ORIGINAL ARTICLE

Noncompliance to treatment and Its Associated Factors among Patients with Diabetes Mellitus in Karachi

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ABSTRACT

Background: Noncompliance to treatment is a widespread problem globally, particularly among people with chronic conditions like diabetes mellitus.

Objective: We aimed to assess the frequency of treatment noncompliance and its associated factors among patients with type 2 diabetes.

Methods: The study was conducted at the family medicine outpatient clinics at the Aga Khan Hospital during one month from 1st to 30th December, 2019. Using a cross-sectional design, we recruited 151 patients with type 2 diabetes who willingly agreed to participate in the research. We employed a pre-approved, self-administered, and structured questionnaire to gather data on demographics, clinical features, and treatment compliance among patients.

Results: There were 77 female and 74 male participants. The average age of the participants was 54.7±11.5 years. Among the 151 individuals in the study, 112 were noncompliant with their prescribed treatment. There was a significant association between treatment non-compliance and lower monthly income (p=0.039), participant's age (p=0.020), and duration of the disease exceeding 5 years (p<0.001). The group of patients with noncompliance also had a higher risk of diabetic foot (p = 0.002) and retinopathy (p = 0.009). When asked about their reasons for noncompliance, participants cited drug side effects (91%), forgetfulness to take medications (81%), and complexity of drug therapy (66%).

Conclusion: Our findings revealed a notable prevalence of noncompliance among participants, which was associated with an elevated risk of complications. The Older age and disease duration for longer than 5 years were factors associated the most with noncompliance. Such interventions could significantly reduce the likelihood of developing diabetes-related complications.

Key Words: Noncompliance, Diabetes mellitus, Patients with type 2 diabetes; Primary care

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INTRODUCTION

The occurrence of diabetes mellitus has surged in recent decades, presenting a considerable public health problem. The IDF Diabetes Atlas's 9th Edition reveals that around 463 million individuals aged 20 to 79 have diabetes worldwide, with roughly 193 million cases remaining undiagnosed. Projections indicate that the global diabetic population will reach 700 million by 2045, underscoring the pressing necessity to tackle this escalating challenge.[1]

The burden of this epidemic falls on the low and middle-income countries, where approximately 75% of the diabetic population resides. In Pakistan, the prevalence of diabetes has risen to 17.1%, marking an alarming 148% increase compared to previous reports.[2]

Type 2 diabetes constitutes over 95% of diagnosed diabetes cases and is associated with the development of microvascular and macrovascular complications.[3] Macrovascular complications include stroke, cardiovascular disease, and peripheral artery disease, while microvascular complications encompass diabetic retinopathy, nephropathy, neuropathy, and diabetic foot problems.[4] These complications have a negative impact on the well-being of patients and caregivers, placing a significant burden on healthcare systems. Managing diabetes, a chronic condition, requires a lifelong and intricate treatment approach.

However, achieving optimal control of diabetes is closely tied to patients' adherence to their treatment plans. In healthcare, compliance or adherence refers to how well patients follow the medical advice provided by their healthcare providers. Compliance not only reduces diabetes-related complications but also slows down disease progression, improving patients' quality of life.[5] Successful diabetes management relies on patients' commitment to self-management, including the dietary modifications, exercise routines, medication adherence, blood glucose monitoring, and proper care of the foot. Noncompliance among diabetic individuals is associated with suboptimal glycemic control and negative clinical outcomes. It can lead to worsening health, delayed recovery, increased healthcare costs, and reduced quality of life.

Factors contributing to non-compliance include forgetfulness, lack of understanding, concerns about side effects, financial constraints, and personal beliefs.[6] A report from the World Health Organization indicates that globally, the compliance rate to medications for Type 2 diabetes (T2DM) is around 50%, with lower rates observed in developing countries due to limited resources.[7]

Noncompliance with medical treatment can stem from various factors, including patient-related, therapy-related, and healthcare system-related factors. The Patient-related factors include demographic characteristics, psychological aspects, and health literacy. Therapy-related factors involve medication administration, treatment duration, complexity, and potential side effects. Healthcare system-related factors encompass service availability, accessibility, and the role of healthcare providers.[8] Healthcare providers play a crucial role in promoting compliance by providing clear instructions, addressing concerns, and establishing a trusting relationship with patients. Patient education, effective communication, and shared decision-making also contribute to improving compliance.[9]

Our study aimed to determine the frequency of diabetic patients who are noncompliant to treatment and to identify the associated factors, and complications.

METHODS

It was a cross-sectional study that investigated the patients with diabetes, visiting the primary care outpatient clinic in the Aga Khan University Hospital from 1st to 30th December, 2019. The study obtained ethical exemption from the institutional review board committee (Reference no. 2019-1820-4510). All adult patients diagnosed with type 2 diabetes who were receiving care at a family medicine clinic were invited to participate and provided with a clear explanation of the study's objectives. Patients with type 1 diabetes mellitus, pregnant women, critically ill patients, and those with mental health disorders were excluded.

The sample size for the study was determined using WHO software for sample size calculation. In a previous study, the estimated prevalence of non-compliance among a group of diabetes patients was found to be 15%.[10]

Therefore, taking into account the population size, with a 5% margin of error, and at a 95% confidence level the sample size came out to be 196. However, only 151 diabetic patients consented to participate in the study (77% response rate).

Convenient random sampling was used for data collection. A structured self-administered questionnaire was developed after reviewing similar studies and underwent review by three subject experts (diabetologists). The questionnaire was translated into Urdu and pilot-tested on 15 participants before the study commencement.

Each participant after giving their written informed consent was administered the structured questionnaire, consisting of 16 components, divided into five sections. Part 1 collected information on the patient's basic demographic characteristics, Part 2 assessed their clinical characteristics, Part 3 examined their compliance with medications for diabetes, by asking questions related to their regularity in taking medications daily, Part 4 explored the reasons for non-compliance, and if applicable, Part 5 assessed treatment adherence longitudinally.

Statistical Analysis

SPSS 22 was used for data analysis. The demographic and clinical characteristics of the non-compliant group were compared with the compliant group using the chi-square test or Fisher exact test for categorical variables, and t-test for continuous variables. P-value ≤ 0.05 was considered statistically significant.

RESULTS

Among 151 patients, 74% (112) admitted that they were non-compliant with anti-diabetic medications. 49% (74) were males and 51% (77) were females; the mean age was 54.7 ± 11.5 years. The mean age of the participants who were non-compliant with treatment was significantly (p<0.05) higher as compared to participants who were compliant with treatment. (Table 1).

The participant's age (p=0.020), and duration of the disease (p=<0.001) were significantly associated with non-compliance (Table 2). The non-compliant group had a significantly increased risk of retinopathy (p=0.009) and diabetic foot (p=0.002). The significant reasons for non-compliance were side effects of the medications, forgetting to take medications, and complexity of the regimen (Figure 1).
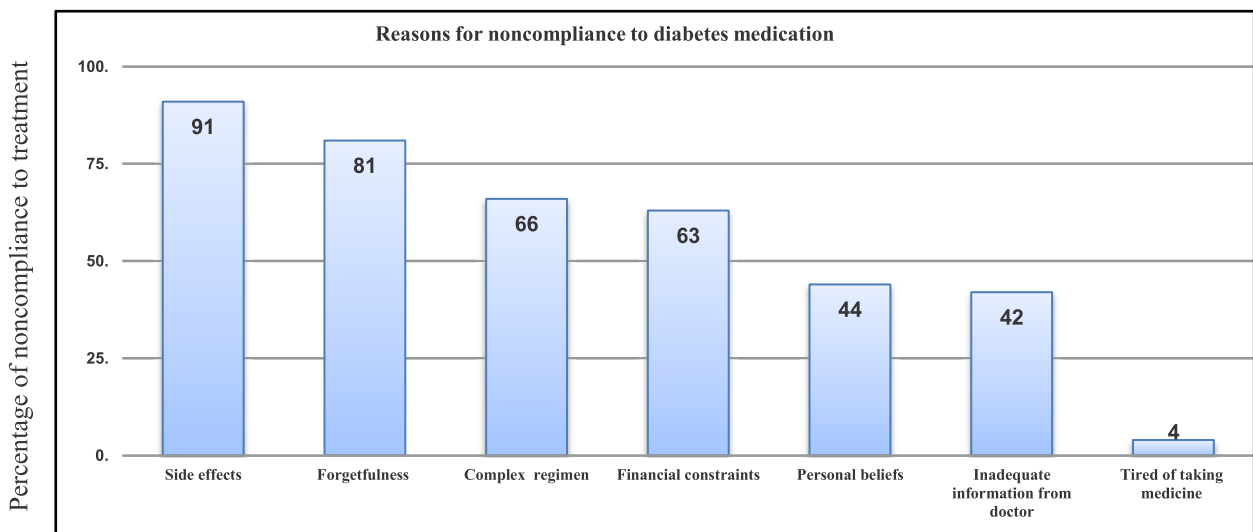

Figure 1: Factors related to noncompliance among study participants

Table 1: Demographics of diabetic patients

Characteristics	Total (n = 151)	Non-compliant (n= 112)	Compliant (n = 39)	p value
Mean age (years)	54.7 ±11.5	55.9 ± 11.1	51.1 ± 11.9	0.020
Gender	n (%)	n (%)	n (%)	
Male	74 (49%)	54 (48%)	20 (51%)	
Female	77 (51%)	58 (52%)	19 (49%)	0.853
Marital Status				
Married	108 (72%)	83 (74%)	25 (64%)	0.465
Never married	29 (19%)	20 (18%)	9 (23%)	
Divorced/Widowed	14 (9%)	9 (8%)	5 (13%)	
Education				
University	93 (62%)	64 (57%)	29 (74%)	0.124
College	31 (21%)	24 (21%)	7 (18%)	
High School	8 (5%)	6 (5%)	2 (5%)	
No formal education	19 (12%)	18 (17%)	1 (3%)	
Religion				
Islam	123 (82%)	93 (83%)	30 (77%)	0.016
Christianity	15 (8%)	7 (6%)	8 (7%)	
Hinduism	13 (10%)	12 (11%)	1 (3%)	

t-test applied on mean age; Frequency and percentage were calculated for rest for the parameters-values ≤ 0.05 were considered statistically significant.

Table: 2 Clinical characteristics of diabetic patients

Characteristics	Total (n = 151)	Non-compliant (n= 112)	Compliant (n = 39)	p-value
	mean ±SD	mean ±SD	mean ±SD	
Duration of Diabetes (years)	6.1 ± 5.1	7.0 ± 5.5	3.6 ± 2.5	<0.001
Current HbA1C	8.2 ± 1.3	8.4 ± 1.3	7.4 ± 1.1	<0.001
	n (%)	n (%)	n (%)	
Family History of Diabetes	107 (71%)	73 (65%)	34 (87%)	>0.05
Current Treatment Regimen				
Oral anti-hyperglycemic	124 (18%)	91 (81%)	33 (85%)	>0.05
Insulin + Oral anti-hyperglycemic	27 (82%)	21 (19%)	6 (15%)	
Lifestyle modifications				
Actively reduced sugar intake	117 (77%)	84 (75%)	33 (85%)	>0.05
Regular exercise (At least three times a week)	69 (45%)	40 (36%)	29 (74%)	
Complications				
Diabetic Foot	58 (38%)	51 (46%)	7 (18%)	>0.05
Retinopathy	38 (25%)	34 (30%)	4 (10%)	
Nephropathy	23 (15%)	20 (18%)	3 (8%)	
Ischemic Heart Disease	28 (19%)	22 (20%)	6 (15%)	
Stroke	8 (5%)	6 (5%)	2 (5%)	

t-test and chi-square test was applied

DISCUSSION

The results of the present study reveal that a substantial majority of the participants (74%), demonstrated noncompliance to their prescribed treatment regimen. Only 26% of participants were found to follow their medication regime as directed by doctor. This situation is particularly concerning given the increasing prevalence of diabetic cases in Pakistan. The study results demonstrated a high rate of medication noncompliance compared to previous non-compliance compared to previous international studies.[11] Specifically, our findings indicated a higher non-compliance rate than what was reported in studies conducted in China, Iran, Turkey, Saudi Arabia, Hong Kong, Africa,

Switzerland, Mexico, and Palestine, where the noncompliance rates ranged from 28.9% to 65%.[12-14] The rate of noncompliance observed in our study was comparable to the reported rate of 75% in India.[15] A recent study by Jehan et al.[11] found a noncompliance rate of 45.5%. In another recent study, over 70% of participants took their medications regularly.[16]

In the current study, there was no significant association observed between gender and non-compliance, which aligns with findings from other studies conducted globally. However, some research suggests a link between gender and noncompliance, with higher noncompliance rates among women. Additionally, in our study, we did not observe a significant correlation between age and noncompliance, even though the prevalence of diabetes mellitus generally increases with age in Pakistan. Previous research has indicated that medication adherence is either independent of age or may even improve with advancing age.[17] Furthermore, our study did not reveal a significant association between education levels and noncompliance, aligning with other studies that also did not find any association between education levels and patient non-compliance.[18] The relationship between educational attainment and compliance appears to be inconsistent, with varying results observed globally.

Our study found no association between marital status and compliance to diabetes medications. This contradicts with earlier studies that reported higher compliance among married individuals due to spousal support.[19] However, most studies did not find any significant association between marital status and medication compliance.[20]

Our study also did not find any association between religion and compliance to diabetes treatment. We could not find any relevant evidence indicating compliance rates across different religions.

The findings of our study indicated that patients who had been taking anti-diabetic medication for more than 5 years had a higher likelihood of non-compliance compared to those who had been on treatment for less than 5 years. These findings are consistent with previous research that reported similar associations [20]

Based on our study, the most frequently found reason for noncompliance among participants was the occurrence of medication side effects, with 91% of participants reporting this factor. Providing patients with education about the potential side effects of their medications is crucial, emphasizing that many of these side effects often improve or resolve with time. This information can help alleviate concerns and encourage patients to continue their medication regimen despite experiencing initial side effects. By addressing these concerns and providing appropriate education, healthcare providers can support patients in effectively navigating and managing medication side effects. Forgetfulness in taking medication emerged as the second most commonly reported factor associated with non-compliance, with 81% of participants selecting this reason. Forgetfulness was the main reason for skipping, reported by nearly 88% of participants in the study by Rahmatullah and Qutubuddin et al.[21] One potential solution to address the issue of forgetfulness among patients is for individuals to utilize alarms and reminders on their phones to help them remember medication times. Other reported reasons for non-compliance in our study were the complexity of the drug regimen and financial constraints.

Several studies have found that in developing countries, like Pakistan, noncompliance to treatment in diabetes is predominantly influenced by factors, such as the loss to follow up with doctors, missing appointments, expensive cost of anti-diabetic medications, cultural influences, smoking, limited health literacy, avenues for alternative medicine, the accessibility and affordability of insulin, need for long-term medication use. The fear of side effects such as abdominal pain, diarrhea, lethargy, nausea, vomiting, weight issues, fear of injections, and hypoglycemia, are other reported

factors for non-compliance associated with anti-diabetic drugs.[17] In our study, the doctor-patient relationship emerged as a significant factor influencing patients' compliance. Patients who received sufficient information regarding the dosage and potential adverse reactions due to their medications exhibited higher levels of compliance. Conversely, those who had not received appropriate information were more likely to be non-compliant. Several research studies focusing on different illnesses have investigated the influence of the doctor-patient relationship on patients' compliance and consistently identified it as a strong contributing factor.[19] When physicians demonstrate support, provide crucial information, and attentively listen to patients, compliance with treatment advice is generally observed to be good.

Healthcare professionals, including physicians and dieticians, can play a crucial role in suggesting this strategy during diabetes education sessions.[11] Additionally, involving family members in the care plan can enhance control and support for the patient, as they can assist in medication adherence if the patient forgets. By implementing these measures, patients can improve their medication management and overall adherence to the care plan.

CONCLUSION

Non-compliance with medication regimens can harm health, leading to treatment failure, worsening of symptoms, delayed recovery, higher healthcare costs, and reduced quality of life. Our study revealed a significant prevalence of non-compliance among participants, which was associated with an increased risk of complications in diabetic patients. Targeted interventions are required to improve adherence and reduce the likelihood of complications.

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