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Contributing Factors of Non-Adherence to Anti-Diabetic Therapy: A Cross-Sectional Study from Islamabad, Pakistan

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ABSTRACT

Objective: To assess the non-adherence to anti-diabetic therapy and factors associated with non-adherence.
Study Design: Cross-sectional study.
Place and Duration of Study: Department of Endocrinology and Diabetes, Federal Government Poly Clinic Postgraduate Medical Institute, Islamabad Pakistan, from Aug to Dec 2021.
Methodology: A total of 245 patients of diabetes were enrolled in this cross-sectional study. Patients aged 18 and 90 years and belonging to either gender were included. Patients with diabetes duration of less than 3 months, having cognitive disorder or inability to answer were excluded.
Results: The mean age of patients was 50.93±10.08 years with equal gender distribution. Non-adherence was found in 117(48%) patients. Forgetfulness was found in 111(94%), unaffordability was reported 44(37.3%), careless attitudes by 41(34.7%), poor tolerability by 57(48.3%) and leaving medicine when feeling better in 41(34.7%) patients, which were all associated with non-adherence (p<0.001). Number of medicines per day (four or more) in 60(50.9%) patients was also found to be associated with non-adherence (p=0.003).
Conclusion: A high proportion of patients of diabetes were found non-adherent to anti diabetic therapy. Forgetfulness, unaffordability and careless patient attitude were factors associated with non-adherence along with increasing number of prescribed medications.

Keywords: Diabetes mellitus type 2, Medication adherence, Patient adherence

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INTRODUCTION

Type 2 Diabetes mellitus (T2DM) is one of the most major public health issues, affecting population in developed as well as developing nations. If diabetes is not properly controlled and managed in daily life, many macro and micro vascular complications may arise.[1] One of the main reasons of uncontrolled glycemic levels among patients is poor adherence to anti-diabetic medications.[2] In Pakistan, the prevalence of T2DM is 13.7% in the general population,[3] and 62% diabetics in our country do not adhere to their prescribed anti-diabetic medication.[4] For proper control of glycemic level, compliance to medication is crucial, especially, in older diabetics and those having insulin dependency. Evidence-based studies highlight numerous factors associated with non-adherence to anti-diabetic drug therapy among patients with DM. Long duration of therapy, non-affordability and high number of medicines along with forget fullness were some of the most common reasons for non-adherence. In this context, Araya *et al*. reported 63.9% patients of T2DM, who were non-adherent to antidiabetic medications. The significant factors associated with non-adherence in their study were, medicines issued for more than 3 months, low monthly income, distance to hospital, more than 4 prescribed medications and lack of counselling.[5] Aminde *et al*. also reported that 54.4% patients with T2DM were non-adherent to medications with forgetfulness, non-affordability, disappearance of symptoms, alcohol consumption and insulin alone being associated with non-adherence.[6]

In the local healthcare setting of Pakistan, the evidence reporting demographic and clinical factors associated with medications non-adherence among T2DM patients is limited. This study was planned to assess the level of non-adherence in our population, and to find out various factors associated with non-adherence to anti diabetic therapy among patients of T2DM. The recognition of these risk factors will help in reducing diabetes related morbidity and mortality by improving patients' adherence to anti diabetic medications.

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METHODOLOGY

The cross-sectional study was conducted at the Department of Endocrinology and Diabetes, Federal Government Poly Clinic Postgraduate Medical Institute, Islamabad Pakistan, from August to December 2021, after getting the approval from Ethics Committee, (letter No. FGPC 1/12/2021). The WHO formula for sample size was used to calculate the sample size, taking the 19.9% as the expected rate of medication non-adherence among patients with type 2 diabetes mellitus.[7]

Inclusion Criteria: Adult patients of Type 2 Diabetes Mellitus, aged 18 to 90 years, of either gender, were included.

Exclusion Criteria: Patients with diabetes duration of over 3 months, having cognitive disorder or inability to answer questions, those patients with serious illnesses and those with incomplete responses were excluded.

Type 2 diabetes mellitus was defined as patients having fasting plasma glucose of ≥126 mg/dl or 2-hours plasma glucose ≥200 mg/dl during an OGTT or HbA1C ≥6.5% or random plasma glucose ≥200 mg/dl with classic symptoms of hyperglycemia.[8] Medication non-adherence was considered in case of suboptimal taking of medicines i.e. missing more than 3 doses per week, either intentional or unintentional.[9] Using non-probability consecutive sampling technique, a total of 245 patients were enrolled. After obtaining informed written consent from all patients before selection in the study. The anonymity and confidentiality of study participants was maintained at every step of data collection.

A self-designed questionnaire was used to record demographic and clinical data. The study variables included patient's age, gender, education status, family income, cigarette smoking status, duration of diabetes, comorbidity, type of medication, and source of medication, adherence to medication along with causes of non-adherence to medication.

Statistical Package for Social Sciences (SPSS) version 24 was used for data entry and statistical analysis. Quantitative variables like age, family income and duration of diabetes were measured as mean and standard deviation. Qualitative variables like gender, education status, smoking status, adherence to medication and causes of non-adherence were measured as frequency and percentage. For measuring odds ratio, a 2x2 table was constructed to look for associated risk factors of non-adherence. Chi square test was applied to find association of risk factors with medication non-adherence where a *p*-value of ≤0.05 was considered significant.

RESULTS

In this study, a total of 245 diabetic patients were enrolled. The mean age of patients was 50.93±10.08 years. Most of the patients (70.2%) were between 41 to 60 years of age in this study. Gender distribution was almost equal, with males being 121(49.4%) and females, 124(50.5%). The average BMI was 27.25±4.70. Around half 112(45.7%) patients were obese. The mean duration of diabetes was 6.64±3.88 years. Baseline and sociodemographic characteristics are shown in Table-I.

Table I: Baseline and Sociodemographic Characteristics of Patients (n=245)

Characteristics of Patients		n(%)
Age (years)	Mean±SD	50.93±10.08
Age categories	Up to 40	36(14.7%)
	41 to 50	98(40%)
	51 to 60	74(30.2%)
	61 to 70	27(11%)
	71 or above	10(4.1%)
Gender	Male	121(49.4%)
	Female	124(50.5%)
BMI	Mean±SD	27.25±4.70
BMI categories	Below normal (<18.5kg/m^2)	1(0.4%)
	Normal (18.5-22.9kg/m^2)	74(30.2%)
	Overweight (23-24.9kg/m^2)	58(23.7%)
	Obese (25-29.9kg/m^2)	112(45.7%)
Duration of Diabetes	Mean±SD	6.64±3.88
Residence	Islamabad	177(72.2%)
	Rawalpindi	68(27.8%)
Marital Status	Divorced	11(4.5%)
	Married	199(81.2%)
	Separated	25(10.2%)
	Single	5(2%)
	Widowed	5(2%)
Education	Never Studied	90(36.7%)
	Primary	90(36.7%)
	Secondary	45(18.4%)
	Graduation	20(8.2%)
Employment Status	Full-Time	43(17.6%)
	Part-time	48(19.6%)
	Retired	7(2.9%)
	Self-employed	36(14.7%)
	Homemaker	72(29.4%)
	Entitled	12(4.9%)
	Unemployment	27(11%)
Family Income	Less than 50k	191(78%)
	More than 50k	54(22%)

There were 127(52.0%) patients who were properly taking their medication while 118(48.0%) were non-adherent to medication. Details regarding anti diabetic medication taken by the patients can be seen in Table-II.

Table II: Detail of Treatment Taken by Patients (n=245)

Medicine Types	n(%)
Both (Insulin + medicine)	97(39.6%)
Insulin	17(6.9%)
Oral medicines	131(53.55%)
Comorbidities	
None	75(30.6%)
Chronic Kidney Disease	6(2.8%)
Hepatitis C	2(0.8%)
Hypertension	140(57%)
Hypothyroidism	15(6.1%)
Ischemic heart disease	5(2%)
Number of Medicines per day	
1 to 3	144(58.8%)
4 or more	101(41.2%)
Sources of Medicines	
Hospital pharmacy/Donation/Re-imbursement	154(62.8%)
Self-purchase	91(37.1%)
Do you read prescription	
Yes	93(38%)
No/no answer	14(5.7%)
Someone else read for me	111(45.3%)
Unable to read	27(11%)

Further analysis was done to identify the factors associated with non-adherence of antidiabetic medicine. No association of baseline characteristics like age and gender was found. Non-affordability was found more likely to be associated with non-adherence of medication compared with adherence (OR 2.5, 95% CI 2.1-3.1, p=<0.001). Forgetfulness was also a highly significant factor for non-adherence (OR 17.7, 95% CI 8.6-36.5, p=<0.001) in this study. Four or more medicine per day were less likely to adhere to anti-diabetic medication (OR 0.67, 95% CI 0.52–0.87, p=0.003). Similarly, carelessness about medicine was found related to non-adherence (OR 2.30, 95% CI 1.88–2.81, p=<0.001). The patients were also likely to be non-adherent to medicine when they felt better or have poor tolerability of medicine. Source of medicine from hospital pharmacy was associated with adherence to medication (70.9% versus 54.2%), whereas self-purchase was found related to non-adherence (OR 1.4, 95% CI 1.1–1.8, p=0.007). However, taking other (herbal) medication by the patients had no effect on non-adherence. These factors associated with non-adherence are listed in Table-III.

DISCUSSION

This study confirmed the evidence in literature that there are high rates of non-adherence among T2DM patients towards anti-diabetic medication in the

Table-III: Factors Associated with Non-adherence (n=245)

Factors		Adherence to medication		OR (95% CI)	p-value
		Yes (n=127)	No (n=118)		
Age (years)	Up to 50	68(53.5%)	66(55.9%)	1.05(0.80-1.36)	0.70
	>50	59(46.5%)	52(44.1%)		
Gender	Male	58(45.7%)	63(53.8%)	1.18(0.91-1.54)	0.20
	Female	69(54.3%)	54(46.2%)		
Non-affordability	Yes	2(1.6%)	44(37.3%)	2.5(2.11-3.15)	<0.001
	No	125(98.4%)	74(62.7%)		
Forgetfulness	Yes	4(3.2%)	111(94.1%)	17.78(8.64–36.58)	<0.001
	No	123(96.8%)	7(5.9%)		
No of medicines/day	1 to 3	86(67.7%)	58(49.1%)	0.67(0.52–0.87)	0.003
	4 or more	41(32.3%)	60(50.9%)		
Careless about Medicine	Yes	5(3.9%)	41(34.7%)	2.30(1.88–2.81)	<0.001
	No	122(96.1%)	77(65.3%)		
When feel better do you stop medicine	Yes	9(7.1%)	41(34.7%)	2.07(1.67–2.58)	<0.001
	No	118(92.9%)	77(65.3%)		
Poor tolerability/adverse effect of medicine	Yes	22(17.3%)	57(48.3%)	1.96(1.54–2.50)	<0.001
	No	105(82.7%)	60(51.7%)		
Source of Medicine	Hospital pharmacy	90(70.9%)	64(54.2%)	1.4(1.1–1.8)	0.007
	Self-purchase/ Reimbursement	37(29.1%)	54(45.8%)		
Taking other Medication	Yes	50(39.4%)	49(41.9%)	1.05(0.81–1.37)	0.69
	No	77(60.6%)	68(58.1%)		

local setting. Many previous local and international studies have found similar findings.[10-14] On study reported that 46.3% of their patients had low adherence to medications and factors such as low family income, diabetic ulcers and male gender were found related.[15] Another study reported that older age and increased number of medications per day were significantly contributing factors towards non-adherence in patients.[16] Another study found a high prevalence of non-adherence (63.9%) in diabetic patients with low monthly income, long distance to hospital, >4 medications/visit and no counseling, being significant factors of non-adherence.[5] Aminde *et al*. also witnessed a high prevalence of non-adherence (54.4%) to anti-diabetic medications, with the most common reasons for non-adherence being forgetfulness, unaffordability and disappearance of symptoms (14.2%).[6] A study by Demoz *et al*. also found similar contributing factors of non-adherence; they witnessed forgetfulness, unavailability and unaffordability significantly associated with non-adherence. In their study female gender, and presence of at least one diabetic complication had higher odds for medication non-adherence.[17] In another study recent study, female gender, and perception of medication were key factors for non-adherence.[9] A local study by Shams *et al* also reported a similar group of associated factors to non-adherence.[4] Our current study validates these previous above mentioned evidence on the rate of non-adherence and associated factors. The high rates of non-adherence might imply a lack of attention diabetic peoples give to their health. Moreover, it also reflects a lack of understanding and adaptability towards the diabetes care model.[18] Since low adherence has been significantly associated with poor diabetic control, it is a vicious cycle of disease progression[19] with the identification of diabetes itself a contributing factor for inappropriate health outcomes and low quality of life. Non-adherence puts more pressure on the health sector, on an individual and community level. Cost-effective interventions such as counselling and home visits by health visitors for proper monitoring and compliance may play a positive role in medicine adherence.[20]

LIMITATION OF STUDY

The current study has many implications for Pakistan's diabetic population and health programs, as the identification of high rate of non-adherence to antidiabetic therapy manifests the need of cost-effective and easy to use interventions in the country. The factors like careless behavior and forgetfulness could be targeted by focusing on counselling and medical help at home.

CONCLUSION

A high proportion of diabetic patients were found non-adherent to anti-diabetic therapy. Forgetfulness, unaffordability, carelessness were found highly associated factors of non-adherence. Number of medicines (four or more) was found to be less likely to adhere to therapy. Targeting these factors by counselling and proper monitoring can reduce non-adherence to anti-diabetic therapy.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

HA & GK: Conception, study design, drafting the manuscript, approval of the final version to be published.

MAT: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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