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Exploring Patient Experiences with Lifestyle Modifications and Monotherapy in Managing Type 2 Diabetes Mellitus in Primary Care.

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ABSTRACTType 2 Diabetes Mellitus (T2DM) is a growing global health concern, with significant physical, psychological, and social implications. In Pakistan, where health literacy is unevenly distributed and traditional health beliefs remain influential, understanding how individuals self-manage T2DM is essential for designing effective interventions. **Objectives:** This qualitative study aimed to (1) explore how individuals with Type 2 Diabetes experience and implement lifestyle modifications as part of their disease management in a primary care setting; (2) understand patients' perspectives on the use of monotherapy medication in managing their Type 2 Diabetes, including perceived effectiveness and challenges; (3) examine how the combination of daily routines, lifestyle changes, and medication use contributes to the self-management of Type 2 Diabetes among patients receiving care in primary healthcare facilities. **Methods:** Using a qualitative exploratory design, in-depth semi-structured interviews were conducted with 20 participants diagnosed with T2DM, aged 35-55, from Islamabad. Participants were selected through purposive sampling, ensuring variation in gender, education, and socioeconomic backgrounds. Data were analyzed using Thematic Analysis following Braun and Clarke's (2018) six-step framework. **Results:** Seven major themes emerged: (1) Recognition and Response to Symptoms, (2) Lifestyle Modifications, (3) Use of Monotherapy (Metformin), (4) Compliance and Self-Management, (5) Impact on Daily Life and Health, (6) Gaps in Support and Resources, and (7) Patient Recommendations and Beliefs. Participants described challenges in symptom interpretation, dietary control, exercise consistency, and medication adherence. Cultural practices, financial limitations, fear of disease progression, and reliance on informal advice shaped their management strategies. Metformin was generally viewed as accessible and effective, though some reported non-compliance due to forgetfulness or lack of awareness. **Conclusion:** The study emphasizes the need for culturally sensitive, patient-centered care models that integrate lifestyle education, psychological support, and community outreach. Improving awareness, accessibility, and structural support is essential to enhance diabetes outcomes in low-resource settings. Future interventions must be multidimensional, addressing medical, behavioral, and social factors to foster sustainable diabetes management.

Keywords: Type 2 Diabetes, Lifestyle Modification, Metformin, Self-Management, Health Beliefs

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and relative insulin deficiency. It is one of the leading causes of morbidity and mortality worldwide, with a growing burden in low- and middle-income countries due to lifestyle changes and urbanization. According to the International Diabetes Federation (IDF, 2023), over 537 million adults globally are living with diabetes, with Type 2 Diabetes accounting for more than 90% of all cases. Pakistan is among the top ten countries with the highest prevalence of diabetes, with an estimated 33 million cases reported in 2021 (IDF, 2021).

The management of Type 2 Diabetes in primary care has increasingly focused on the role of lifestyle interventions, including diet modification, physical activity, weight management, and behavioral changes, alongside pharmacological therapy. Lifestyle modification is often the first line of treatment and continues to play a pivotal role even when pharmacological agents are introduced (ADA, 2022).

Patients managed with monotherapy, typically metformin, are often advised to adopt lifestyle changes concurrently. However, the success of this dual approach depends on individual experiences, adherence, understanding, and support. While extensive quantitative research has established the efficacy of lifestyle interventions in lowering blood glucose levels and preventing complications, there is limited qualitative insight into how patients perceive, experience, and manage these lifestyle modifications, particularly in conjunction with medication use in primary care settings.

Theoretical Frameworks

Understanding the psychosocial dynamics of diabetes self-management requires a solid theoretical foundation. Various models have been instrumental in shaping health behavior research, providing insights into how and why individuals adopt and maintain lifestyle changes. This section elaborates on five key models relevant to the current study: The Health Belief Model, Social Cognitive Theory, Self-Determination Theory, the Health Action Process Approach, and the Biopsychosocial Model.

Health Belief Model (HBM)

The Health Belief Model (Rosenstock, 1974) is one of the earliest and most widely used theories in health psychology. It suggests that individuals' beliefs about their health condition,

perceived threats (susceptibility and severity), perceived benefits and barriers to action, cues to action (such as medical advice or symptoms), and self-efficacy collectively influence their likelihood of engaging in health-related behaviors. In the context of diabetes, this model helps explain why some patients engage in lifestyle modifications and medication adherence, while others do not. Studies have used HBM to design interventions that improve dietary behaviors and physical activity among diabetic patients (Orji et al., 2012).

Social Cognitive Theory (SCT)

Social Cognitive Theory (Bandura, 1986) emphasizes the interplay between personal factors, environmental influences, and behavior. Central to SCT is the concept of self-efficacy, one's belief in their capacity to perform specific behaviors. Observational learning (e.g., watching peers manage diabetes effectively), reinforcement, and goal setting are key mechanisms. In diabetes care, SCT informs the development of self-management education programs, where patients learn skills and strategies to monitor blood glucose, adhere to diet plans, and stay physically active. Evidence shows that SCT-based interventions can significantly enhance glycemic control and self-care behaviors (White et al., 2009).

Self-Determination Theory (SDT)

Self-Determination Theory (Deci & Ryan, 1985) distinguishes between intrinsic and extrinsic motivation. It posits that fulfilling basic psychological needs, autonomy, competence, and relatedness, is essential for sustaining behavior change. In diabetes management, SDT has been applied to explore how internal motivation impacts dietary adherence, medication routines, and exercise habits. For example, when patients feel their choices are self-directed and supported by their healthcare providers, they are more likely to maintain lifestyle changes (Ng et al., 2012).

Health Action Process Approach (HAPA)

The Health Action Process Approach (Schwarzer, 2008) integrates motivational and volitional processes. It separates the behavior change process into two phases: the motivational phase (risk perception, outcome expectancy, self-efficacy) and the volitional phase (planning, action, maintenance, recovery). HAPA is particularly relevant to chronic disease management, including diabetes, where initiating and sustaining complex behavioral regimens is critical. Interventions grounded in HAPA have demonstrated improvements in dietary control and exercise adherence among diabetic patients (Zhou et al., 2016).

Biopsychosocial Model

Proposed by George L. Engel in 1977, the Biopsychosocial Model serves as an expansion of the traditional Biomedical Model by incorporating psychological and social dimensions alongside biological factors in understanding health and illness. This holistic model is particularly relevant for chronic conditions such as Type 2 Diabetes, which require ongoing management and lifestyle adjustments.

The biological domain in diabetes management includes physiological elements such as blood glucose levels, insulin resistance, and pharmacological treatments (e.g., metformin monotherapy). However, Engel emphasized that focusing solely on these metrics may neglect the broader influences on a patient's health outcomes.

The psychological component encompasses mental health, emotional well-being, stress levels, motivation, and health beliefs. Psychological distress, such as anxiety or depression, can significantly hinder adherence to dietary changes, exercise routines, and medication regimens. Research shows that patients who receive psychological support demonstrate improved self-care behaviors and glycemic control (Gonzalez et al., 2008).

The social aspect of the model includes social support networks, cultural beliefs, economic stability, and patient-provider relationships. In the context of primary care, supportive family dynamics and effective communication with healthcare professionals have been found to improve treatment adherence and encourage sustainable lifestyle changes (Bailey et al., 2014).

By recognizing that diabetes management is not purely a biomedical task but one that is shaped by personal emotions, social environments, and healthcare infrastructure, the Biopsychosocial Model advocates for individualized, patient-centered care. This makes it an appropriate framework for the present qualitative study, which seeks to explore the lived experiences of patients navigating lifestyle modifications and monotherapy within real-world primary care settings.

Together, these theoretical models provide a robust framework for interpreting patients' experiences with lifestyle modifications and monotherapy. By exploring how patients internalize health risks, perceive benefits, feel supported, and sustain motivation, this study will gain deeper insights into their lived experiences and challenges.

These models also underpin interventions aiming to enhance adherence and long-term management behaviors in chronic illnesses like diabetes.

Lifestyle Modifications in Diabetes Management

Lifestyle changes significantly influence the course of diabetes. Regular physical activity helps enhance insulin sensitivity, lower blood glucose levels, and manage weight effectively. Exercise, such as brisk walking, strength training, or aerobic activities, can improve glucose uptake by muscles, contributing to better glycemic control (Colberg et al., 2016). Dietary changes, particularly reducing intake of refined carbohydrates and saturated fats while increasing fiber-rich foods, are associated with improved blood sugar control and lipid profiles (Evert et al., 2019).

Sleep also plays a crucial role in diabetes management. Poor sleep quality and short sleep duration have been linked with increased insulin resistance, poor glycemic control, and a higher risk of developing complications (Reutrakul & Van Cauter, 2014). Ensuring 7–9 hours of restorative sleep per night contributes to better hormonal regulation and metabolic outcomes.

Weight management is another critical component. Excess weight, particularly central obesity, is a known risk factor for insulin resistance. Even modest weight loss (5–10% of body weight) has been shown to improve glycemic outcomes and reduce the need for medication significantly (Look AHEAD Research Group, 2014).

A systematic review by Uusitupa et al. (2019) confirmed that intensive lifestyle interventions in patients with impaired glucose tolerance significantly reduced the progression to Type 2 Diabetes. Similarly, evidence suggests that lifestyle changes can improve glycemic control, reduce the need for medication, and enhance quality of life (Tuomilehto et al., 2001).

Stress management and mental well-being are equally important. Chronic stress elevates cortisol levels, which can lead to increased blood glucose. Incorporating stress-reduction strategies such as mindfulness, relaxation techniques, and counseling can enhance overall diabetes self-care and adherence (Baum & Posluszny, 1999).

Hence, lifestyle modification includes changes in diet, physical activity, and weight management. Numerous studies have demonstrated the efficacy of these interventions in delaying or preventing the onset of Type 2 Diabetes. The Diabetes Prevention Program (DPP)

in the United States found that lifestyle interventions reduced the incidence of diabetes by 58% compared to 31% with metformin alone (Knowler et al., 2002).

Monotherapy in Diabetes Management

Metformin is widely recognized as the first-line pharmacological agent for the management of Type 2 Diabetes Mellitus (T2DM). It works primarily by reducing hepatic glucose production and increasing insulin sensitivity, thereby improving glycaemic control. According to the American Diabetes Association (ADA, 2022), metformin remains the preferred initial pharmacologic agent for most patients with T2DM due to its proven efficacy, low risk of hypoglycaemia, favorable effect on weight, and cost-effectiveness.

Large-scale studies, such as the UK Prospective Diabetes Study (UKPDS, 1998), demonstrated that metformin monotherapy significantly reduced diabetes-related endpoints, including myocardial infarction and all-cause mortality, especially in overweight patients. These findings have solidified its central role in early T2DM management.

The importance of monotherapy, particularly in newly diagnosed patients or those with mild hyperglycaemia, lies in its potential to simplify treatment regimens, enhance patient adherence, and delay the need for combination or insulin therapy (Inzucchi et al., 2015). Simplified regimens have been associated with improved medication adherence, better glycaemic control, and reduced healthcare costs (Polonsky & Henry, 2016).

Moreover, when accompanied by lifestyle modifications such as dietary changes and increased physical activity, monotherapy can be particularly effective. Studies suggest that combining pharmacologic therapy with lifestyle changes enhances glycaemic control more than either approach alone. For instance, the Diabetes Prevention Program (Knowler et al., 2002) found that while metformin reduced the incidence of diabetes by 31%, lifestyle intervention alone led to a 58% reduction, highlighting the complementary role of lifestyle change.

A more recent systematic review by Buse et al. (2020) emphasized that metformin monotherapy remains effective in maintaining glycaemic targets for many patients during the early stages of diabetes. However, they also noted that treatment intensification may be required over time as the disease progresses, reinforcing the need for long-term behavioral change alongside pharmacologic management.

Despite its documented efficacy, the real-world effectiveness of monotherapy is highly dependent on patient adherence, tolerance, and lifestyle habits. Qualitative studies reveal that patient beliefs, understanding of the disease, social support, and healthcare communication significantly influence the successful implementation of monotherapy (Nam et al., 2011).

Patient Experiences and Primary Care Context

A Dutch study by van Dam et al. (2014) revealed that patients valued supportive communication and culturally sensitive advice when adopting lifestyle changes. Another study by Masud Preum et al. (2019) highlighted variability in how patients seek, interpret, and act upon diabetes-related information, underscoring the need for personalized care.

In primary care settings, where time and resources are limited, the quality of patient-provider interaction significantly affects adherence to both medication and lifestyle advice. Nurses and primary care providers play a crucial role in delivering diabetes education and behavioral counseling (Funnell et al., 2009).

Primary care settings in many low- and middle-income countries, including Pakistan, often face constraints such as short consultation times, limited access to trained diabetes educators, inconsistent follow-up systems, and inadequate infrastructure (Ansari et al., 2020). These systemic limitations can make it difficult for patients to fully comprehend and implement lifestyle guidance. Patients may also struggle with limited health literacy, cultural beliefs about illness and food, financial constraints, and lack of social support. A qualitative study by Khunti et al. (2017) reported that patients often felt rushed during consultations and overwhelmed by generic advice, which impeded their ability to personalize or implement lifestyle recommendations.

Moreover, the day-to-day experiences of patients reveal deeper layers of complexity. Some patients perceive lifestyle change as burdensome, especially when faced with conflicting demands such as work, caregiving, or lack of safe environments for physical activity. Others express skepticism about non-pharmacological interventions due to perceived ineffectiveness or past failures (Patel et al., 2015). In contexts where dietary traditions are communal and entrenched, making individualized changes can lead to social friction. These realities often go unnoticed in standardized care protocols.

Despite these challenges, many patients do attempt to make adjustments, particularly when they receive empathetic counseling, culturally tailored guidance, and practical advice that

aligns with their daily realities. This suggests a need to explore not only clinical outcomes but also patient experiences to design more effective, patient-centered interventions (Nam et al., 2011).

Although lifestyle modification is a key component of Type 2 Diabetes management, adherence and implementation remain inconsistent, particularly among patients on monotherapy. There is limited qualitative insight into how these individuals experience and integrate lifestyle changes into their daily routines. This study aims to explore the lived experiences, perceptions, and challenges of patients managing Type 2 Diabetes with lifestyle modifications and monotherapy in primary care. By focusing on this dual approach, the study seeks to inform more patient-centered interventions and enhance understanding of diabetes self-management in real-world primary healthcare settings.

METHODOLOGY

Research Design

This study was conducted to explore the lived experiences of patients managing Type 2 Diabetes Mellitus (T2DM) through lifestyle modification alongside monotherapy. A qualitative exploratory approach was adopted to capture in-depth insights into how individuals implement and maintain lifestyle changes while managing their condition with a single-drug regimen. This design was chosen for its strength in understanding subjective experiences and generating rich, detailed narratives.

Instrument

A comprehensive interview guide was developed in both Urdu and English, incorporating feedback and recommendations from subject matter experts to ensure its relevance and effectiveness. A panel of qualified professionals reviewed a draft version of the guide, providing input to enhance its clarity and alignment with the study's objectives. Expert validation confirmed the significance and appropriateness of each question, and necessary improvements were made accordingly. To facilitate ease of communication, semi-structured interviews were conducted in Urdu, allowing participants to express themselves comfortably. With informed consent, interviews were audio recorded and later transcribed in detail. Using the finalized interview guide, in-depth interviews were conducted to explore participants' perspectives. The sample questions from the interview guide are stated below:

1. Can you describe your journey since being diagnosed with Type 2 Diabetes?
2. What changes, if any, have you made to your daily routine to manage your diabetes?
3. Can you talk about the specific lifestyle modifications you've made, such as your diet, exercise habits, sleep patterns, and work-life balance?
4. What things did you stop doing or cut back on after being diagnosed? What new habits or practices did you adopt?
5. Have you used any traditional, homemade, or desi remedies as part of your diabetes management? *Like herbal drinks, turmeric, methi seeds, karela juice, etc.*

Sampling and Participants

Participants were selected from Islamabad, Pakistan, through purposive sampling to ensure that only individuals with relevant and specific experiences were included, i.e., individuals managing T2DM with lifestyle modifications and monotherapy. The final sample comprised 20 individuals (both male and female) aged 35 to 55 years, who were already diagnosed with Type 2 Diabetes Mellitus and had been managing their condition through lifestyle

modifications and monotherapy. Participants were drawn from diverse educational, socioeconomic, and marital backgrounds to ensure a varied and representative sample.

Data collection continued until data saturation was reached, when no new information or themes emerged. Participants were informed about the purpose of the study, and written consent was obtained. Full confidentiality was maintained throughout the study, and participants were assured of their right to withdraw at any stage. The final sample consisted of (N=20) participants. To maintain participant confidentiality, pseudonyms have been assigned. For the present study, the sample size of 20 individuals conforms to the recommended sample size by Braun and Clarke, 2018 version.

Inclusion Criteria

Participants included in this study were individuals aged between 35 and 55 years who had a diagnosed history of Type 2 Diabetes Mellitus (T2DM). All selected individuals were actively managing their condition through monotherapy, defined as the use of a single oral anti-diabetic medication. Additionally, participants were required to be consistently practicing lifestyle modifications, such as dietary changes, physical activity, or other self-care practices related to diabetes management. Both male and female participants from varied socioeconomic, educational, and marital backgrounds were included to ensure diversity in lived experiences. All participants were required to provide informed consent and demonstrate a willingness to share their experiences openly.

Exclusion Criteria

Individuals were excluded from the study if they were not diagnosed with T2DM or if they were receiving combination pharmacotherapy, including multiple oral drugs or insulin. Those who did not engage in any form of lifestyle modification were also excluded, as the study specifically focused on the dual approach of medication and lifestyle changes. Furthermore, participants with any other chronic illnesses, comorbid conditions, or physical or mental health issues were not considered to avoid confounding factors. Individuals below 35 or above 55 years of age were also excluded to maintain a consistent age range across the sample.

Data Analysis

The data obtained from the interviews were analyzed using Thematic Analysis as outlined by Braun and Clarke (2018). The analysis consisted of the following steps:

- Familiarization with data
- Initial code generation
- Searching for themes
- Reviewing themes
- Defining/naming themes
- Producing the report

This method allowed for the systematic identification, organization, and interpretation of themes relevant to the research objectives. The interviews were transcribed and coded in multiple stages, resulting in the emergence of key themes and subthemes.

To enhance the credibility of the findings, member checking was conducted: participants were invited to review and verify summarized themes to ensure their perspectives were accurately represented. Additionally, methodological triangulation was applied by comparing data across various participant accounts and supporting findings with existing literature. Researcher triangulation was also employed through collaborative coding by the research team to ensure consistency and reduce bias.

Table 1

Demographics of the participants (N=20)

Pseudonyms	Age (years)	Gender	Duration of Diabetes (Years)
AL	39	M	6
IB	36	F	3
WL	53	M	12
AS	47	M	7

LM	41	F	8
SM	39	F	5
RI	50	M	10
IY	40	M	6
WB	39	F	9
AW	35	F	3
SG	32	M	6
WK	53	F	5
AR	37	M	2
LO	47	F	8
SI	43	M	9
HW	37	F	3
MI	38	F	2
AS	40	F	4
WW	52	M	7
HR	45	F	8

RESULTS

Based on the interview transcripts, a total of seven themes emerged, providing a detailed understanding of the various perspectives and personal experiences shared by the participants.

Figure 1

This figure shows all the main themes that emerged from the data. These themes are categorized and detailed as follows, highlighting the important points that were recurrently mentioned throughout the discussions:

1. Recognition and Response to Symptoms, 2. Lifestyle Modifications, 3. Use of Monotherapy (Metformin), 4. Compliance and Self-Management, 5. Impact on Daily Life and Health, 6. Gaps in Support and Resources, 7. Patient Recommendations and Beliefs

MAIN CATEGORY	THEMES
LIFESTYLE MODIFICATIONS AND MONOTHERAPY FOR T2DM	RECOGNITION AND RESPONSE TO SYMPTOMS
	LIFESTYLE MODIFICATIONS
	USE OF MONOTHERAPY (METFORMIN)
	COMPLIANCE AND SELF-MANAGEMENT
	IMPACT ON DAILY LIFE AND HEALTH
	GAPS IN SUPPORT AND RESOURCES
	PATIENT RECOMMENDATIONS AND BELIEFS

Table 2

The description and explanation of emergent themes with their subthemes

Main Themes	Sub-themes	Codes	Description
Recognition and Response to Symptoms	Early Warning Signs	Extreme hunger, shivering, cold sweats, thirst, weakness, weight loss, fatigue, indigestion, frequent urination, dry throat	Participants described classic symptoms that signaled the onset of diabetes.

Main Themes	Sub-themes	Codes	Description
Lifestyle Modifications	Realization and Action	Unaware of the problem, decided to lose weight, family history, regular checkups	Many did not recognize symptoms early but took action after a diagnosis or family prompting.
	Dietary Adjustments	Reduced sugar, eliminated refined flour, fatty foods, bakery products	Most participants adopted healthier eating habits to control their blood sugar levels.
	Inclusion of Alternatives	Fresh juices, herbal teas (kehwa), desi totkay	Participants used traditional remedies in conjunction with dietary improvements.
	Exercise and Physical Activity	Started walking, physical activity, reduced desserts	Incorporation of physical activity was common in daily routines.
	Routine Management	Modified sleep, managed stress, work-life adjustments	Participants altered their routines to accommodate healthier lifestyles.
Use of Monotherapy (Metformin)	Effectiveness and Outcomes	Improved HbA1c, better health, symptom relief	Participants reported that metformin was effective when used with lifestyle changes.
	Compliance and Routine Integration	Part of routine, some forgot, missed doses	Mixed experiences with medication adherence due to busy lives or forgetfulness.
	Accessibility and Tolerability	Affordable, minimal side effects (indigestion)	Metformin was generally accessible and well-tolerated.
Compliance and Self-Management	Role of Education and Class	Higher compliance among educated, lower among uneducated	Socioeconomic and educational factors influenced adherence to treatment plans.
	Barriers to Compliance	Reluctance, financial issues, ignorance	Cultural beliefs, lack of awareness, and affordability issues hindered timely management.
	Trigger for Adherence	Worsening symptoms, fear of insulin or dual therapy	Fear of complications motivated better self-care and lifestyle compliance.

Main Themes	Sub-themes	Codes	Description
Impact on Daily Life and Health	Improved Quality of Life	Better sleep, improved urination and thirst, stabilized blood sugar	Positive health outcomes were observed by participants who complied with treatment.
	Health Awareness	Fear of escalation	Awareness of disease progression helped patients take their condition seriously.
	Stressors	Workplace stress, mismanagement, and lack of healthy food	External stressors and poor access to resources made self-management harder.
Gaps in Support and Resources	Lack of Structured Support	Diabetes seen as "normal," not taken seriously	Minimal social or institutional support for diabetes, leading to neglect.
	Financial and Informational Barriers	Cost of medicine, inconsistent use, and lack of guidance	Financial limitations and lack of sustained health education affected treatment adherence.
	Community Reliance on Informal Remedies	Desi totkay, herbal alternatives tried first	Some preferred home remedies before seeking professional help.
Patient Recommendations and Beliefs	Advice to Others	Eat healthy, manage stress, follow doctor's orders	Participants emphasized long-term commitment to self-care and adherence to medical advice.
	Belief in the Combined Approach	Monotherapy + lifestyle = success	The majority believed diabetes management was most effective with both medication and healthy routines.

Recognition and Response to Symptoms

Sub-themes: *Early Warning Signs, Realization, and Action*

Participants recalled symptoms like extreme thirst, frequent urination, and fatigue that eventually led to diagnosis. Many initially ignored the signs but were prompted by family history or escalating discomfort.

Early Warning Signs

"I felt so weak and thirsty all the time. I thought maybe I was just tired."

Realization

"I kept losing weight even though I wasn't dieting. That's when I decided to get a check-up."

Action

"My sister had diabetes, so I got myself tested just in case, and there it was, I also had diabetes."

Lifestyle Modifications

Sub-themes: *Dietary Adjustments, Inclusion of Alternatives, Exercise and Physical Activity, Routine Management*

Most participants adopted healthier eating habits and incorporated physical activity. Some also leaned on cultural or home remedies.

Dietary Adjustments

"I stopped eating white bread and sweets. Now it's all whole wheat and vegetables."

Inclusion of Alternatives

Exercise and Physical Activity

"I started walking daily. Even if it's just 20 minutes, it helps."

Routine Management

"My mother gave me fenugreek seeds in the morning. I've kept that going."

"I now go to bed earlier and make sure I sleep enough, which helps control my sugar."

Use of Monotherapy (Metformin)

Sub-themes: *Effectiveness and Outcomes, Compliance and Routine Integration, Accessibility and Tolerability*

Participants found Metformin effective and affordable, with few side effects, but adherence varied due to busy schedules or forgetfulness.

Effectiveness and Outcomes

"Metformin helped me get my sugar under control without too many side effects."

Compliance and Routine Integration

"I sometimes forget to take it if I'm busy, but mostly I keep it in my daily routine."

Accessibility and Tolerability

"It's cheap and easy to get, no issue with that."

Compliance and Self-Management

Sub-themes: *Role of Education and Class, Barriers to Compliance, Trigger for Adherence*
Education and socioeconomic status impacted adherence. Participants noted fear of insulin or worsening symptoms as motivators.

Trigger for Adherence

"The doctor said if I control it now, I won't need insulin later. That scared me enough to be serious."

"I knew I had to take medicine, but I didn't even know how serious diabetes was until I fell sick."

Role of Education and Class

"It's hard to follow everything when you don't have money or knowledge."

Impact on Daily Life and Health

Sub-themes: *Improved Quality of Life, Health Awareness, Stressors*
Participants experienced better sleep, energy, and mental clarity with proper management, but external stressors posed ongoing challenges.

Improved Quality of Life

"I used to feel dizzy often. Now with proper diet and medicine, I feel better."

Health Awareness

"Managing my sugar has helped me sleep better and focus more."

Stressors

"There's no healthy food in my office canteen, and I can't always bring homemade food with me. It's frustrating."

Gaps in Support and Resources

Sub-themes: *Lack of Structured Support, Financial and Informational Barriers, Community Reliance on Informal Remedies*

Participants felt overlooked by formal health systems and highlighted confusion from inconsistent advice. Some relied on home remedies first.

Lack of Structured Support

"People think it's a common illness, but they don't realize how hard it is to manage every single day."

Financial and Informational Barriers

"Even the hakeem I usually go to gave me different advice from the doctor. Who do I listen to?"

Community Reliance on Informal Remedies

"I tried herbal stuff first. Only went to a doctor when it didn't work."

Patient Recommendations and Beliefs

Sub-themes: *Advice to Others, Belief in Combined Approach*

Participants advocated for holistic management and long-term commitment to both medicine and lifestyle changes.

Advice to Others

"Eat healthy, don't skip medicine, and keep moving. That's the only way."

Belief in Combined Approach

"Don't rely just on tablets. You have to change your life, too. Both things work together."

DISCUSSION

This study aimed to explore the lived experiences of patients with Type 2 Diabetes Mellitus (T2DM) who are managing their condition through lifestyle modifications and monotherapy, specifically Metformin. The thematic analysis revealed seven core themes, each offering deep insight into how patients perceive, manage, and cope with their condition. The findings align with and extend previous literature, offering a culturally nuanced understanding of diabetes management in a Pakistani context.

Patients' recognition of early symptoms was often delayed, and many initially attributed symptoms like extreme fatigue, thirst, and weight loss to non-medical causes. These findings are consistent with previous research indicating that patients often normalize or misattribute early diabetes symptoms, leading to delays in diagnosis (Collins et al., 2009).

Participants emphasized how symptoms such as weakness, indigestion, and dry throat prompted eventual testing, especially when family history was involved. This supports findings by Nam et al. (2011), who noted that family awareness is a crucial determinant in early diagnosis. Patients' decision to seek medical help often came after symptoms became disruptive to daily life.

Dietary adjustments and exercise were pivotal in patients' self-management practices. Participants reported reducing sugar and refined carbohydrates, incorporating fresh juices, and using herbal remedies. These responses align with studies highlighting dietary control as a cornerstone of T2DM management (Shrivastava et al., 2013).

Exercise, mostly in the form of daily walks, was frequently mentioned. This is in agreement with recommendations from the American Diabetes Association (2023), which stress the role of regular physical activity in glycaemic control. Traditional remedies such as kehwa and green tea were also cited, reflecting the influence of indigenous health beliefs on diabetes care in South Asian populations (Chandwani et al., 2012).

Participants generally viewed Metformin as effective, accessible, and well-tolerated. These findings corroborate previous clinical evidence indicating that Metformin is often the first-line pharmacological treatment due to its cost-effectiveness and minimal side effects (Inzucchi et al., 2012). However, compliance varied. Some participants missed doses due to forgetfulness or lifestyle demands. This highlights the importance of patient-centered care models that consider daily routines, as proposed by Gellad et al. (2011). Adherence could be improved through better health literacy and behavioral interventions.

Educational background and social class played significant roles in shaping treatment compliance. Participants with higher education levels reported better adherence, supporting findings by Rwegerera et al. (2017), which linked health literacy to improved diabetes outcomes.

Barriers such as financial constraints, lack of awareness, and fear of insulin therapy were also reported. These reflect systemic issues, including inadequate health education and resource

availability, as noted by Hill-Briggs et al. (2020). Interestingly, fear of disease progression often acted as a motivator for compliance.

Participants experienced notable improvements in quality of life with effective management. Better sleep, increased energy, and mental clarity were reported outcomes, resonating with the findings of Glasgow et al. (2001) on diabetes-related behavior change.

However, external stressors such as demanding work environments and a lack of healthy food options at workplaces created challenges. This supports the WHO's call for a systemic, multi-sectoral response to non-communicable diseases, particularly in work settings (WHO, 2016).

Participants expressed frustration over the lack of structured support, inconsistent advice from healthcare providers, and the normalization of diabetes within the community. These findings align with those of Karter et al. (2000), who found that fragmented care and poor communication with providers hinder effective management.

Financial limitations and reliance on informal remedies further complicated disease control. The absence of culturally sensitive educational resources and community-based interventions was glaring.

A significant number of participants stressed the need for combining lifestyle changes with medication. This integrated view echoes evidence from Norris et al. (2001), which emphasizes the effectiveness of multi-component self-management programs.

Patients suffering from T2DM also advised others to "eat healthy, take medicine regularly, and manage stress," encapsulating the lived reality of managing a chronic illness in a resource-limited setting.

CONCLUSION

This qualitative study explored the lived experiences of individuals managing Type 2 Diabetes Mellitus (T2DM) through lifestyle modifications and monotherapy in a primary care setting. The study's findings revealed seven central themes: Recognition and Response to Symptoms, Lifestyle Modifications, Use of Monotherapy (Metformin), Compliance and Self-Management, Impact on Daily Life and Health, Gaps in Support and Resources, and Patient Recommendations and Beliefs.

Participants shared that the early signs of diabetes were often misunderstood or ignored until symptoms became severe, prompting diagnosis. Lifestyle changes such as dietary restrictions,

increased physical activity, and the use of herbal and traditional remedies were commonly reported. The role of Metformin as an affordable and generally well-tolerated medication was emphasized, though challenges with compliance were evident due to forgetfulness, lack of routine, or limited awareness. Educational background, socio-economic class, and access to healthcare significantly influenced how participants engaged with self-management strategies. Those with higher literacy and resources were better able to implement and sustain healthy habits and treatment routines. Improvements in physical and emotional well-being were observed in participants who maintained regular medication intake and dietary discipline. Conversely, a lack of support, financial constraints, and inadequate community health education hindered progress for others.

Participants provided practical advice emphasizing stress management, consistent medication use, regular exercise, and dietary control. The study highlights the importance of integrated care models that combine medical treatment with culturally relevant health education and psychosocial support. Tailored interventions are needed to bridge gaps in knowledge and resource accessibility, ultimately improving diabetes outcomes. These insights can guide primary healthcare providers, policymakers, and educators in designing more responsive, inclusive, and effective diabetes care strategies. The findings provide a contextual understanding of how patients navigate diabetes management in their daily lives. They highlight the strengths and gaps within current healthcare systems and reinforce the need for culturally adapted interventions. Education, awareness, and community-based supports must be prioritized to enhance adherence and improve health outcomes.

LIMITATIONS

1. This study utilized a qualitative design with a small, purposive sample drawn from areas within Islamabad. While this approach enabled deep exploration of personal experiences, the findings cannot be generalized to all individuals with T2DM across Pakistan, particularly those from rural regions or different socio-economic backgrounds.
2. The study focused exclusively on patients using Metformin monotherapy and lifestyle modifications. While this narrowed focus offered clarity, it excluded individuals managing diabetes through insulin or combination therapies, thereby limiting insight into the broader spectrum of treatment experiences.

3. The study did not incorporate clinical data or biomarker validation (e.g., HbA1c levels) to corroborate participants' perceptions of health improvement or glycaemic control. This limits the ability to objectively assess the effectiveness of the reported management strategies.

RECOMMENDATIONS FOR FUTURE RESEARCH

1. Future studies should explore the lived experiences of patients managing Type 2 Diabetes Mellitus (T2DM) through a variety of treatments, including insulin therapy, combination medications, and alternative medicine. This would provide a more comprehensive understanding of treatment adherence and patient preferences.
2. While qualitative insights offer depth, future research can benefit from quantitative or mixed-methods designs to validate findings on a larger scale. Incorporating clinical indicators (e.g., blood glucose levels, HbA1c) can help assess the actual impact of self-management strategies and medication adherence.
3. Researchers should include participants from rural, underserved, or culturally distinct regions of Pakistan to identify unique barriers and facilitators of diabetes management across different communities. Comparative studies between urban and rural settings could highlight structural disparities.
4. There is a need for longitudinal research to track changes in patients' management strategies, psychological adaptation, and health outcomes over time. Such studies would help identify critical periods for intervention and sustained behavior change.

IMPLICATIONS

1. The study highlights significant gaps in diabetes-related knowledge, especially among less-educated participants. Healthcare providers should develop and deliver culturally relevant, language-appropriate educational materials focusing on symptom recognition, medication use, and lifestyle adjustments.
2. Given the emotional and social challenges expressed by participants, diabetes management programs should integrate psychological counseling and peer support mechanisms. This can help patients cope with stress, fear of progression, and feelings of isolation.
3. Many participants lacked access to structured support. Primary healthcare systems should incorporate community health workers or mobile health units to provide

consistent follow-up, reinforce healthy behaviors, and offer personalized guidance, especially in low-resource settings.

4. The findings suggest that workplaces and institutions often lack diabetes-friendly environments. Policymakers and employers should consider workplace wellness programs, healthy food options, and flexible scheduling to support diabetic employees in managing their condition effectively.

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