ORIGINAL | INDEPENDENT JOURNAL OF ALLIED HEALTH SCIENCES

IJAHS-0077

EVALUATION OF MEDICATION ADHERENCE AMONG DIABETICS:

A CROSS-SECTIONAL STUDY IN LAHORE, PUNJAB, PAKISTAN

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Date of Received: 22/12/2017 **Date of Acceptance:** 29/01/2018

ABSTRACT

Background: Diabetes mellitus (DM) is a concerning and amongst the leading health issue these days. Poor adherence to medication regimen can cause adverse health outcomes so therapeutic goals are stapled with patient adherence. No study on medication adherence of diabetic patients have been published from Lahore yet so this study was conducted to check whether diabetic patients adhere to their medications or not. **Study design:** Cross-sectional study. **Methods:** 8-item Morisky Medication Adherence Scale (MMAS-8) was used to check adherence. A sample size of 432 patients was taken. Patients were interviewed and the consent was taken prior to interview. Statistical Package for Social Sciences (SPSS) was employed for statistical analysis where required. Adherence level was compared against multiple factors such as education, age and gender. **Results:** Out of 432 diabetic patients, 178 (41.2%) patients have low adherence, 186 (43.1%) patients have medium adherence, and 68 (15.7%) have high adherence. **Conclusions:** In Lahore, a major population of diabetics were non-adherent.

Key words: Medication Adherence. Diabetes mellitus. Pakistan. Morisky Medication Adherence Scale-8 (MMAS-8)

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Article Citation: Beg MB, Khan H, Hasan UD, Izhar Z, Amin U, Areej S. Evaluation of Medication Adherence Among Diabetics: A Cross-sectional Study In Lahore, Punjab, Pakistan. **IJAHS**, Jan-Mar 2018;01(01-03): 27-32.

INTRODUCTION

Diabetes mellitus (DM) is an increasing health issue these days. It is widely prevalent with a higher number of cases with morbidity and mortality. Diabetes is one of the diseases which is equally prevalent in developed as well as in developing countries. It is estimated that by the year 2025 over three-fourths of all the patients having diabetes will be from the developing countries[1]. According to an estimate, in Pakistan by the year 2025, there will be an increase in the number of diabetic patients up to 14.5 million which was estimated to be 4.3 million back in 1995.

The National Institute of Diabetes and Endocrinology revealed that nearly 7.1 million people are affected by diabetes in Pakistan, this makes Pakistan the 7th highest pool of diabetics in world. According to an estimation, the occurrence of diabetes at present is around 7.6 per cent, and by 2030, the country will be the 4th largest diabetic pool in the world. Low adherence to the anti-diabetic medications may lead to more complications, comorbidities or even may cause death.

A study revealed that in chronic diseases there is a positive relationship between low medication adherence and the resources that are utilized for their treatment[2]. This means that high resources need to be allocated for treating such diseases but poor adherence to medications may lead to wastage of these resources. So to prevent this

monetary loss it is more important in developing countries to introduce methods which can enhance drug adherence, hence minimizing undue expenses. Most patients lose adherence due to poly-pharmacy and mainly due to the high frequency of drug intake.

WHO defines adherence as the degree to which a patient sticks with its prescribed medications, dietary or lifestyle modifications by a healthcare practitioner[3,4]. There are two ways to measure medication adherence, a direct method, and an indirect method. Direct methods include plasma concentration of medicine or its metabolite while indirect methods include self-reporting and prescription refill[5]. Self-reporting is considered as the simplest and the least expensive method[6].

Medication adherence may help in disease management and hence prevents the wastage of resources. This study was aimed to check medication adherence among the patients with type 2 diabetes. Furthermore, the study was conducted to identify the factors that may be a cause of non-adherence and by addressing such factors, adherence to antidiabetic medication may be improved.

METHODS

Study design and selection of patients: This cross-sectional study was conducted between August 2015 and December 2015 at two main public sector hospitals (Mayo Hospital and Jinnah Hospital) of Lahore, Punjab, Pakistan. Criteria for inclusion in the study was that patient: (1) has been diagnosed with Type-2 diabetes; (2) has been taking any antidiabetic medication; (3) with 18 years old or above and 4) can communicate in Urdu. To calculate the sample size, a tool Raosoft® sample size calculator (http://www.raosoft.com/samplesize.html) was employed. A sample size of minimum 377 patients was required for a confidence level of 95%. However, a convenience sample of 432 patients met the inclusion criteria and agreed to participate in the study. This reduced the margin of error to 4.66% with a confidence level of 96.43%.

Assessment and Measures: The tool employed to conduct the study consisted of two sections: the first section collects the patient's socio demographics and the second part consists of medication adherence. An Urdu version of validated Morisky Medication Adherence Scale (MMAS-8) was used[7]. This Urdu version of Morisky Medication Adherence Scale consisted of an eight-item questionnaire. The questionnaire had first seven questions with the response as either 'Yes' or 'No', however, the final question had 5 responses ('Never', 'Once in a while', 'Sometimes', 'Usually' and 'Always') hence, a 5-point Likert scale. The scoring system was based upon patient's adherence level, the adherence was gauged as follows: low adherence (3 to 8), medium adherence (1 to <3) and high adherence (<1). Patients answering a 'Yes' equals one score whereas a 'No' equals to zero point score for questions 1, 2, 3, 4, 6 and 7.However, question number 5 has a reverse response in which a 'No' equals one score whereas a 'Yes' gets zero score. The last question has 5 options, for patients answering 'Never', the score will be zero; 'Once in a while' will score 0.25 marks; if a patient chooses 'Sometimes', 'Usually' or 'Always' the adherence score will be 0.5, 0.75 and 1.0 respectively.

Data Analysis: Association was established between variables by applying inferential statistics i.e. cross tabulation and Chi-square test with Phi and Cramer's V nominal. The data was analyzed by IBM-SPSSv20 and the results were expressed as mean *(X)*, percentages *(%)* and significant '*P*' values. A p-value of <0.05 was considered to be significant.

RESULTS

A total of 432 patients took part in the study, 47.1 years was the mean age of all the patients, these patients fall in the range of 18 to 85 years. Out of them, 205 (47.5%) individuals were male and 227 (52.5%) individuals were female. The characteristics of the total patient groups and their level of adherence are shown in Table 1.

Out of 432 diabetic patients, 178 (41.2%) patients were in the low adherence groups, 186 (43.1%)

Table 1 - Patient characteristic groups and their adherence

Characteristics		Total	High Adherence (%)	Moderate Adherence (%)	Low Adherence (%)	P Value
		432	68 (15.7)	186 (43.1)	178 (41.2)	
GENDER						
Female	Count	205 (47.5)	22 (32.4)	85 (45.7)	98 (55.1)	<0.05
	Expected	205.0	32.3	88.3	84.5	
Male	Count	227 (52.5)	46 (67.6)	101 (54.3)	80 (44.9)	
	Expected	227.0	35.7	97.7	93.5	
AGE						
<35 years	Count	42 (9.7)	2 (2.9)	23 (12.4)	17 (9.6)	>0.05
	Expected	42.0	6.6	18.1	17.3	
35 - 44 years	Count	94 (21.8)	22 (32.4)	39 (21.0)	33 (18.5)	
	Expected	94.0	14.8	40.5	38.7	
45 - 54 years	Count	189 (43.8)	25 (36.8)	85 (45.7)	79 (44.4)	
	Expected	189.0	29.8	81.4	77.9	
55 - 64 years	Count	93 (21.5)	15 (22.1)	36 (19.4)	42 (23.6)	
	Expected	93.0	14.6	40.0	38.3	
65 or above	Count	14 (3.2)	4 (5.9)	3 (1.6)	7 (3.9)	
	Expected	14.0	2.2	6.0	5.8	
EDUCATION						
Uneducated	Count	134 (31.0)	17 (25.0)	47 (25.3)	70 (39.3)	>0.05
	Expected	134.0	21.1	57.7	55.2	
Primary	Count	24 (5.6)	0 (0.0)	16 (8.6)	8 (4.5)	
	Expected	24.0	3.8	10.3	9.9	
Middle	Count	77 (17.8)	9 (13.2)	37 (19.9)	31 (17.4)	
	Expected	77.0	12.1	33.2	31.7	
Matric	Count	83 (19.2)	21 (30.9)	36 (19.4)	26 (14.6)	
	Expected	83.0	13.1	35.7	34.2	
Intermediate	Count	46 (10.7)	5 (7.4)	18 (9.7)	23 (12.9)	
	Expected	46.0	7.2	19.8	19.0	
Graduate Or Above	Count	68 (15.7)	16 (23.5)	32 (17.2)	20 (11.2)	
	Expected	68.0	10.7	29.3	28.0	

patients were in medium adherence groups and 68 (15.7%) were in high adherence groups.

The analysis revealed that nearly 60.2% of the total patients usually forgot to takeanti-diabetic medication; in last two weeks prior to interview, 33.6% of the patients had skipped their medicines due to reasons other than lapse of memory; nearly 31.3% of the patients when felt unpleasant, withdrew their medication without consulting with their physician; while traveling or leaving home for overlong period of time approximately 30.3% of the diabetics forgot to keep their medicines along with them; some 84.9% patients didn't take their medication before the day they were interviewed; patients who skipped their medication when they feel well were nearly 23.8%; and almost 36.3% felt annoyed while taking medicine and find it difficult to stick to their plan of treatment.

When the patients were asked about how often they forget to take their medications; 42.8% of the patients find it difficult to remember taking their medication once in a while; 21.3% of the patients forget to take their medications sometimes; 7.9% of sample usually find it difficult to remember taking their medicines; whilst 2.1% of diabetics

Table 2: Response of patients to 8 questions in MMAS - 8			Yes (%)	No (%)
	Do you sometimes forget to take your hypoglycemic medicine?		260 (60.2)	172 (39.8)
	Sometimes, people do not take their medication for some reasons other than forgetfulness. Have there been any days over the past 2 weeks you did not take your hypoglycemic medicine?		145 (33.6)	287 (66.4)
	Have you ever reduced or stopped taking your hypoglycemic medicine without telling your doctor because you felt that your condition has become worse when you had taken the medicine?		135 (31.3)	297 (68.7)
	Do you, sometimes, forget to bring your hypoglycemic medicine with you when you travel or leave home?		131 (30.3)	301 (69.7)
	Did you take your hypoglycemic medicine yesterday?		65 (15.1)	367 (84.9)
	When you feel that your health condition is under control, do you sometimes stop taking the hypoglycemic medicine?		103 (23.8)	329 (76.2)
	Taking medication daily may not appeal to some people. Do you feel dissatisfaction or resentment or confusion due to your daily commitment to take your hypoglycemic medicine?		157 (36.3)	275 (63.7)
	How often do you face difficulties remembering to take all your medications?			
	A	Never/rarely	112 (25.9)	
	B	Once in a while	185 (42.8)	
	C	Sometimes	92 (21.3)	
	D	Usually	34 (7.9)	
	E	Always	9 (2.1)	

faced these difficulties all the times. But 25.9% diabetic patients didn't have any problem when it comes to taking their medicines on time. Table 2 shows these responses against each question of MMAS-8.

Patients were categorized and segregated on the basis of education level as uneducated, primary, middle, matriculation, intermediate and graduate or above and adherence was correlated against each category. Out of 432 patients, 134 (31.0%) were uneducated in which only 17 (12.7%) patients were highly adherent, 47 (35.1%) patients were moderately adherent and 70 (52.2%) patients were low adherents. Only 24 (5.6%) patients were educated to the primary level in which no patient was highly adherent, 16 (66.7%) patients were moderately adherent and 8 (33.3%) patients were low adherents.

Out of total sample, 77 (17.8%) patients had an education up to the middle level in which only 9 (11.7%) patients were highly adherent, 37 (48.1%) patients were moderately adherent and 31 (40.3%) patients were low adherent to their medication. 83 (19.2%) patients out of total sample studied up to matriculation in which 21 (25.3%) patients were highly adherent, 36 (43.4%) patients were moderately and 26 (31.3%) patients had low adherence to their medication. 46 (10.7%) patients were intermediate passed in which 5 (10.9%) patients were highly, 18 (39.1%) patients were moderately and 23 (50%) patients were low adherent. Out of 432, only 68 (15.7%) patients were graduates, out of them 16 (23.5%) patients were highly, 32 (47.1%) patients were moderately and 20 (29.4%) patients were having low adherence to their medication as shown in Figure 1. There is a strong association between educational level and adherence (P = 0.001).

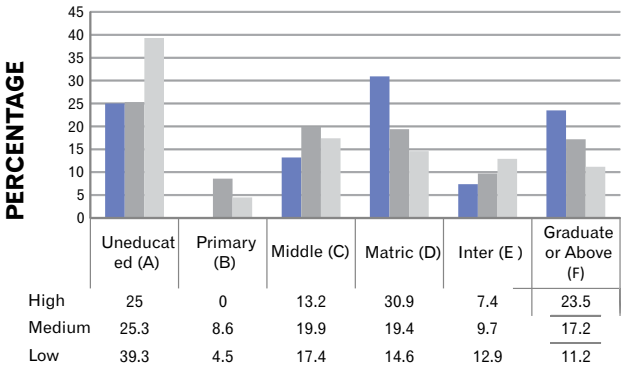

Figure 1: Association of education with adherence in variable percentage of patients.

Similarly, ages were categorized into 5 groups such as <35 years, 35-44, 45-54, 55-64 and 65 or above. No correlation was present between age group and adherence level (P = 0.084).

Only 2.9% of highly adherent patients (68) that having an age of less than 35 years whereas most of the patients (12.4%) in that age group had medium adherence and 9.6% patients had low adherence. But 32.4% of patients within the age of 35-44 had high adherence while 21% had moderate and 18.5% had low adherence. 36.8% of patients in age group of 45-54 had high adherence, 45.7% patients had medium while 44.4% had low adherence. Similar trends were observed in age range of 55-64, however, patients of age 65 or above had greater percentage (5.9%) of high adherence as compared to medium (1.6%) and low adherence (3.9%).

Out of 432 patients 205(47.5%) were male in which 22 patients were highly adherent 85 were moderately and 98 patients were low adherent. Whereas 227 (52.5%) patients were female in which 46 patients were highly, 101 patients were moderately and 80 patients were low adherent to their medication. Average adherence was 2.41 for male patients and 2.81 for female patients. There is an association between gender and adherence level ($P = 0.005$).

DISCUSSION

In our study, the majority (43%) of patients were having medium adherence (adherence score 1 to <3), while 41% of Diabetic patients have low adherence (score 3-8) and only 16% of the total patients were found to have high adherence. Similar studies was conducted in Karachi and Palestine, both of them concluded that the majority of patients there were non-adherent[8,9].

The findings of our study about the relationship of level of education and adherence to anti-diabetic medications was consistent with the studies conducted in past [10]. According to our data, 39.3% of uneducated patients have low adherence. Patients with higher educational background have higher degree of adherence to their medication. This might be due to the fact that such patients are more aware of the disease and its implications, and might have a good understanding of importance of medication as well as physician guidelines.

Many studies in other countries have exhibited different or same results as to those that were concluded in our study. The data derived for the study was limited to major public sector hospitals and diabetic outpatient clinics in Lahore, yet the sample size we gathered in our study was huge enough to evaluate the associations between different variables. Self-reported questionnaires may have a disadvantage that patient might exaggerate the adherence to their medication, but such questionnaires have proven to be the best when it comes to reliability and validity. Also such tools have an advantage that they can easily be employed for medication adherence data collection. Another limitation to this study was the fact that patient might have an educational class of diabetes by the physician or diabetic educator. This can be added in future studies and an association of diabetic education can be checked against medication adherence.

CONCLUSIONS

Most of the patients enrolled in our study were non-adherent. Adherence to medication is the key factor in managing the disease and therefore this issue needs to be addressed. Education has a greater impact on adherence of medication so if a patient has an illiterate background at least knowledge regarding the disease must be provided to patient. The role of diabetic educators are important in this regard.

It is important to further investigate the factors that may alter adherence such as disease specific knowledge, other co-morbidities that may affect the medication regimen, or, check whether the patient is on insulin therapy or oral hypoglycemic. The role of physician, nurse, pharmacist and diabetic educator can be very effective in providing patient information that may lead to high medication adherence.

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4	Zayed Izhar	Collected the data	Zayed Izhar
5	Usama Amin	Analyzed and interpreted the data	Usama Amin
6	Sadaf Areej	Did the final review	Sadaf Areej