps me regular and disciplined" (HN & OZ).	Empowerment	7		

4. Discussion

This qualitative study explored type II diabetes patients' adherence to medication, diet and physical activity. The present study examined patients' experiences of adherence to medication, dietary changes, and physical activity in diabetes management. Findings show that adherence produces tangible improvements in daily functioning participants reported better sleep, less pain, and regained ability to perform routine tasks outcomes that reinforce continued adherence and enhance quality of life (Saleh, 2022; Trief et al., 2023). Despite these benefits, participants described a range of barriers that complicated adherence. Physical side effects (e.g., dizziness, transient

weakness) and treatment-related cravings were commonly reported and undermined daily routines; additionally, misconceptions about therapies (for example, insulin being perceived as a "last-stage" treatment) generated fear and anxiety that could reduce acceptance of recommended care (Bayked et al., 2022).

Our findings revealed that family and household support emerged as a consistent facilitator of adherence. When family members provided reminders, adopted shared dietary practices, or joined in informal activity, patients described greater consistency and less isolation in their self-management. Social support is a best way of boosting the treatment adherence process, research has revealed that

having relatives involved increases the form of consistency and minimizes the act of isolation in the self-management process. In conclusion, DiMatteo (2004) discovered that positive behavior changing behaviors were facilitated by social support, whereas Wenn et al. (2022) found greater compliance to treatment in cardiac patients who perceived they were supported. Martos-Méndez (2015) also emphasized that social support enhances self-efficacy and compliance to treatment.

Similarly, adherence to physical activity tended to be lower and more variable than adherence to medication or diet. Participants who succeeded often did so by embedding activity in daily life (walking after meals, stretching during prayer, playing indoor games) rather than by following structured gym programs consistent with systematic reviews showing wide variability in adherence to exercise interventions and a median adherence around the mid-range in controlled studies (MacDonald et al., 2021). These findings suggest that culturally relevant, time-efficient, home-based activity options are more feasible and likely to be sustained. Structural constraints particularly cost and accessibility played a major role in limiting adherence for some participants. Recurring medication costs (notably for insulin) and transport difficulties for clinic visits forced difficult household trade-offs, sometimes causing skipped appointments or financial sacrifices; research from lower-resource settings similarly identifies supply, affordability, and market failures as important barriers to sustained treatment (Bayked et al., 2022; Saleh, 2022). Policy responses (subsidies, supply-chain improvements, and more accessible local services) are therefore crucial complements to individual-level interventions.

Finally, personal motivation and self-regulation strategies (for example, keeping diaries of glucose readings and medication, and drawing motivation from family responsibilities) helped many participants remain engaged with treatment. These emotional drivers and practical monitoring tools appear to amplify resilience in the face of daily lapses and social pressures, indicating that interventions which combine emotional support, habit-forming tools, and family involvement are likely to yield the greatest gains. In short, improving adherence to medication, diet, and exercise requires an integrated approach that addresses physical side effects, social and cultural dynamics, and structural barriers alongside clear medical guidance and patient education.

Conclusion and Implication

We found that numerous factors affect compliance to medication, eating habits, and physical fitness in type II diabetes beyond willpower i.e., financial constraints, culture pressure, and competing responsibilities. Although, the family support and individual motivation helped in adherence, the structural barrier and social illusions impeded consistency. To achieve successful compliance, patient education is not the sole tool persistently needed and is accompanied by social support, interventions in healthcare system, and policy to enhance accessibility to insulin and medicines affordability. Thus, it is recommended to explore culturally based interventions that involve family and community to improve adherence, particularly in physical activity.

Limitations and Suggestions

Despite its contributions, this study has several limitations. First, the findings are based on qualitative data from a limited number of participants, which may restrict the generalizability of results to wider type II diabetic populations. Second, self-reported accounts may be subject to recall bias or social desirability bias, as participants might underreport lapses or overemphasize adherence. Third, the study focused primarily on patients' perspectives, without including healthcare

providers' or family members' viewpoints, which could have provided a more holistic understanding of adherence. Finally, the study did not quantitatively measure adherence outcomes, such as HbA1c levels or objective activity tracking, which could strengthen the link between reported behaviors and clinical outcomes.

Future studies should include larger and more diverse participant groups across different regions, socioeconomic backgrounds, and healthcare settings to enhance representativeness. Combining qualitative interviews with quantitative measures (e.g., HbA1c monitoring, wearable physical activity trackers, or validated adherence scales) can provide a more comprehensive understanding of adherence behaviors and their impact on health outcomes. Exploring the perspectives of family members, healthcare providers, and community leaders would help identify multi-level strategies that support sustained adherence. Further investigation into the role of health insurance, subsidies, and health system reforms is recommended to address financial and access barriers.

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