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Evaluation of Medication Adherence in Patients with Type 2 Diabetes Mellitus: A Mixed-Methods Approach

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Abstract

Background: *Medication adherence refers to how closely an individual follows the prescribed medication regimen. It is essential for achieving desired therapeutic outcomes and improving patient health. Inadequate adherence can result in the deterioration of health conditions, higher mortality rates, and increased healthcare expenses. Diabetes mellitus, being a chronic condition, demands ongoing medical care not only to prevent the onset of serious complications but also to manage them effectively once they arise. A high level of adherence to diabetic medications is necessary, however, it is good to be checked, and finding out various factors contributing to low adherence is mandatory to reduce patient morbidity and mortality.* ***Objectives:*** *(1) To assess medication adherence among people diagnosed with diabetes mellitus. (2) To explore the lived experiences of people diagnosed with diabetes mellitus. (3) To determine the association of medication adherence with selected baseline variables.* ***Methods:*** *The study employed an explanatory sequential design as its research framework. The sample consisted of 100 participants, who were chosen using a purposive sampling technique. Data was collected using a proforma to elicit baseline variables and a semi-structured checklist regarding medication adherence to diabetes. Among 100 samples, 17 samples were reported to have a low level of medication adherence, and they were invited to be a part of an in-depth interview, where data saturation was attained at the 8th sample.* ***Results:*** *In the quantitative arm, the majority of participants (53%) were aged 51–70 years, with 56% being female, 47% having a normal body mass index (BMI), and 41% having a high school education. Most were unskilled workers (46%) and married (96%), with 31% earning a monthly income of Rs.2391–7101. The majority (63%) were using one anti-diabetic drug, and adherence was medium in 48%, high in 35%, and low in 17%. A significant association was found with occupation, but no associations were observed with age, gender, education, income, marital status, BMI, or medication use. In the qualitative arm, key themes identified included perceived challenges (mood changes, fear of side effects), financial constraints (low prioritization, high medication costs), alternative therapies (home remedies, Ayurvedic treatments, weight reduction exercises), lack of knowledge (inadequate healthcare guidance, confusion due to social media), and self-management (diet adaptation, self-regulation of medications, irregular follow-ups).* ***Interpretation and Conclusion:*** *Out of 100 samples from the urban population, 17% had low adherence. This mixed-method study highlights the importance of understanding both the quantitative and qualitative aspects of medication adherence in type 2 diabetes mellitus (T2DM) patients. By tackling the identified obstacles and utilizing the facilitators, healthcare providers can create more effective approaches to boost adherence, leading to better patient outcomes.*

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INTRODUCTION

Oral hypoglycemic agents (OHAs) are highly effective in the management of type 2 diabetes

when taken correctly. The World Health Organization (WHO) defines adherence as "the degree to which a person's actions—such as taking medications, following a prescribed diet, and/or making lifestyle adjustments—align with the advice given by a healthcare provider." Adherence to diabetes medications is essential to achieve effective diabetes management and prevent complications and mortality. Research has demonstrated that the rate of adherence to OHAs ranges from 36% to 93% across various populations [1].

Medication adherence can be influenced by a range of factors, including a lack of understanding of the complex regimen, co-existing health conditions, perceptions of the medication's benefits, side effects, long-term medication costs, and emotional well-being. Additionally, personality traits and cultural factors may affect adherence rates. Poor adherence to prescribed medication regimens contributes to worsening illnesses, increased mortality, and higher healthcare costs [2].

Diabetes mellitus, a chronic condition, requires long-term medical management to prevent severe complications and to address them when they arise. Type 2 diabetes mellitus (T2DM) is an expensive condition that affects a significant proportion of the population, especially individuals aged ≥40 years. The disease may remain undiagnosed for years owing to its typically mild symptoms, such as the absence of ketoacidosis and occasional sporadic symptoms. However, if left untreated, T2DM can lead to serious complications, such as kidney failure, vascular disease (including coronary artery disease), and vision problems [3–6].

The global prevalence of type 2 diabetes is reaching epidemic levels, and its incidence and prevalence continue to increase. The worldwide prevalence of T2DM is estimated to increase from 382 million people in 2013 to 417 million by 2035. This is a significant concern, as T2DM represents the largest healthcare expenditure in many countries owing to the high rates of morbidity and mortality associated with the disease. Moreover, the financial burden of T2DM has been steadily increasing global scale [7].

Need for Study

Type 2 diabetes mellitus is the most common type of diabetes. Its prevalence is 2.4% in rural areas and 11.6% in urban areas, with impaired glucose tolerance also being notably higher in urban populations. India has seen the most significant rise in diabetes cases in recent years, with the number of individuals affected increasing from 108 million in 1980 to 422 million in 2014. Its prevalence has been growing more quickly in low- and middle-income countries than in high-income countries. Diabetes is a major cause of blindness, kidney failure, heart attack, stroke, and lower limb amputation. Between 2000 and 2016, premature deaths due to diabetes increased by 5%. In 2019, approximately 1.5 million deaths were directly attributed to diabetes, whereas in 2012, an additional 2.2 million deaths were linked to elevated blood glucose levels. Type 2 diabetes can be prevented, or its onset can be delayed through a healthy diet, regular physical activity, maintaining a healthy weight, and avoiding tobacco use [8–13].

Diabetes can be effectively managed, and its complications can be prevented or delayed with proper diet, regular exercise, medication, and ongoing monitoring and treatment of associated complications. Adherence to diabetes medication is a critical factor in maintaining good control over the condition and preventing complications and death. Therefore, a comprehensive analytical approach to better understand the specific barriers and facilitators of therapy adherence is urgently needed [14].

REVIEW OF LITERATURE

A study conducted on medication adherence and patient outcomes in type 2 diabetes: a sequential explanatory mixed-methods study in 2021conducted a sequential explanatory study, first collecting and analyzing quantitative data on medication adherence and health outcomes, followed by qualitative interviews to explain the quantitative findings in greater depth. This approach effectively bridges quantitative results with qualitative explanations, offering a clear narrative of how and why adherence impacts patient outcomes [7].

A study conducted on understanding medication adherence in type 2 diabetes: a convergent parallel mixed-methods study in 2019 used a convergent parallel mixed-method design to explore medication adherence, integrating statistical analysis of adherence rates with thematic analysis of patient interviews. This study provides both numerical data and personal insights into adherence behaviors [8].

OBJECTIVES

1. To assess medication adherence among people diagnosed with diabetes mellitus.
2. To explore the lived experiences of people diagnosed with diabetes mellitus.
3. To determine the association of medication adherence with selected baseline variables.

Operational Definition

Adherence

In this study, adherence refers to the extent to which people diagnosed with diabetes adhere to the drug regimen, based on a checklist prepared by the investigator.

Lived Experience

This refers to the feelings and experiences of individuals with low adherence to diabetes medications.

Baseline Variables

In this study, the baseline variables were age, sex, height, weight, body mass index (BMI), education, occupation, monthly income, marital status, duration of diabetes, and number of current anti-diabetic drugs.

Inclusion Criteria

1. 18 years and above
2. On anti-diabetic drugs more than 6 months
3. Who can understand Kannada or English

Exclusion Criteria

1. People who are unconscious
2. People are mentally retarded

METHODOLOGY

1. Official permission was obtained from the Principal.
2. The Institutional Ethics Committee (IEC) clearance was obtained.
3. Administrative approval was obtained from the Principal of St. Johns College of Nursing and Medical Officers of Urban Primary Health Centers.

Quantitative Strand

1. Participants were selected using a purposive sampling method in accordance with the defined inclusion and exclusion criteria.
2. An informational document was provided to the participants, and informed consent was obtained. Baseline data were collected using a structured proforma.
3. Medication adherence was evaluated using a checklist created by the investigator, which took approximately 10 minutes for each participant to complete.

Qualitative Strand

1. After analyzing the results, the participants with low adherence (17) were asked about their willingness to participate in an in-depth interview. Subsequently, informed consent was obtained, and an information sheet was provided to the participants. An in-depth interview was conducted on a one-to-one basis, which was simultaneously audio-recorded. Data saturation was obtained at the 8th sample.
2. From the recorded audio, verbatim and themes were extracted.

RESULTS

Section 1: Description of Baseline Variables of Subjects with Diabetes

Frequency and percentage distribution of baseline variables of samples, including age, sex, BMI, education, occupation, monthly income, marital status, and no. of anti-diabetic drugs are shown in Table 1.

Table 1. Frequency and percentage distribution of baseline variables of samples (n=100).

S.N.	Baseline variables	Frequency	Percentage
1.	*Age*		
	≥50	42	42
	≥50	58	58
	(Mean age is 53 years)		
2.	*Gender*		
	Male	44	44
	Female	56	56
3.	*BMI*		
	Normal	47	47
	Overweight	42	42
	Obese	11	11
4.	*Education*		
	Primary school	14	14
	Middle school	22	22
	High school	41	41
	Intermediate	16	16
	Graduate	7	7
5.	*Occupation*		
	Unemployed	4	4
	Professional	1	1
	Semi-professional	4	4
	Clerical/shop owners	15	15
	Skilled	29	29
	Semiskilled	1	1
	Unskilled	46	46
6.	*Monthly income*		
	Less than Rs.2390	2	2
	Rs.2391–7101	31	31
	Rs.7102–11836	29	29
	Rs.11837–17755	19	19
	Rs.17756–23673	11	11
	Rs.23674–47347	7	7
	Rs.47348 and above	1	1
7.	*Marital status*		
	Married	96	96
	Unmarried	2	2
	Widow	2	2
8.	*Number of anti-diabetic drugs*		
	One	63	63
	Two or more	37	37

Section 2: Description of Medication Adherence

The percentage distribution of the samples based on their level of medication adherence is shown in Figure 1 and Table 2.

Section 3: Description of Association of Medication Adherence of Samples with Their Baseline Variables

A significant association was found with occupation, whereas no significant associations were observed with other baseline factors, including age, sex, education, monthly income, marital status, BMI, and the number of anti-diabetic medications.

Section 4: Thematic Explanation of Lived Experience of Samples with Low Medication Adherence

The themes formed were perceived challenges, financial constraints, alternative therapies, lack of knowledge, and self-management (Figures 2 and 3(a)–(e)).

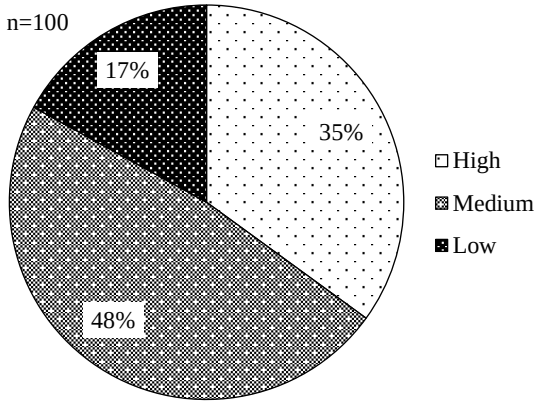

Figure 1. The pie diagram shows the percentage distribution of samples based on their level of medication adherence.

Table 2. Range, mean, and SD of medication adherence.

Variable	Range	Mean	SD
Medication adherence	0-10	5.48	2.3

Inference: The higher the score, the higher the adherence.

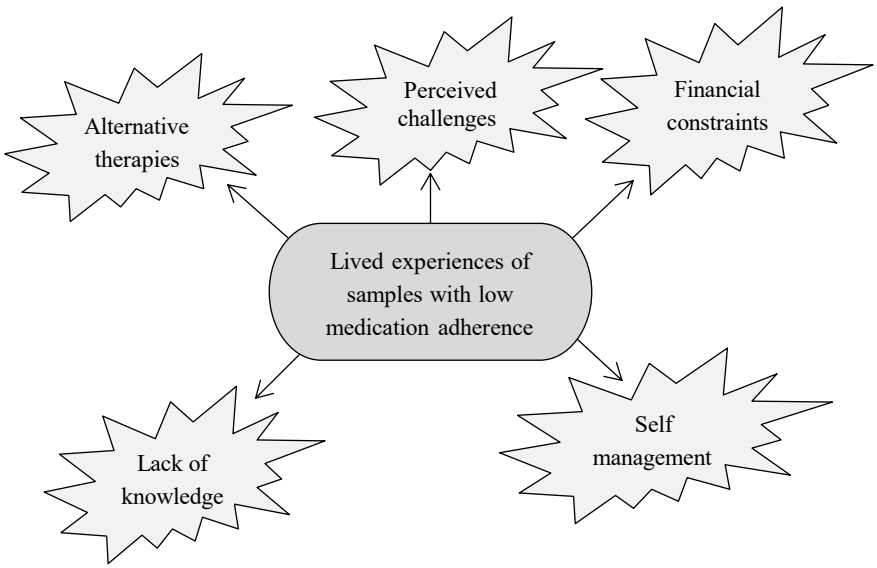

Figure 2. The lived experience of samples with low medication adherence.

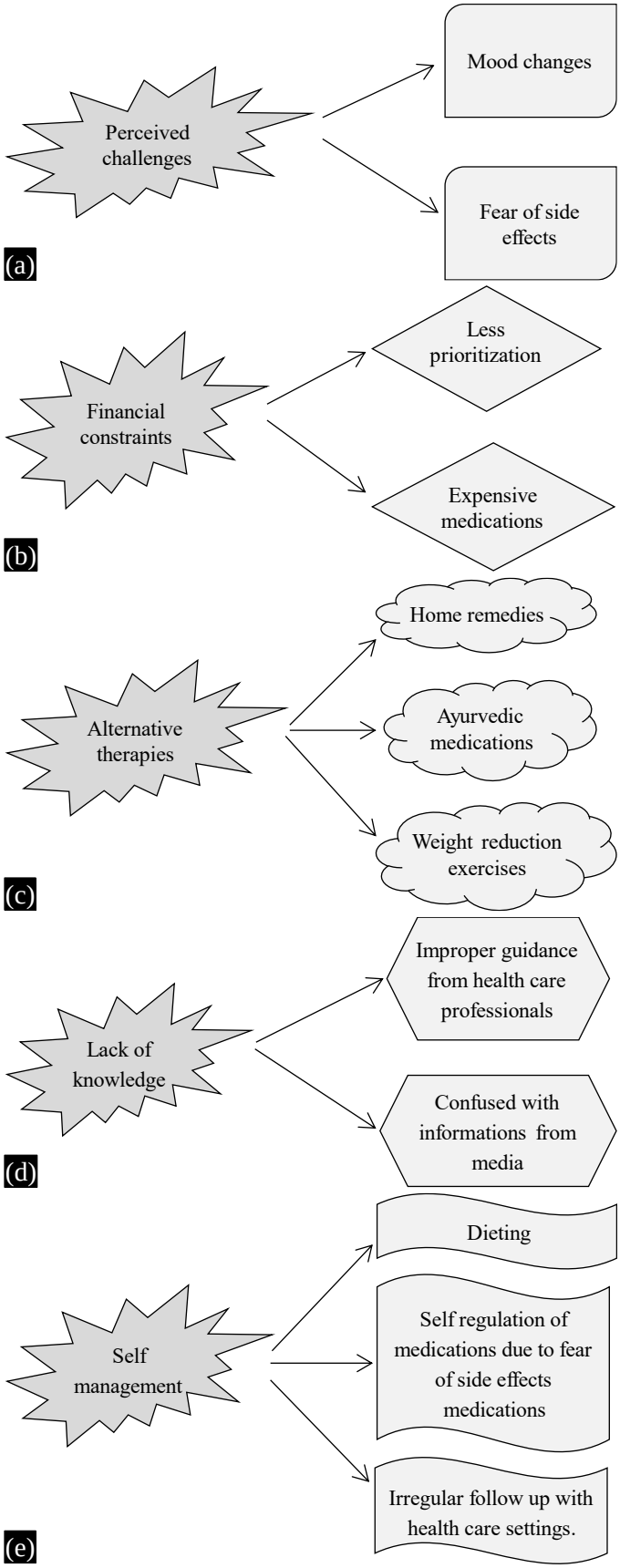

Figure 3. (a) perceived challenges, (b) financial constraints, (c) alternative therapies, (d) lack of knowledge, (e) self-management.

DISCUSSION

The integration of quantitative and qualitative findings offers a comprehensive understanding of medication adherence in T2DM patients. Quantitative data quantified the prevalence and correlations of adherence, while qualitative data provided deeper insights into the personal and systemic factors influencing adherence. For instance, the quantitative finding that older adults had better adherence was supported by qualitative insights, revealing that older patients often had better routines and support systems in place.

The findings of this study align with those of previous research, which highlights various factors affecting medication adherence in patients with T2DM. Similar to other studies, this study emphasizes the crucial role of socioeconomic factors, patient education, and healthcare support in adherence rates. However, this study contributes to existing literature by using a mixed-methods approach, offering a deeper insight into patient experiences and contextual influences on adherence. The results of this study have significant implications for clinical practice. Healthcare providers should prioritize patient education, particularly for younger individuals and those newly diagnosed with diabetes. Interventions aimed at simplifying medication regimens and enhancing social support networks may be particularly effective in improving adherence. Regular follow-up appointments and personalized care plans that consider both the medical and psychosocial components of diabetes management are crucial [15].

Limitations

A limitation of this study was that the data were gathered at only one specific point in time. Future research should consider larger and more diverse populations and explore the impact of specific interventions designed to improve medication adherence. Longitudinal studies could also provide deeper insights into how adherence behaviors change over time and in response to different interventions.

CONCLUSION

This mixed-methods study highlights the importance of understanding both the quantitative and qualitative aspects of medication adherence in T2DM patients. By overcoming the identified obstacles and utilizing facilitators, healthcare providers can create more effective strategies to boost adherence and, in turn, improve patient outcomes.

Conflict of Interest

No conflict of interest.

Funding

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Ethical Approval

Approved by Institutional Ethics Committee (IEC No:50/2022).

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