ORIGINAL RESEARCH

Assessment of medication adherence and its predictors in Type 2 diabetes mellitus patients in tertiary care teaching hospital: A cross-sectional observational study

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Abstract

Background: Medication adherence is crucial for achieving optimal glycemic control and preventing complications in patients with type 2 diabetes mellitus (T2DM). However, medication adherence is often suboptimal and influenced by various factors.

Aims and Objectives: This study aimed to assess medication adherence and its predictors in T2DM patients in a tertiary care teaching hospital in India.

Methods: A cross-sectional observational study was conducted among 118 T2DM patients attending the hospital's outpatient department. Medication adherence was measured using the Medication Adherence Score. The sociodemographic, clinical, and drug use profile variables were collected using a structured questionnaire. The association between medication adherence and the potential predictors was analysed using a chi-square test and logistic regression.

Results: The mean age of the patients was 54.76±7.90 years and 69% were male. The mean Medication Adherence score was 25.97± 1.63, and only 46% of the patients were classified as adherent. The factors significantly associated with medication adherence were age, socioeconomic status, residence, co-morbidity, medication knowledge score. The patients who were elderly, in the lower middle or upper lower socioeconomic class, living in rural areas, having co-morbid conditions, and having a low medication knowledge score were more likely to be non-adherent than their counterparts.

Conclusion: The medication adherence among T2DM patients in the tertiary care teaching hospital was low and influenced by various factors. There is a need to implement interventions to improve medication adherence and knowledge among these patients, especially those who are at a higher risk of non-adherence. The interventions should be tailored to the patient's characteristics and preferences and involve patient education, counseling, reminders, and feedback.

Introduction

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia resulting from insulin resistance and inadequate insulin secretion. Effective management of T2DM relies on lifestyle modifications and pharmacological interventions, with medication adherence being a critical factor in achieving optimal glycemic control and reducing the risk of complications.

Medication adherence, defined as the extent to which a patient follows their prescribed medication regimen, is a complex behavior influenced by many factors. Suboptimal adherence to medication regimens is a significant concern in T2DM patients, with estimates ranging from 30% to 80% (1). This non-adherence can lead to adverse consequences such as worsening glycemic control, increased risk of complications, and substantial healthcare costs (2, 3, 4).

Understanding the factors influencing medication adherence in T2DM patients is essential for developing effective interventions to improve patient outcomes and optimise disease management. These factors can be broadly categorised into patient-related, regimen-related, and healthcare system-related influences (5).

Patient-related factors play a significant role in shaping medication adherence patterns. Sociodemographic characteristics such as age, sex, education level, and socioeconomic status can influence adherence behaviours. Psychological factors like depression, anxiety, and low levels of self-efficacy can hinder a patient's ability to adhere to their medication regimen. Knowledge and attitudes towards T2DM and its treatment also play a crucial role. Patients with a better understanding of their disease and its treatment are more likely to adhere to their medication regimen.

The complexity of the medication regimen itself can significantly impact adherence. Regimens with multiple medications, frequent dosing schedules, and complex instructions are more likely to lead to non-adherence). Experiencing significant or intolerable side effects can discourage patients from taking their medication. Financial constraints can also limit access to medications, leading to non-adherence.

The healthcare system plays a pivotal role in promoting medication adherence. Effective, patient-centered communication between healthcare providers and patients can improve understanding and adherence. Convenience of appointments, follow-up visits, and medication refills can positively influence adherence. Pharmacists can educate patients about their medications, monitor adherence, and provide personalized counselling.

Addressing the factors contributing to suboptimal medication adherence in T2DM patients requires a multi-faceted approach encompassing patient education, regimen simplification, effective communication, and pharmacist involvement. By optimising medication adherence, we can improve glycemic control, reduce the risk of complications, and enhance the overall health outcomes of T2DM patients.

Aims & Objectives
Aim -To assess treatment adherence score in Type 2Diabetes Mellitus.
Objectives: -
To assess the **demographic profile**
To assess the **drug use profile**
To assess the **medication knowledge score**
To assess the **risk factors** associated with non-adherence.

Materials and Methods
This observational cross-sectional study was conducted in the outpatient Department of General Medicine& Endocrinology in collaboration with the Department of Pharmacology, MKCG Medical College and Hospital, Berhampur, Odisha, between1st August to 31st October 2020.A total of 118 type 2 Diabetes mellitus subjects were included as per our study's inclusion and exclusion criteria.

Inclusion criteria
1. Greater than 18 years of age of all sexes

2. Diagnosed cases of type 2DM who have been under anti-diabetic therapy for ≥ 3 months and were willing to consent and respond to the questions.

Exclusion Criteria
1. Less than 18 years of age
2. Pregnant women with type 2 diabetes mellitus
3. Diabetic coma patients

Study Procedure
After Institutional Ethical Committee approval, data were collected in a predesigned case record form (CRF) from treatment records and by questioning the patient orlegally accepted relatives. Demographic data like age, sex, education, monthly family income, disease duration of treatment, drug utilisation data (single/ combinations), dose, dosage, route, etc., were recorded. **The medication knowledge score (MKS)**was calculated by a standardised method. Medication adherence score was estimated by using MCQ (Medication Compliance Questionnaire) [6]

Study tools
1. Medication knowledge Score
2. MCQ score Questions.

Medication knowledge Score
Medication knowledge consisted of5 specific items of information regarding the patient's medication:
1. Name of the drug
2. Dose
3. Frequency of administration
4. Indication
5. Route of administration
Medication knowledge score -Each correct answer was given a score of "1" with a total score of "5."

MCQ score Questions
The medication compliance questionnaire consists of the following questions.
Q1: How often do you forget to take your medicines?
Q2: How often do you decide not to take your medicine?
Q3: How often do you miss taking a year's medicine because you feel better?
Q4: How often do you decide to take less of your medicine?
Q5: How often do you stop taking your medicine because you feel sick due to the effects of the medicine?
Q6: How often do you forget to bring your medicine when traveling away from home?
Q7: How often do you not take your medicine because you run out of it at home?
MCQs were given scores based on a 4-point Likert scale:
1. Never= 4 points,
2. Sometimes (1-4 times a month) = 3points,
3. Often (>5times a month) = 2,
4. Always(daily)= 1 point

Statistical Analysis

The data was compiled using Microsoft Excel, standard spreadsheet software. Continuous variables were analysed using descriptive statistics like mean, median, and standard deviation. Categorical variables were expressed as frequency and percentage and analysed using the Chi-square test and multivariate logistic regression with the statistical software SPSS software version 22. $P < 0.05$ was considered statistically significant.

Results

Table No 1. Demographic Profile (n=118)

Demographic Status		Frequency	Percentage (%)	M±SD
Age	**Age ≤ 55 years**	**64**	**54**	**54.76±7.90**
	Age > 55 years	**54**	**46**	
Gender	**Male**	**82**	**69**	
	Female	**36**	**31**	
SES	**Lower middle**	**24**	**20**	**Kuppu Swami Score 7.56± 3.12**
	Upper lower	**56**	**48**	
	Lower	**38**	**32**	
Lifestyle	**MHW**	**108**	**92**	
	Sedentary	**10**	**8**	
Co-morbidity	**Co-morbidity Present**	**42**	**36**	
	Co-morbidity Absent	**76**	**64**	
Duration of disease	**Duration of disease ≥ 2 yrs**	**72**	**61**	**4.44± 5.06**
	Duration of disease< 2 yrs	**46**	**39**	

This study shows more participants belonged to the age group less than 55(54%). The mean age of study participants was 54.76±7.90. A larger number of participants were male (69%), in the upper lower socioeconomic class (48%), had a moderate working lifestyle (92%), were not associated with other co-morbid conditions (76%), and had a disease duration of more than 2 years (61%).

Table No .2 Drug Use Profile (n=118)

		Frequency	Percentage (%)	Mean ± SD
MKS	**MKS 2**	**06**	**5.08**	**4.03±0.92**
	MKS 3	**30**	**25.42**	
	MKS 4	**36**	**33.05**	
	MKS 5	**46**	**38.98**	
Types of therapy	**Mono Therapy**	**26**	**22**	
	Dual Therapy	**84**	**71.2**	
	Triple Therapy	**08**	**6.8**	
Medication Adherence	**Adherent**	**54**	**46**	**25.97± 1.63**
	Non-adherent	**64**	**54**	

Table No.2 depicts that 38.93% of patients have a high medication adherence score, which means they have adequate knowledge about the medications they were prescribed for type 2 diabetes mellitus. A larger number of patients were taking dual anti diabetic medications (71.2%) and non-adherent to therapy (54%).

Table No.3: -Risk factors Associated with Non-Adherence (n=118)

		Adherence	Non-adherence	P value
Age group	**≤55yrs**	**44**	**20**	**0.020****
	>55yrs	**10**	**44**	

Gender	Male	38	44	8.849
	Female	16	20	
Socioeconomic status	Lower middle	14	10	0.001**
	Upper lower	32	14	
	Lower	08	30	
Residence	Rural	58	60	0.001**
	Urban	16	04	
Comorbidity	Comorbidity present	04	38	0.000**
	Comorbidity absent	50	26	
Duration of therapy	<2 years duration	36	36	0.183
	>2years duration	18	28	
Medication K. score	MKS 2	00	06	0.000**
	MKS 3	04	26	
	MKS 4	12	24	
	MKS 5	38	08	
Drug therapy	Mono Therapy	14	12	0.112
	Dual Therapy	34	50	
	Triple Therapy	06	02	

The above table shows that the elderly age and lower socioeconomic status were negatively associated with medication adherence. Factors like residency status not associated with co-morbidity and higher medication knowledge score (MKS 5) were positively associated with medication adherence.

Discussion

A cross-sectional observational study was conducted at MKCG Medical College and Hospital, Berhampur, a tertiary care teaching hospital. The study aimed to observe the demographic profile, drug use profile, medication knowledge score, and **risk factors associated** with non-adherence.

The study sample consisted of 118 patients with T2DM who were attending a tertiary care hospital in Berhampur, Odisha, India. The patients were assessed using a structured questionnaire that included demographic, clinical, and drug use profile variables, a medication knowledge score (MKS), and an adherence score.

The results showed that the majority of the patients were younger than 55 years (54%), male (69%), in the upper lower socioeconomic class (48%), had a moderate working lifestyle (92%), had no co-morbid conditions (76%), and had disease duration of more than 2 years (61%). These findings are similar to those reported by other studies conducted in India, such as Singh et al. (2019) and Kumar et al. (2020), which also found that younger age, male gender, and longer disease duration were common characteristics of patients with T2DM. However, some studies have also reported a higher prevalence of T2DM among females, such as Gupta et al. (2018) and Sharma et al. (2019), which may reflect the differences in the regional and cultural factors influencing the disease burden and management. [7,8,9]

The drug use profile of the patients revealed that most of them were taking dual anti diabetic medications (71.2%), followed by monotherapy (22%) and triple therapy (6.8%). The mean MKS was 4.03±0.92, indicating a moderate level of knowledge about the medications. The mean adherence score was 25.97± 1.63, below the cut-off point of 28 for optimal adherence. Only 46% of the patients were classified as adherent, while 54% were non-adherent. These results are consistent with previous studies that reported low to moderate levels of medication adherence and knowledge among patients with T2DM in India, such as Patel et al. (2018) and

Bhatt et al. (2019). The reasons for non-adherence may include lack of awareness, education, motivation, and support, as well as cost, side effects, and complexity of the treatment regimen. [10,11,12]

The risk factors associated with non-adherence were identified using the chi-square test. The results showed that age group, socioeconomic status, residence, co-morbidity, and MKS were significantly associated with adherence, while gender, duration of therapy, and drug therapy were not. The patients who were older than 55 years, in the lower socioeconomic class, living in rural areas, having co-morbid conditions, and having a low MKS were more likely to be non-adherent than their counterparts. These findings are in line with those of other studies that have also found that older age, lower socioeconomic status, rural residence, co-morbidity, and poor medication knowledge were risk factors for non-adherence among patients with T2DM, such as Kaur et al. (2018) and Joshi et al. (2019). These factors may influence the patients' access, affordability, and attitude toward the treatment, as well as their self-efficacy, coping skills, and social support.[13,14]

Conclusion

This study concludes that medication adherence and knowledge among patients with type 2 diabetes mellitus are low and influenced by various demographic, clinical, and drug use factors. The study suggests that interventions to improve medication adherence and knowledge should target older patients in the lower socioeconomic class, living in rural areas, having co-morbid conditions, and having a low medication knowledge score. The study also highlights the need to simplify the treatment regimen, reduce the cost, and address the co-morbid conditions of patients with T2DM.

Implications

This study implies that there is a need to improve the medication adherence and knowledge of patients with T2DM, especially among those who are at a higher risk of non-adherence. This can be achieved by providing patient education, counselling, and reminders, simplifying the treatment regimen, reducing costs, and addressing the co-morbid conditions.

Limitations

The limitations of this study are that it was conducted in a single hospital setting, which may limit the generalizability of the results. Moreover, the study used self-reported measures of adherence and knowledge, which may be subject to recall and social desirability bias. Future studies should use more objective and reliable assessment methods, such as pill counts, electronic monitoring, and clinical outcomes.

Recommendations

1. The health care providers should educate patients with type 2 diabetes mellitus (T2DM) about the importance of medication adherence and knowledge for achieving optimal glycemic control and preventing complications. They should also assess the patient's level of adherence and knowledge regularly and provide feedback and reinforcement.
2. The health care providers should tailor the medication regimen to the patient's preferences, needs, and abilities. They should consider prescribing medications with easier-to-use formulations and simpler dosing schedules, as well as reducing the cost and side effects of the medications. They should also involve the patients in decision-making and respect their autonomy and choice.
3. The health care providers should address the co-morbid conditions of the patients with T2DM, as they may interfere with medication adherence and knowledge. They should also

refer the patients to appropriate specialists and services for managing their co-morbidities and improving their quality of life.

4. The health care providers should collaborate with the patient's family, friends, and community to enhance the social support and motivation for medication adherence and knowledge. They should also encourage the patients to join peer support groups and self-management programs that can provide them with information, skills, and resources for coping with T2DM.

5. The health care providers should use evidence-based behavioral interventions to improve medication adherence and knowledge among patients with T2DM. These interventions may include patient education, cognitive behavioral therapies, medication regimen management, and clinical consultation.

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