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ORIGINAL RESEARCH

Compliance Conundrum: Navigating the Challenges in Diabetes Medication Adherence

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ABSTRACT

Introduction: Adhering to medication regimens is crucial for enhancing health outcomes in individuals with diabetes and related comorbid conditions. This study aimed to delve deeply into the factors influencing patient compliance within G2 clinics. **Methods:** This was an observational cross-sectional study conducted among outpatients at G2 Clinics from September 2022 to September 2023. Individuals aged between 10 and 80 years, diagnosed with diabetes mellitus (DM) attending G2 Clinics and currently undergoing treatment with oral hypoglycemic agents and/or insulin therapy were included.Structured interviews were conducted to assess patient compliance, focusing on key topics such as medication adherence, dosage consistency, lifestyle modifications, and barriers to compliance. **Results:** A total of 300 patients were included with mean age of 48.92 years.The majority of patients (64.3%) were in the age group of 31-60 years. Patients aged 61-80 years had comparatively higher medium compliance (56.2%) than other age groups.Medium compliance was observed among patients with diabetic diet (51.5%) whereas low compliance was observed among patients without diabetic diet (53.9%). Higher proportion of patients with duration of type 2 DM<5 years showed low compliance (75.6%). **Conclusion:** This study highlights the need for targeted interventions to improve medication adherence among younger patients.

Keywords: Type 2 diabetes mellitus, medication compliance, Morisky medication adherence score, risk factors

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both [1]. It is a major global health concern due to its increasing prevalence and associated complications, which can lead to significant morbidity and mortality [2]. Effective management of diabetes involves not only lifestyle modifications but also the adherence to prescribed anti-diabetic medications [3]. Adherence, or compliance, to medication regimens is crucial for achieving optimal glycemic control and preventing complications such as cardiovascular disease, neuropathy, retinopathy, and nephropathy [4].

Adherence to diabetes treatment is influenced by various factors including disease complexity, age, gender, self-esteem, stress, depression, patient-provider relationships, social support, and daily life changes [5]. Inadequate compliance can lead to poor glycemic control, which exacerbates the risk of developing diabetes-related complications [6]. Therefore, assessing the level of compliance among diabetic patients, especially those under the care of tertiary healthcare facilities, is essential for identifying gaps in care and implementing strategies to enhance adherence.

Tertiary care settings, such as specialized hospitals and clinics, play a critical role in the management of chronic diseases like diabetes. These settings typically offer comprehensive care, including advanced diagnostic services, specialized treatment options, and multidisciplinary healthcare teams. However, despite the availability of these resources, compliance with prescribed anti-diabetic agents remains a challenge. Patients attending tertiary care facilities often have complex medical needs, and the burden of managing multiple medications can be overwhelming.

This study aimed to delve deeply into the factors influencing patient compliance within the G2 clinics environment. By understanding these gradations, healthcare providers can tailor interventions, educational programs, and support mechanisms to enhance patient adherence to prescribed treatment plans.

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METHODS

This is an observational cross-sectional study conducted among outpatients at G2 Clinics from September 2022 to September 2023. The study unfolds within the premises of G2 Clinics, a specialized healthcare facility catering to patients with diabetes in Ulhasnagar, Thane, Maharashtra. G2 Clinics, known for its comprehensive diabetes care services, serves as an ideal setting to investigate compliance behaviors due to its accessibility and focused patient population. Informed consent was obtained from all patients prior to study enrolment.

Individuals aged between 10 and 80 years, diagnosed with diabetes mellitus (DM) attending G2 Clinics and currently undergoing treatment with oral hypoglycemic agents and/or insulin therapy were included in this study. Patients without a confirmed diagnosis of DM, involved in cases of poisoning or accidents, aged below 10 years or above 80 years and having gestational diabetes were excluded.

Structured interviews were conducted to assess patient compliance, focusing on key topics such as medication adherence, dosage consistency, lifestyle modifications, and barriers to compliance. These interviews, detailed in Annexure 1, provide qualitative insights that help understand patient perspectives and behaviors, offering a comprehensive view of their adherence patterns. To systematically categorize compliance levels, the Morisky Medication Adherence Scale (MMAS Questionnaire) was employed. This validated tool effectively classified compliance into high, medium, and low categories, facilitating a nuanced understanding of patient adherence and enabling targeted interventions to improve overall compliance.

Sample size calculated based on expected prevalence of diabetic patients on medication (26.3%). Resulting in a sample size of approximately 300 patients.

Statistical analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) [IBM

Corporation, Version 23.0, Descriptive statistics was used to summarize the demographic and clinical characteristics of the study population, including means, medians, and standard deviations for continuous variables, and frequencies and percentages for categorical variables.

Inferential statistics was performed to explore associations between patient compliance and various influencing factors. Chi-squared tests was used to determine the association between categorical variables, such as gender, age groups, and adherence levels categorized by the MMAS. Logistic regression analysis was conducted to identify predictors of high versus low compliance, considering potential confounders like socioeconomic status, education level, and duration of diabetes.

RESULTS

A total of 300 patients were included with mean (SD) age of 48.92 (13.52) years. The majority of patients (64.3%) were in the age group of 31-60 years. The proportion of female was more (57.3%).

Medication Compliance Survey

The majority of respondents (106 out of 200) indicate a consistent compliance to their medication schedules, reporting that they do not forget to take their medications.

A substantial proportion (152 out of 200) of respondents demonstrates a commendable practice by not discontinuing medications when they perceive an improvement in their health. The majority (151 out of 200) of respondents affirm their commitment to compliance by stating that they do not skip doses. This Compliance to the prescribed dosage regimen is a positive indication of responsible medication behavior.

A significant majority (158 out of 200) of respondents adhere to their prescribed medication plans and do not take fewer medications than recommended. This aligns with positive medication Compliance behavior.

A substantial number (134 out of 200) of respondents display proactive behavior by ensuring timely medication procurement, as they claim not to forget to buy medications on time. The majority (170 out of 200) finds it not difficult to adhere to their diabetic medication schedule. This positive perception indicates a favorable attitude towards following the prescribed medication plan.

A significant portion (141 out of 200) of respondents does not abstain from taking medications due to perceived side effects. However, this also suggests that side effects are a concern for some respondents, warranting attention and further exploration.

A substantial majority (164 out of 200) does not let cost be a hindrance to medication Compliance.

Demographical profile vs. MMAS score

Patients aged 61-80 years had comparatively higher medium compliance than other age groups. Moreover, low compliance was observed among patients aged 10-30 years (61.5%). Compliance was comparable across gender, marital status, educational level and occupation (Table 1).

Risk factors vs. MMAS scale

Medium compliance was observed among patients with diabetic diet (51.5%) whereas low compliance was observed among patients without diabetic diet (53.9%). There was no effect of physical exercise, family history of diabetes, habit of smoking and alcohol use on MMAS score (Table 2).

Diabetes related information vs. MMAS scale

Significantly higher proportion of patients with duration of type 2 DM <5 years showed low compliance compared to other groups ($p<0.05$).

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Similarly, higher proportion of patients with HbA1c ≥8% observed with low compliance rate (40.7% vs. 49.0% vs. 73.6%; p<0.05). Patients with comorbidities showed medium compliance rate than patients without comorbidities (53.6% vs. 27.5%). Medium compliance rate was observed in patients with knowledge of complications of DM vice versa patients without knowledge of complications of DM showed low compliance rate (Table 3).

Table 1: Association between demographical profile and MMAS scale.

Characteristics	MMAS scale		
	High Compliance (>8)	Medium Compliance (6 – 8)	Low Compliance (<6)
Age group (years)			
10 – 30	-	05 (38.5)	08 (61.5)
31 – 60	-	108 (45.2)	131(54.8)
61 – 80	-	27 (56.2)	21 (43.8)
Gender			
Male	-	74 (49.0)	77 (51.0)
Female	-	66 (44.3)	83 (55.7)
Marital status			
Married	-	122 (48.4)	130 (51.6)
Unmarried	-	18 (37.5)	30 (62.5)
Education level			
Graduate	-	12 (29.3)	29 (70.7)
Primary	-	44 (52.4)	40 (47.6)
None	-	88 (50.3)	87 (49.7)
Occupation			
Employed	-	89 (47.3)	99 (52.7)
Unemployed	-	51 (45.5)	61 (54.5)
Data presented as n (%). MMAS, Morisky medication adherence.			

Table 2: Association of risk factors with MMAS scale.

Characteristics	MMAS scale		
	High Compliance (>8)	Medium Compliance (6 – 8)	Low Compliance (<6)
Diabetic diet			
Yes	-	17 (51.5)	16 (48.5)
No	-	123 (46.1)	144 (53.9)
Physical exercise			
Yes	-	33 (44.0)	42 (56.0)
No	-	107 (47.6)	118 (52.4)
Family history of T2DM			
Yes	-	57 (44.5)	71 (55.5)
No	-	83 (48.3)	89 (51.7)
Smoking			
Yes	-	20 (43.5)	26 (56.5)
No	-	120 (47.2)	134 (52.8)
Alcohol status			
Yes	-	64 (51.2)	61 (48.8)
No	-	76 (43.4)	99 (56.6)
Data presented as n (%). MMAS, Morisky medication adherence; T2DM, Type 2 diabetes mellitus.			

Table 3: Association of diabetes related information with MMAS scale.

Characteristics	MMAS scale		
	High Compliance (>8)	Medium Compliance (6 – 8)	Low Compliance (<6)
Duration of DM (years)			
<5	-	19 (24.4)	59 (75.6)

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5	-	7 (50.0)	7 (50.0)
>5	-	114 (54.8)	94 (45.2)
HbA1c (%)			
<7	-	67 (59.3)	46 (40.7)
7	-	49 (51.0)	47 (49.0)
≥8	-	24 (26.4)	67 (73.6)
Co-morbidities			
Yes	-	118 (53.6)	102 (46.4)
No	-	22 (27.5)	58 (72.5)
Knowledge of complications of DM			
Yes	-	95 (55.2)	77 (44.8)
No	-	45 (35.2)	83 (64.8)
Data presented as n (%). MMAS,Morisky medication adherence; DM, Diabetes mellitus; HbA1c, Glycated hemoglobin.			

DISCUSSION

The assessment of medication Compliance among diabetic patients attending G2 Clinic is crucial for understanding the effectiveness of prescribed treatment regimens and optimizing patient outcomes. Compliance, defined as the extent to which patients adhere to prescribed antidiabetic medications, was evaluated using MMAS, revealing various factors influencing compliance.

The findings indicate a positive effect in compliance behaviors among the majority of respondents, reflecting a commendable commitment to following prescribed treatment plans. This suggests that a significant portion of patients attending G2 Clinic are actively engaged in managing their diabetes through medication adherence.

The data reveals interesting trends regarding medication compliance as measured by the MMAS across different demographic groups. Specifically, patients aged 61-80 years showed comparatively higher medium compliance levels than those in other age groups. This could be attributed to the increased health awareness and routine check-ups commonly observed in this age group. Conversely, a significant proportion of patients aged 10-30 years demonstrated low compliance. This lower compliance might be influenced by factors such as lifestyle, a lack of perceived severity of the condition, or a lesser degree of health-related responsibility often seen in younger populations.

Gender, marital status, educational level, and occupation did not show significant differences in compliance, suggesting that these factors may not be primary determinants of medication adherence in this patient population. This uniformity across such varied demographic characteristics indicates that interventions to improve medication adherence might need to be more focused on age-specific strategies rather than broader demographic categories.

Interestingly, certain factors, such as older age, gender, diabetes duration (≤ 5 years), and family history or comorbidities, showed inconsistent associations with medication adherence within specific demographic sub-domains [7]. While some studies indicate a positive relationship between these factors and medication adherence, others report negative or no associations. older age is associated with poor medication adherence in study conducted in Kolkata from India [8]. However, few studies from Indian subparts specifically from south region reported that older diabetic patients had better medication adherence [9,10].

Dietary habits emerged as a significant factor in medication compliance. Patients adhering to a diabetic diet demonstrated a medium compliance rate of 51.5%, whereas those not following a diabetic diet showed a high low compliance rate of 53.9%. This underscores the importance of dietary management in chronic disease adherence. Despite this, other potential risk factors such as physical exercise, family history of diabetes, smoking habits, and alcohol use did not significantly impact MMAS scores. This indicates that while lifestyle modifications are crucial for overall health management, their direct influence on medication adherence might be more complex and less pronounced.

The duration of diabetes significantly influenced compliance levels. Patients with a disease duration of less than five years showed higher low compliance rates compared to those with a longer duration. This suggestthat newer patients may struggle more with adapting to a long-term medication regimen. However, these results contrast with two other studies examining medication adherence in relation to disease duration [10,11]. One possible explanation is the patient's perception of their susceptibility to the disease and the perceived benefits of the medication they are taking [12].

Furthermore, patients with higher HbA1c levels (≥8%) were significantly more likely to exhibit low compliance, with rates increasing as HbA1c levels rose (40.7% for lower HbA1c vs. 73.6% for the highest HbA1c category). This correlation indicates that poor glycemic control may be both a cause and effect of low medication adherence.

Patients with comorbid conditions exhibited better medium compliance rates (53.6%) compared to those without comorbidities (27.5%). This could be because

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patients with multiple health issues may be more engaged with their healthcare providers and more diligent about following medical advice. This finding aligns with a study conducted in India, which reported that patients with diabetes and hypertension as a comorbid condition were more compliant with their diabetes treatment [12]. Knowledge about the complications of diabetes was linked to better compliance. Patients aware of potential complications showed medium compliance rates, while those without this knowledge were more likely to demonstrate low compliance. Two other factors related to the knowledge subdomain are the level of knowledge about diabetes and its medications [8,13]. Adherence to medication in diabetic patients increases when these factors improve. These findings are consistent with studies conducted in West Asian and Middle Eastern countries, which reported similar results [14,15].

In the realm of clinical practice at G2 Clinics, the findings of this study hold immense significance. Through a focused exploration of patient compliance, healthcare providers can develop personalized approaches to diabetes management, optimizing treatment outcomes for each individual. Moreover, insights gained from this study can inform the design of targeted interventions, educational initiatives, and patient support programs within the G2 Clinics framework.

This study has several limitations. First, the single-clinic setting may limit the generalizability of the findings. Second, the cross-sectional design restricts the ability to establish causal relationships. Finally, reliance on self-reported compliance introduces potential bias.

CONCLUSION

This study highlights the need for targeted interventions to improve medication adherence among specific age groups, particularly younger patients. Dietary management appears to play a crucial role in compliance, emphasizing the need for comprehensive dietary counselling. Additionally, educating patients on the complications of diabetes and ensuring thorough disease management in newly diagnosed patients can significantly enhance adherence rates. Overall, personalized and informed approaches are essential in addressing the multifaceted nature of medication compliance in diabetes care.

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