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"I no longer feel that diabetes is the end of everything, but rather the beginning of a healthier lifestyle": Experience of type 2 diabetes mellitus patient to achieve glycemic control

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ABSTRACT

Introduction: This study explored the experiences of patients with type 2 diabetes mellitus (T2DM) who achieved glycemic control.

Methods: A qualitative descriptive design was applied with 15 purposively selected participants from five primary health centers in Surabaya, Indonesia. Participants (8 women, 7 men; aged 40–68 years; diabetes duration 2–15 years) completed in-person semi-structured interviews. Data were analyzed using thematic analysis.

Results: Five themes and 15 sub-themes were derived from the analysis: (1) moving between despair and hope, (2) perceptions of lifestyle changes, (3) social support, (4) coping mechanisms to reduce stress, and (5) barriers to glycemic control. These themes illustrate participants' transition from initial denial and emotional struggle toward adaptation, empowerment, and sustained self-care.

Conclusion: Glycemic control was experienced as both clinical success and personal transformation. Healthcare providers should adopt holistic, patient-centered approaches. Policies that strengthen family engagement and community-based support may enhance self-management and improve quality of life for people with T2DM.

Keywords: diabetes, glycemic control, HbA1c, type 2 diabetes mellitus, metabolic disease

INTRODUCTION

People living with type 2 diabetes mellitus (T2DM) often describe the diagnosis as a turning point in their lives. With lifestyle adjustments, family support, and personal determination, many are able to achieve not only improved glycemic control but also a renewed sense of independence and hope [1, 2]. Such patient experiences highlight the potential for transformation despite the challenges of living with a chronic condition.

Type 2 diabetes mellitus (T2DM) is a chronic metabolic condition that affects millions of people worldwide [3]. T2DM is characterized by hyperglycaemia due to insulin deficiency or resistance [4, 5]. Despite the availability of pharmacotherapy and lifestyle adjustments, the optimization of glycemic control remains a global dilemma [6-8]. Studies consistently show poor glycemic control in various settings: e.g., 70% of Tanzanian patients with T2DM had suboptimal control because they did not have regular follow-up [9]; glycemic control dropped from 57.4% from 2007–2010 to 50.5% from 2015–2018 in the United States [10]; and meta-analysis from sub-Saharan Africa showed that only 30.3% of the patients had good control [11].

Glycemic control is a function of lifestyle, compliance with treatment, and psychosocial factors [12-16]. Medical interventions and structured programs can significantly improve outcomes [17]. Tailored plans including exercise [18], adhering to a diet pattern [19], taking the medication regularly and according to the dosage [20] and weight loss, appears to be a significant factor in achieving glycemic control [21]. Family support, patient willpower, and public awareness also decide long-term success of diabetes control [22-25]. Unfortunately, there is no one-size-fits-all approach.

Beyond clinical management, living with diabetes is a self-modifying process, an initiation of transformative journey. Patients shift from viewing diabetes as a limitation to embracing it as an opportunity for lifestyle change. This is an experience that is immediately linked to mindset alterations, improved self-efficacy, and sustained motivation [30-32]. Those patients who internalize a sense of self-management capability are likely to achieve sustained glycemic control even when errors occur.

Despite these results, the literature remains short of detailing how individuals personally undergo this change and interpret their diagnosis. The majority of studies currently employed quantitative measures of glycemic control, and therefore emotional, psychological, and social perspectives are under researched. Therefore, the aim of this research is to explore the lived experiences of the adults with T2DM in transition from perceiving diabetes as a limitation to an opportunity for lifestyle change. Through the collection of patients' stories, this study seeks to provide a more nuanced perspective and appreciation for the human experience of diabetes that can be applied to develop more patient-centered education and support interventions.

METHOD

Design

This research uses a qualitative descriptive design [26], which is in accordance with the aim of the research to obtain information about the experiences gained directly from the person concerned [27]. Apart from that, this method also allows researchers to carry out an in-depth understanding of participants' perspectives on life experiences of T2DM who have achieved glycemic control. The Consolidated Criteria for Reporting Qualitative Research (COREQ) 32-item checklist for interviews and focus groups was used in this study [28].

Participants and Settings

Participants were recruited between April to June 2023. The participants in this research were 15 T2DM patients who were recruited from primary health care providers using a purposive sampling method. The inclusion criteria were adult T2DM patients, willing to participate in the study, controlled diabetes condition with HbA1c < 6.5% in the last 3 months, and able to recount experiences associated with their illness. The data collection took place between April and June 2023 in five primary health care centers (PHCs) in Surabaya, Indonesia. After obtaining permission from the PHC to collect data, researchers (ROP and SDW) assisted by nurses screened visit data at the community health center to record prospective participants who met the inclusion and exclusion criteria. After identifying potential participants, researchers together with nurses and health cadres contacted potential participants by telephone. If they agree, the researcher will visit each participant's home to provide informed consent and determine an interview schedule. The time and place of the interview were established through an agreement with each participant, which ever made the participant feel most comfortable during the interview and where patient privacy could be maintained.

Data Collection

Semi-structured interviews were conducted between April to June 2023 by ROP (man, lecturer in medical and surgical nursing) and SDW (woman, lecturer in community health). Participants were probed about their experiences with the background and course of the disease, strategies and interventions used, social and environmental support, challenges and obstacles, coping mechanisms and resilience, reflection and learning in controlling blood sugar. The interview guide was developed by ROP and FE, who have experience conducting qualitative interviews. The open-ended nature of semi-structured questions allowed researchers to gather comprehensive data by exploring participant responses further through a predetermined set of prompts and follow-up questions [29], while allowing flexibility for other questions based on the participants' storytelling of their experiences.

The interview questions focused on participants' experience in controlling blood glucose as well as in- depth the experiences and views of participants regarding this matter. The questions for the interview include:

- How did you first find out that you had type 2 diabetes?,
- What was your and your family's reaction when you heard the diagnosis?,
- What lifestyle changes have you made since your diagnosis?,
- What has been your experience with the prescribed medications?,
- How important is the support from family and friends in your diabetes management journey?,
- Have you joined any support groups?,
- What are the biggest challenges you face in managing diabetes?,
- How do you overcome these challenges?,
- What is the most valuable lesson you have learned from your experience?,
- What advice would you give to someone newly diagnosed with type 2 diabetes?

Each participant was interviewed for approximately 60 minutes. In addition to recording the interview, ROP and SDW also took notes of their observations. After all interviews were completed, ROP and SDW held a discussion to review the interim findings from the interviews. Triangulation of the interview and fieldwork observation data was undertaken to enrich the data [30]. Recruiting additional participants ceased when the data reached saturation. Data saturation is obtained when the answers of new participants match those of earlier participants, and no new themes are identified [31]. Data were identified using participant codes. Participant information was also collected, such as age, gender, duration of diabetes, body mass index (BMI), marital status, educational status, and employment status.

Data Analysis

Data management and organization were supported by NVivo version 12. Audio recordings were transcribed verbatim by the first author, who listened to each interview repeatedly to ensure accuracy and familiarity with the data. Analysis followed Braun and Clarke's six steps of inductive thematic analysis, consistent with a qualitative descriptive approach [32].

During initial coding, each transcript was coded line-by-line to capture key ideas. For instance, the participant statement,

> P7 At first I found it difficult to accept the reality and still continued my old habit of drinking sweets. However, when the doctor told me about the risk of amputation… I knew I had to change my life.

was coded as "difficulty accepting diagnosis" and "trigger for lifestyle change." Similar codes were then grouped into categories (e.g., "psychological reaction to diagnosis"), which were further refined into higher-level themes. In this example,

Table 1. Distribution of themes

Themes	Sub-themes
Between despair and hope	Denial and acceptance
	Finding new hope
	Overcoming overwhelm
Perceptions of lifestyle changes	Positive view on changes
	Realize the benefits of lifestyle changes
	Challenges and obstacles
Social support	Family support
	Peer support
	Support groups
Coping mechanisms to reduce stress	Routine activities
	Diversion through work
	Spiritual practices and prayer
Barriers to glycemic control	Dietary challenges
	Exercise challenges
	Social and cultural influences

these categories contributed to the theme "Between Despair and Hope" and the sub-theme "Denial and Acceptance."

This iterative activity was carried out for every transcript until a codebook had been developed, which was then consistently applied to the dataset. Coding decisions, categories, and ultimate themes were regularly discussed by the research team in order to achieve consensus and credibility [31]. NVivo was also used in the development of thematic maps to graphically depict relationships between codes and categories, facilitating easier refinement of themes and sub-themes. Recruitment and data analysis went hand in hand, and we used the data saturation strategy [32]. Data saturation was determined when no new codes, categories, or themes emerged from three consecutive interviews. After the 15th interview, only redundant information was identified, and no novel insights appeared in subsequent coding and thematic discussions. Transcripts from the last three interviews (participants 13–15) were carefully reviewed by the research team to confirm redundancy before deciding to cease recruitment. This process ensured that the dataset comprehensively captured participants' experiences with well-controlled T2DM.

The research team consisted of nursing researchers with clinical and academic backgrounds in diabetes care and qualitative research. The interpretation of participants' accounts may have been influenced by prior clinical practice in caring for T2DM patients. In order to mitigate potential minimal bias, reflexive practices were integrated at each step of the research process. The lead author kept a reflexive journal to record assumptions, preconceptions, and emotional reactions during data collection and analysis. Regular debriefing meetings for the research team were employed to discuss these reflections and critically evaluate how our own perspectives might bias coding and theme development. Explanations that disagreed were debated until a consensus was established to guarantee final themes truly represented participants' voices and not research agendas. This self-reflexive process lent validity and legitimacy to the results.

The final analysis produced five main themes and associated sub-themes (**Table 1**), including "Between Despair and Hope," "Perceptions of Lifestyle Changes," "Social Support," "Coping Mechanisms to Reduce Stress," and "Barriers to Glycemic Control."

Table 2. Respondents' characteristics

Respondent characteristics	Total number	Percentage (%)
Age (years)	15	100%
40 – 49	5	33.3%
50 – 59	4	26.7%
above 60	6	40.0%
Gender		
Male	7	46.7%
Female	8	53.3%
Duration of Diabetes		
2 – 10	4	26.7%
10 – 15	5	33.3%
above 15	6	40.0%
BMI		
Overweight	3	20.0%
Underweight	4	26.7%
Normal	8	53.3%
Marital Status		
Married	9	60.0%
Single	4	26.7%
Widow	2	13.3%
Educational Level		
High School Graduates	10	66.7%
University	5	33.3%
Employment Status		
Employed	10	66.7%
Unemployed	3	20.0%
Retired	2	13.3%

Ethical Considerations

This study received ethics approval from the Health Commission Ethics Committee of the Faculty of Nursing, Airlangga University, Indonesia (2856-KEPK). Participants were required to give their written informed consent to participate free of coercion and indicate their willingness to be recorded during the interview. They could withdraw from study without giving reason, and with no impact on their health care, and could decline to answer any of the questions. Furthermore, the researchers maintained participant privacy throughout the research process. The data was de-identified at the time of transcribing, with participants named according to a number such as P1, P2, and so forth. The study did not have the potential to harm the participants' well-being.

RESULT

Table 2 provides a general summary of participant demographics. The sample included 15 participants with good glycemic control T2DM, representing a cross-section of age, gender, and life circumstances. Participants were aged between 40 and over 60 years, of whom 40.0% were over 60 years, indicating the prevalence of diabetes in old age. Gender representation was balanced (46.7% male, 53.3% female).

Duration of time since diagnosis varied, with 26.7% diabetes duration of 5-10 years, 33.3% 10-15 years, and 40.0% 15+ years, demonstrating recent adjustment as well as long-term experience of management. Most participants (60.0%) were married, emphasizing the importance of supportive family networks, and 13.3% were widowed, possibly having social and emotional repercussions.

Education levels were predominantly secondary, with 66.7% having completed high school; this may affect self-management ability and health literacy. Socioeconomic

diversity was also reflected in the labor market profile: 66.7% employed (mainly in small-scale trade, agriculture, and casual work informal sectors), 20.0% unemployed, and 13.3% retired. These characteristics put into context the difficulties facing participants in adhering to lifestyle modifications advised to them, particularly time availability, availability of resources, and exposure to information about health.

The BMI categories were heterogeneous with 20.0% in the overweight category, 26.7% in the underweight category, and 53.3% in the normal category, showing heterogeneity of the participants' nutritional status. All participants came from the same cultural community emphasizing social gatherings and dining together, which was one of the common barriers to diet adherence in the analysis.

Five themes and 15 sub-themes emerged from the analysis related to the experiences of people with well-controlled T2DM. The themes were:

(1) Between despair and hope,

(2) Perceptions of lifestyle changes,

(3) Social support to achieve glycemic control

(4) Coping mechanisms to reduce stress, and

(5) Barriers to glycemic control (**Table 1**).

The following is a description of each theme and the relevant signposted participant quotes:

Theme 1: Between Despair and Hope

Several T2DM patients initially feel surprised and anxious when they receive a diabetes diagnosis. The majority of participants did not know they had diabetes until they experienced symptoms of polydipsia, polyuria and polyphagia and were confirmed to have diabetes by health workers at the health service. However, over time, they learn to accept their condition and make adjustments to their lifestyle. Some patients experience personal transformation as a result of their journey managing diabetes. They become more aware of the importance of maintaining health, more responsible for their choices, and appreciate life more.

Denial and acceptance

When receiving information about T2DM, many individuals experience rejection and feel distrust of their condition. However, eventually their acceptance came gradually.

P7 At first I found it difficult to accept the reality and still continued my old habit of drinking sweets. However, when the doctor told me about the risk of amputation due to the worsening condition of my feet, I knew I had to change my life. That was a turning point for me. I no longer see diabetes as the end of everything, but as an encouragement to live a better life.

P9 When I first got diagnosed with diabetes, I was in complete denial. I thought, 'This can't be happening to me.' However, after experiencing very severe dizziness and weakness due to lack of blood sugar at that time, I realized that my illness was serious and decided to take control of my health.

Finding new hope

After being able to overcome inner turmoil and information that shocked them, many participants found new hope in their journey. This hope arises from lifestyle changes, support from loved ones, and a new commitment to health and wellness.

P3 Now, I feel like I have new hope in life. I no longer feel that diabetes is the end of everything, but rather the beginning of a healthier lifestyle. I learned to care more about my body and take more responsibility for my own health.

P10 Living with diabetes has given me a new perspective on life. I have become more proactive about my health and appreciate the little things more. This is not the end, but a new beginning.

Overcoming overwhelm

Too much new information and sudden lifestyle changes can feel overwhelming at first. Gradually, participants learn to accept their new reality, finding confidence in their ability to manage diabetes effectively.

P13 For the first few months, I felt overwhelmed by all the information the doctors were giving me. I had to change my diet, exercise regularly, and monitor my blood sugar levels every day. In the beginning, I often felt confused about what I should do. But slowly I learned to take better care of myself.

P12 At first it felt hard, but step by step, I managed to take control. According to the doctor's instructions, I recorded every result of my random blood glucose (RBG) examination. When I see this record, I become motivated and become a positive change.

Theme 2: Perceptions of Lifestyle Changes

The perception of changing lifestyle for participants is not only to fulfill the need to live healthier or build a new habit. Furthermore, participants felt that changing their lifestyle was a turning point in becoming a new, better person. These quotes underscore the importance of positive lifestyle changes in reshaping participants' perceptions of diabetes management.

Positive view on changes

Lifestyle changes for T2DM sufferers are very difficult but can be viewed positively. Participants may see this as an opportunity to start over and make healthier choices that benefit overall well-being.

P1 Changing your lifestyle for the better is like starting a new life and becoming a new person. It's hard, but life is a choice. Healthy or sick choice. Whatever I do, I intend to be healthier.

P12 Adapting to a new lifestyle was challenging, but I started to see it as an opportunity. Discovering new healthy foods and activities makes me feel like I can take control of my life in a positive way.

Realize the benefits of lifestyle changes

Over time, the benefits of lifestyle changes become clear. Better health, increased energy, and more stable blood sugar levels reinforce the importance of these changes.

P6 As time went by, I began to realize that this change actually brought many benefits. I started to feel healthier and more energetic. I've lost weight, and I no longer feel tired or sleepy after eating. Apart from that, my blood sugar levels have become more stable.

P5 At first, I struggled with the change, but now, I see the benefits. I don't get tired easily, and I feel healthier. Regular exercise and a balanced diet have become habits that I enjoy.

Challenges and obstacles

Despite the benefits, maintaining lifestyle changes presents challenges. Social gatherings, cravings, and maintaining consistency in exercise and diet can be significant obstacles.

P14 One of the hardest parts was not eating the foods I loved. I had to look for a healthier and more satisfying alternative. It took time, but in the end, I found foods that were healthy but that worked for me. “I prefer boiled corn but add balado chili sauce.

P4 When there is a gathering with friends, we usually have a big meal. Well, if you refuse an invitation it feels bad, it’s not loyal to your friend. So I still went along but I adjusted the food menu. Or I just eat a little.

Theme 3: Social Support

This theme places greater emphasis on the communal aspects of diabetes management and on the potential benefits of involving social networks in patient care plans. Friends and family were portrayed not only as sources of encouragement but also as important allies in the fight against diabetes. The statement underscores the important role of social support in participants’ success in achieving glycemic control.

Family support

Family support plays an important role in managing diabetes. Encouragement and help from family members can help patients adhere to treatment plans and make healthier lifestyle choices.

P15 The greatest support is of course from family. Because they always remind me to take medicine and eat properly. If I want to give up, I have to be reminded by my family to return to compliance with diabetes treatment. Especially if my blood sugar rises.

P2 My family is my strength. They not only help me stay on track with my medications but also help me get into a healthier eating and exercise routine. Their support makes a big difference.

Peer support

Support from peers, whether friends or colleagues, provides additional motivation and responsibility. Shared experiences and insights from those in similar situations can be very comforting.

P10 My neighbor has the same condition as me. We both have diabetes. So from there we usually shop together, sometimes we like to exchange cooking recipes. The problem is that now you have to go on a diet, so the recipes are also special. I’m happy because I feel like I’m not fighting alone.”

P7 I have a friend on Facebook and he often posts his activities as a diabetic. I like following his updates because they really inspire me. He can remain confident and doesn’t even look like he has diabetes because his body is healthy and fresh.

Support groups

Joining a support group offers a sense of community. Sharing experiences and strategies with others facing the same challenges helps patients feel understood and less isolated.

P14 I joined a support group for diabetes patients. Initially I was invited by a friend to join the Chronic Disease Activity Program (ProLanis). There I met people who experienced the same thing, and we could share experiences and advice. Regular meetings with this group give me a sense of community and help me realize that I am not alone in this struggle.

P11 Being part of a support group is very empowering. Sharing experiences and strategies with others facing the same challenges makes me feel understood and not alone.

Theme 4: Coping Mechanisms to Reduce Stress

The coping mechanisms theme describes how participants develop strategies to face the challenges of keeping their glycemic levels stable. The coping mechanisms that participants implemented included developing a consistent daily routine to reduce stress. Participants managed to keep their glycemic levels stable through a combination of effective coping strategies. They carry out activities that can focus their attention not only on the disease, but on other things that are useful in everyday life.

Routine activities

Establishing a regular routine, such as a morning walk or other exercise, can significantly reduce stress. These activities provide structure and a sense of normality.

P3 Since I developed diabetes, morning walks have become a routine now. Apart from the cool air, the air is also clean. I don’t feel this is a burden, but part of my routine that helps me not to stress.

P6 I find that starting my day with a morning walk can clear my mind and set a positive tone for the rest of the day. This has been an important part of managing my stress and blood sugar levels.

Diversion through work

Engaging in work or a hobby helps keep the mind busy and prevents constant focus on diabetes, serving as a healthy distraction from stress.

P8 When I feel stressed, I always try to divert myself to other activities. That’s why it’s better for me to fill my time by working, because by working I can focus on work without thinking about other things.

P9 Engaging in work and hobbies keeps my mind busy and helps me avoid constantly thinking about my diabetes. Staying busy is a great way to manage my stress and maintain a positive outlook.

Spiritual practices and prayer

Spiritual practices and prayer offer emotional support and peace of mind. Many find calm and strength in their faith, which helps in dealing with the stress of managing diabetes.

P10 During morning prayers, I pray that I will be given health that day. This gives me strength and peace of mind. This helps me start the day with a positive attitude and reduces the stress of managing my diabetes.

P5 I find inner peace in every prayer I make. Attending religious services and praying regularly keeps me calm. I can reduce my stress and not think about all kinds of things.

Theme 5: Barriers to Glycemic Control

Participants expressed the various obstacles they faced on their journey to glycemic control. These barriers include lifestyle challenges and environmental constraints that impact their ability to manage diabetes effectively. Understanding these barriers is critical to designing appropriate and effective interventions in diabetes management.

Dietary challenges

Maintaining a healthy diet can be difficult for participants. In the midst of many temptations and the obligation to continue socializing with the culture around them, participants try to find suitable alternative diets and continue to try to be disciplined, even though it often feels difficult.

P11 It's difficult to maintain a proper diet when there are so many unhealthy food temptations around me. Especially if there is an invitation to eat together, wow... then it will be difficult for me to refuse. But sometimes I think about it too.

P1 Maintaining a healthy diet is difficult when surrounded by temptation. "Meetings in the village or at the office often cause me to lose my diet that is already on track, making it difficult to maintain stable blood sugar levels.

Exercise challenges

Fitting regular exercise into a busy schedule can be very difficult. Physical limitations, lack of time, and fatigue often get in the way of a consistent exercise routine.

P3 The hardest thing for me is exercise. Finding time for regular exercise is a big challenge, especially with a busy work schedule. When you get home you will definitely be tired and want to rest immediately.

P14 I find it difficult to keep exercising because of my joint pain. This is frustrating because I know how important physical activity is for managing diabetes.

Social and cultural influences

Cultural and social expectations around food can make dietary adherence difficult. Social gatherings and cultural norms may pressure individuals to deviate from their dietary plans, thereby affecting blood sugar control.

P4 In my village, there is always a culture of eating when people gather. Sometimes once a week during recitation, sometimes at the PKK women's social gathering, and thanksgiving too. If you don't eat, you feel uncomfortable with your neighbors, they give you food but you don't eat it. I feel confused myself.

P15 When my office friends ask me to go out to eat, I usually just give in. Well, sometimes I eat a little, sometimes I just set aside what I can eat. Usually, I eat vegetables. At least you can still hang out with friends.

DISCUSSION

This study explores the lived experience of type 2 diabetes mellitus (T2DM) patients who have managed to achieve glycemic control. At diagnosis, the majority of the participants reported feelings of shock, denial, and psychological rejection, which initially discouraged adherence to medication. Such emotional responses might lead to poor self-care and risk of complications. In Indonesia, effective control of T2DM is guided on the five pillars of diabetes care. They are education, diet [33], exercise, compliance with medication or insulin, and monitoring blood glucose [34]. While all the participants attempted to embrace these pillars, the majority indicated difficulty in sustaining consistency over a prolonged time. Boredom, anxiety, and even despair were indicated among the participants, with some of them indicating discontinuation of treatment or "vacuum periods" before resumption.

Most participants eventually moved from shock to acceptance, embracing a healthier lifestyle over time and becoming health-oriented. This inner change allowed them to feel a greater sense of responsibility for their own well-being. Many participants reported experiencing renewed optimism, shifting the perception of diabetes not just as a chronic condition but as a driver to lead a healthier life. The overarching theme of "Between Despair and Hope" highlights the central role of psychological adaptation in coping with chronic illness. These findings are consistent with Visagie et al., who listed emotional processing, acceptance, and changing behavior as most essential elements in successful self-management among South African adults with T2DM [35]. Similarly, some qualitative study had also observed that Türkiye's low socioeconomic status patients, in the context of nutrition and affective adversity, relied on family and coping resource support to facilitate adjustment and glycemic control [36, 37]. The similarities highlight the importance of psychosocial and structural support in the sustenance of diabetes self-care.

Participants tended to utilize lifestyle modification as a critical juncture, where they could feel empowered and confident that they could control their disease. Though difficult at first, the process ultimately came to be viewed as a positive experience, resulting in increased energy and better outlook. Previous research has shown that positive psychology-based interventions by improving optimism and well-being can increase adherence and health outcomes [38, 39]. In the present study, participants appreciated lifestyle changes not merely as necessary adjustments but as turning points that affirmed their sense of self-efficacy. Interventions that build lifestyle change in a positive direction and focus on empowerment can thus improve patient engagement and treatment long-term stability.

While these qualitative data provide rich descriptions of patients' experiences, quantitative studies show that psychological, educational, and peer-support interventions yield measurable benefits. For example, a meta-analysis of DSME/S in patients with T2DM found a pooled effect of SMD −0.604 (95% CI −0.854 to −0.353; I^2=90.3; p<0.001) versus control [40]. In absolute terms, another study reported that DSME reduced HbA1c by 0.64 percentage points (95% CI 0.45 to 0.83) [41]. Interventions that added peer support to DSME also improved glycemic control (SMD −0.41; 95% CI −0.69 to −0.13; p<0.001). In a pilot trial of an intervention among African Americans, a peer-support behavioral intervention improved medication taking and produced a modest effect on HbA1c [42]. These data show that the integration of qualitative story-telling with quantitative outcome measures (HbA1c, rates of taking medication, quality of life) can provide a more comprehensive view of the way by which psychological adjustment and lifestyle change are translated into health outcomes [41].

Social support, such as from family, peers, and friends, was also identified as being central to facilitating glycemic control. They not only encouraged participants but also prompted them to adhere to medication schedules and dietary adherence. This is in line with research within African populations, wherein family and social networks were found to be significant in facilitating the care of diabetes [43, 44]. A recent study also identified that culturally rooted social factors, i.e., diabetes distress and perceptions of exclusion, influenced self-care activities and HbA1c levels in Latino adults in the U.S. [45]. Overall, these findings underscore the need for culturally sensitive, family and community-centered support interventions.

Participants employed numerous various coping mechanisms for glycemic control, which involved adopting a daily routine, exercising, participating in support groups, and acquiring stress management. Adaptive coping strategies not only alleviated distress but also allowed participants to remain consistent with healthy behavior. Consistent with research in Zambia, where religious coping and acceptance were reported to be common among diabetic patients, these coping mechanisms may be a buffer against diabetic distress [46]. Emotion-focused coping, particularly among non–insulin-dependent patients, has been associated with improved glycemic control [47]. Recognizing and enhancing adaptive coping strategies may therefore be a beneficial component of diabetes management.

Despite such adaptive behaviors, participants were regularly faced with challenges like temptation by unhealthy food, busy schedules interfering with exercise, and sociocultural pressure to social eat. Cross-national questionnaires confirm that diabetes distress, eating problems, and medication nonadherence (e.g., positive denial, inconsistent testing) are major barriers to best glycemic control [48, 49]. These findings imply that interventions need to address both structural (e.g., access to healthy food and safe spaces for physical exercise) and cognitive (e.g., beliefs and lack of information) barriers to improve adherence.

Participants also reported that variability in blood glucose significantly impacted their mental health, causing stress, anxiety, and hopelessness. Recurring hyperglycemia was found to be emotionally draining, causing frustration and mental fatigue. Past research has also emphasized the correlation between glycemic variability and distress [50, 51]. Integration of psychological services in diabetes care in the form of counseling, stress-reducing strategies, and patient education could act as a buffer against these negative effects and improve quality of life.

To overcome the obstacles that have been discovered in this study, several evidence-based interventions are suggested. Diabetes Self-Management Education and Support (DSMES) programs, particularly when delivered in small groups of high contact, are discovered to improve adherence and glycemic control [52]. In individuals with no family support, family-based coaching and eHealth interventions can engage relatives in treatment and improve outcomes [53]. Peer support interventions have the potential to decrease diabetes-related distress, enhance motivation, and enhance adherence [54]. Moreover, culturally tailored, community-level interventions will likely prioritize sociocultural factors in depth [55]. Finally, technology-based health solutions, such as the Integrated Diabetes Self-Management (IDSM) app, can provide real-time reminders and feedback and enable communication with the healthcare team to support long-term behavior change [56].

Alongside the individual-level interventions, the implications of the findings for health systems and policy are noteworthy. Integrating diabetes self-management training into primary care, subsidized fresh food availability, and promoting workplace-based programs that promote daily physical activity could reduce structural obstacles to patients. Policymakers should also invest in community health worker interventions and culturally adapted peer-support interventions, found to improve adherence and outcomes at the population level. The integration of psychosocial care along diabetes care pathways may also decrease distress and enhance long-term retention.

CONCLUSION

This research demonstrates that achieving glycemic control for type 2 diabetes patients involves a complex, multifaceted adjustment process. By accepting their condition, making lifestyle changes, seeking social support, and employing effective coping mechanisms, patients can discover new hope and enthusiasm for a healthier, more fulfilling life. However, overcoming the obstacles they face requires the right strategies to ensure optimal diabetes management. Long-term success in managing type 2 diabetes mellitus critically depends on support from family, friends, and the community, as well as individualized interventions tailored to each patient's needs.

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Ethical statement: The authors stated that the study was approved by the Health Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga (Approval No. 2856-KEPK). Before recruiting participants, we provided detailed participant information and asked all the participants to confirm their agreement to participate by signing the informed consent form. During data collection, interpreting the analysis, and sharing the findings, confidentiality of all the participants was ensured.

AI Statement: The authors stated that generative AI tools were used to assist in improving the English language clarity. All content was reviewed, edited, and verified by the authors to ensure accuracy and integrity.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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