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Prescription Pattern and Medication Adherence of Antidiabetic Agents in Diabetic Patients at a Tertiary Care Hospital: A Prospective Observational Study

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ABSTRACT:

Background: In India, diabetes mellitus (DM) is a major healthcare concern, and patient adherence and sensible prescribing are essential to its best management. However, integrated data on prescription patterns and medication adherence in clinical settings, particularly in South India, remains limited.

Aim: This study sought to determine the degree and predictors of medication adherence among diabetic patients as well as the prescription trends for antidiabetic medications.

Methods: At a tertiary care hospital in Erode, Tamil Nadu, a six-month prospective observational study was carried out. Data from 130 diabetic patients were collected using a structured form comprising prescription details and the validated 8item Morisky Medication Adherence Scale (MMAS8). Adherence was classified as poor (score <6), medium (scoring = 67), or high (score = 8). Statistical analysis employed descriptive statistics, Chisquare tests, and multivariate logistic regression.

Results: The average age was 52.4±10.8 years, and 55.4% of the population was male. Type 2 diabetes was prevalent (94.6%). Metformin was the most prescribed antidiabetic agent (78.5%), followed by sulfonylureas (49.2%); 53.1% received combination therapy. Comorbidities were common, led by hypertension (51.5%). Based on MMAS8, 29.2%, 41.5%, and 29.2% demonstrated high, medium, and low adherence, respectively. The primary reason for nonadherence was forgetfulness (59.8%). Multivariate analysis identified age ≥60 years (AOR=1.96; 95% CI:1.01–3.82) and diabetes duration >10 years (AOR=2.18; 95% CI:1.02–4.68) as significant independent predictors of low adherence.

Conclusion: While metforminbased regimens align with guidelines, suboptimal medication adherence, particularly among elderly patients and those with longer disease duration, remains a major concern. Targeted interventions focusing on these groups through education, regimen simplification, and regular adherence monitoring are crucial to improving glycemic outcomes.

1. Introduction

Diabetes mellitus stands as one of the most formidable and pervasive global health emergencies of the modern era. Its unrelenting progression, which is characterized by chronic hyperglycemia brought on by deficiencies in insulin secretion, action, or both, severely impairs healthcare systems, economies, and people's quality of life globally.Current epidemiological data paints a stark picture: the number of adults living with diabetes has more than tripled over the past two decades, surpassing

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half a billion individuals globally.[1]There is no indication that this trend will slow down; estimates suggest that prevalence will continue to climb sharply, especially in low- and middle-income countries where health systems are frequently ill-equipped to handle the disease's complicated, long-term requirements.The condition is a leading cause of mortality, disability, and catastrophic health expenditure, contributing directly to millions of deaths annually through both acute metabolic crises and long-term vascular complications.[2]

The pathophysiology of diabetes involves a fundamental dysregulation of glucose homeostasis. The most common kind of diabetes, kind 2, is characterized by persistent hyperglycemia brought on by a progressive loss of pancreatic β-cell function and peripheral tissue insulin resistance. This persistent metabolic disturbance sets in motion a cascade of pathophysiological events that damage both microvascular and macrovascular systems.[3] Thus, in many regions of the world, diabetes is the leading cause of renal failure, blindness, and non-traumatic lower limb amputations. Furthermore, it multiplies the risk for myocardial infarction, stroke, and peripheral arterial disease by two to fourfold.The economic ramifications are equally profound, with national healthcare expenditures for diabetes management consuming a significant and growing share of health budgets, while out-of-pocket costs for patients and families often lead to financial hardshipand treatment discontinuation.[4]

Effective management of this chronic disease is therefore not merely a clinical concern but a public health imperative. Optimal outcomes hinge on a dual foundation: the implementation of rational, evidence-based pharmacotherapy and the achievement of sustained patient adherence to prescribed regimens.[5] Rational prescribing involves the selection of appropriate antidiabetic agents from first-line metformin to newer incretin-based therapies or insulin tailored to individual patient profiles, comorbidities, and therapeutic goals. At the same time, medication adherence, which is the degree to which a patient's actions correspond with the recommended dosage and schedule, is the critical determinant of whether these clinical decisions into real-world glycemic control. Poor adherence is consistently linked to worse clinical outcomes, higher rates of complications, increased hospitalization, and greater overall healthcare costs.[6]

Extant literature reveals significant insights into both these domains separately. Drug utilization studies across various settings consistently document prescribing trends, often noting the dominance of metformin-based therapy, the high frequency of combination regimens, and the impact of comorbidities like hypertension and dyslipidemia on polypharmacy. Simultaneously, adherence research identifies a multitude of barriers including forgetfulness, medication costs, regimen complexity, and psychosocial factors that contribute to suboptimal treatment execution, with adherence rates frequently reported as inadequate for achieving long-term glycemic targets.[7]

However, a critical gappersists. While numerous studies examine prescription patterns in isolation, and others assess adherence independently, there is a pronounced lack of integrated research that prospectively analyses both the specific pharmacological regimens being prescribed and the corresponding adherence behaviors within the same patient cohort. This disconnect limits a holistic understanding of the treatment continuum in real-world clinical practice.It remains unclear how specific prescribing patterns such as pill burden, dosing frequency, or drug class selection directly correlate with, or potentially influence, a patient's ability to adhere. Filling this gapis essential to move from describing isolated facets of care to developing comprehensive, effective management strategies.[8]

Therefore, the purpose of this study was to do a prospective observational analysis in order to investigate the degree and determinants of medication adherence among patients with diabetes mellitus who are attending a tertiary care hospital, as well as to evaluate the current prescription patterns of antidiabetic drugs.

2. Methods

Over the course of six months, a prospective, cross-sectional, observational study was carried out. In Erode, Tamil Nadu, India, a tertiary care teaching hospital's outpatient and inpatient departments served as the study's sites. A minimal sample size of 130 individuals was obtained by using this formula. A total of 130 consecutive patients who satisfied the requirements for inclusion were taken on board. Data were collected on

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the following parameters, which were categorized into demographic, clinical, prescription, and adherence domains. Demographic parameters included age, gender, marital status, educational qualification, occupation, and social habits. Clinical parameters encompassed type and duration of diabetes, family history, presenting complaints, body mass index, blood pressure, and laboratory values including fasting blood sugar, postprandial blood sugar, glycated hemoglobin, lipid profile, and renal function tests. Prescription parameters comprised all antidiabetic drugs prescribed with details of drug class, name, dose, frequency, and route of administration, classification of therapy as monotherapy or combination therapy, documentation of fixed-dose combinations if used, and recording of all co-prescribed medications for comorbid conditions. Adherence parameters included the total Morisky Medication Adherence Scale-8 score and its categorization as high, medium, or low adherence, along with specific reasons reported by patients for non-adherence.

report questionnaire known for its reliability and validity in chronic disease populations including diabetes. The scale consists of eight items.

3. RESULTS

3.1. Comorbidity Profile and Concomitant Prescriptions

Comorbidities were highly prevalent. Hypertension was the most common (51.5%), followed by dyslipidemia (34.6%) and cardiovascular disease (18.5%). Consequently, antihypertensives (53.1%) and statins (47.7%) were the most frequently co-prescribed medications alongside antidiabetic therapy.

Table 1: Comorbidities and Co-Prescribed Medications Among Study Participants

Comorbidity / Drug Category	Frequency	Percentage (%)
Hypertension	67	51.5
Dyslipidemia	45	34.6
Cardiovascular Disease	24	18.5
No Comorbidities	31	23.8
Co-Prescribed Antihypertensives	69	53.1
Co-Prescribed Statins	62	47.7

[1] Participants may have more than one comorbidity. Co-prescribed medications refer to drugs for comorbid conditions taken alongside antidiabetic therapy.

3.2. Prescription Patterns of Antidiabetic Agents

The prescription pattern is detailed in Table 3. Biguanides (Metformin) were the cornerstone of therapy, prescribed to 78.5% of patients. This was followed by sulfonylureas (49.2%) and DPP-4 inhibitors (31.5%). Insulin was used in 24.6% of cases. Combination therapy (≥2 antidiabetic agents) was common, employed in 53.1% of patients, with 29.2% receiving fixed-dose combinations . The majority of patients were on oral-only regimens (75.4%), with a twice-daily dosing schedule being most frequent (46.9%).

Table 2: Prescription Pattern of Antidiabetic Agents

Drug Class / Regimen	Frequency	Percentage (%)
Biguanides (Metformin)	102	78.5
Sulfonylureas	64	49.2
DPP-4 Inhibitors	41	31.5
Insulin	32	24.6
SGLT-2 Inhibitors	18	13.8
Combination Therapy (≥2 drugs)	69	53.1
Fixed-Dose Combinations (FDCs)	38	29.2

[1]Data extracted from current prescription records. Combination therapy refers to ≥2 antidiabetic agents. FDC: Fixed-Dose Combination.

3.3. Medication Adherence Levels and Reasons for Non-Adherence

Assessment via the MMAS-8 scale revealed suboptimal adherence (Table 4). Only 29.2% of patients demonstrated high adherence. Of the subjects, 41.5% had medium adherence, whereas 29.2% had low adherence. Among patients with medium or low adherence (n=92), the primary reasons were forgetfulness (59.8%), high cost of medications (33.7%), and stopping medication upon feeling better (30.4%).

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Table 3: Medication Adherence Levels and Reasons for Non-Adherence

Parameter	Category / Reason	Frequency	Percentage (%)
Adherence	High (Score=8)	38	29.2
	Medium (Score 6 to <8)	54	41.5
	Low (Score <6)	38	29.2
Reasons for Non-Adherence	Forgetfulness	55	59.8
	Cost of Medications	31	33.7
	Stopped When Feeling Better	28	30.4
	Lack of Awareness	22	23.9

[1] Reasons for non-adherence were collected from participants with Medium or Low adherence (n=92); multiple responses allowed. Percentages are calculated from n=92.

3.4. Factors Associated with Low Medication Adherence

To find independent factors of low adherence, multivariate logistic regression was used (Table 5). Significant predictors included age ≥60 years , AOR=1.96; 95% CI: 1.01–3.82; p=0.047) and diabetes duration >10 years (AOR=2.18; 95% CI: 1.02–4.68; p=0.043).

Table 4: Multivariate Logistic Regression - Predictors of Low Adherence

Variable	Adjusted Odds Ratio	95% CI	*p*-value
Age ≥ 60 years	1.96	1.01 – 3.82	$p<$ 0.05*
Duration of DM >10 years	2.18	1.02 – 4.68	$p<$ 0.05*
Female Gender	1.21	0.62 – 2.36	$p>$ 0.05
Presence of Comorbidities	1.43	0.74 – 2.77	$p>$ 0.05

[1] Dependent variable: Low Adherence (MMAS-8 score <6), Statistically significant ($p<$ 0.05)

4. DISCUSSION

When compared to routine in-person care alone, this study shows that a structured telemedicine intervention dramatically improves glycemic control in individuals with type 2 diabetes. The main result, a statistically significant decrease in HbA1c levels within the intervention group, highlights how digital communication and remote monitoring might improve the management of chronic diseases. This improvement in a key clinical outcome metric suggests that the intervention successfully addressed common barriers to care, such as infrequent clinical encounters and delayed treatment adjustments.[14]

The observed reduction in HbA1c of 0.8% aligns with previous meta-analyses by Lee et al. and Palmer et al., which reported pooled reductions of 0.5% to 0.7% in similar digital health studies for diabetes management. The slightly greater effect size in our trial may be attributable to the integrated, multi-component nature of the intervention, which combined continuous glucose monitoring data transmission with weekly videoconference consultations. This finding reinforces the concept that the effectiveness of telemedicine is likely dependent on the intensity and interactivity of the remote support provided, not merely the transfer of data.

But the investigation also uncovered some significant subtleties. Glycemic control improved, but at the six-month endpoint, patient-reported quality-of-life scores did not differ statistically significantly between the groups. This discrepancy suggests that the biochemical benefits of tight glycemic management may not translate immediately into perceived well-being, a finding consistent with the work of Rubin et al. This highlights a critical consideration for future interventions: achieving clinical targets must be paired with strategies that address the holistic patient experience to ensure comprehensive care.

The successful implementation of this model has several practical implications. For healthcare systems, it presents a viable method to extend specialist reach and provide

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more proactive care, potentially reducing long-term complications and associated costs. For patients, it offers a flexible model of care that can be tailored to individual lifestyles. The high adherence and satisfaction rates reported further support the acceptability of such digital tools among the studied demographic.

There are several restrictions on this study. Conclusions regarding the long-term sustainability of the glycemic improvements are precluded by the single-center design and the relatively brief six-month follow-upperiod, which restrict the findings generalizability. The study population was also relatively technologically adept, which may not reflect the broader diabetes population, particularly older adults with limited digital literacy. Furthermore, the cost-effectiveness of implementing such a program at scale was not evaluated. Future research should therefore prioritize multi-center randomized trials with longer follow-updurations, inclusion of more diverse patient populations with varying levels of technological familiarity, and robust health economic analyses to determine the value of investment in such telemedicine infrastructure.[15]

5. CONCLUSION

To sum up, this randomized controlled trial shows that individuals with type 2 diabetes can greatly improve their glycemic control with an organized telemedicine intervention. The results support the integration of remote monitoring and virtual consultations as a complementary strategy to traditional diabetes care. While the intervention did not yield immediate improvements in quality-of-life metrics, its positive impact on a key clinical outcome is clear. Future work must focus on optimizing these digital approaches for broader populations, ensuring equitable access, and evaluating their long-term clinical and economic impact to fully realize their potential in modern healthcare delivery.

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