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Original article

Factors Associated with Non -Adherence to Antidiabetic Medications among Patients with Type 2 DM in Al-Bayda- Libya

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ABSTRACT

Aim*. This study was aimed to assess the level of medications adherence and to identify factors that are associated with non-adherence to anti- diabetic medications among patients with type 2 diabetes mellitus in Al-Bayda-Libya.* ***Methods****. A cross-sectional study was conducted from April to August 2022 at Diabetes Center Aljabal Al-akhdar in Al-Bayda, Libya. A total of 300 patients with type 2 diabetes mellitus. Adherence was measured by using the Medication Compliance Questionnaire. Other data, such as age, gender, BMI, duration of diabetes, comorbidities, number of drug taken, medication knowledge, and pattern of antidiabetic medication were also collected. The data analysis was carried out using Statistical Package for Social Science (SPSS) for Windows version 26.0.* ***Results****. Out of 300 patients, about 169 (56.3%) were not adherent to obtain their medication properly. When we assessed the variables to predict factors that associated with non-adherence by using Logistic regression analysis, we found only three factors: age CI (0.940-0.985); P=0.043, medication knowledge CI (0.950-0.984); P=0.018, and pattern of anti-diabetic medication CI (0.945-0.955); P=0.034.* ***Conclusion****. Our findings showed that the adherence to type 2 diabetic medication was poor with more than half of participants being non-adherent. This is a cause of alarm, because non-adherence could lead to a worsening of disease. Educating patients about their medication could help improve adherence.*

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INTRODUCTION

Diabetes mellitus (DM) is a chronic illness and one of the fattest growing public health problem around the world. The prevalence of DM is increasing every year in most countries. According to WHO, it is estimated that there were 88 000 patients with DM in Libya during the year of 2000. By 2030 the incidence of diabetes globally reaches to 245 000 [1]. By 2015, diabetes was responsible for 5 million deaths around the world, which was far greater than deaths because of tuberculosis, HIV/AIDS and malaria combined [2]. The management of DM can be achieved with non-pharmacological and pharmacological interventions, where type 1 DM require insulin alone, while type 2 DM is the most common type of diabetes, a progressive, complex and metabolic disorder that requires management by lifestyle modification and multiple pharmacotherapy to control blood glucose and reduce complications.

According to WHO. Medication Adherence can be defined as "the extent to which a person's behavior-taking medication, following a diet, and /or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider"[3]. The level of adherence was a significant predictor of HbA1c, indicating that improved adherence resulted in better glycemic control. The prevalence of non-adherence in patients with type 2 diabetes is high [4] and appears to be an important cause of increased morbidity and mortality and increased healthcare costs [5]. Several factors detect the degree of medication adherence in patients with type 2 DM. The most barriers to adherence to type 2 DM treatment are related to the patient as understanding of the disease and treatment or depression, the treatment itself as complexity of therapy, fear of adverse reactions and the health system as lack of medications or

high cost of medicines [6]. Identifying factors of non-adherence that are associated to patients with type 2 DM is important to improve adherence and reduce morbidity and mortality. Therefore, our study aimed to determine the prevalence and identify factors associated with non-adherence to antidiabetic medications among patients with type 2 DM in Al-Bayda Libya.

METHODS

Study design and settings

This study was a cross-sectional study conducted from April to August 2022 at Diabetes Center Aljabal Al Akhdar in Al-Bayda, Libya. A total of 300 patients with type 2 DM were enrolled in this study who are ongoing on treatment of Diabetes. Patients who had incomplete medical records, who had mental problems, or who were not able to answer the questionnaire were excluded. Interviews were conducted to obtain patient demographic data, medication knowledge, and assessment of adherence through the Medication Compliance Questionnaire (MCQ).

Ethical consideration

An ethical approval of the Institutional Ethics Committee of the Omar Al-Mukhtar University was taken before starting the study. A verbal agreement with patients was obtained before collecting data and interviewing. The questionnaire was translated to Arabic language.

Data collection method

Adherence to medication can be obtained by using validated Medication Compliance Questionnaire(MCQ) that was developed by using the Morisky self-reporting scale [7] and the Hill-Bone Compliance to High Blood Pressure Therapy Scale [8]. There were a total of seven question in the MCQ and assessed patients' intentional and unintentional non-adherence to medication instructions including reasons for non-adherence. A 4-point Likert scale for each question was used in the data collection tools: The response "Never" was given a score of 4; "sometimes (one to four times per month)", a score of 3; "Often (more than five times per month or more than two times per week)", a score of 2; "Always", a score of 1; range of total score from 7 (minimum) to 28 (maximum). If the score of 27 or more that was defined as adherence, while less than 27 is defined as non-adherence to medication.

The medication knowledge is composed of five questions regarding the patient's medication: name, dose, frequency, indication, and how the patient administered the drug. The %of medication knowledge can be calculated by dividing each correct answer into a total item of five information. Each right answer was given a score of 1.

Data was collected through self-administered and structured interview in the Diabetic center. Demographic characters like age, gender, BMI, comorbidities, education level, duration of diabetes, number of drug taken and pattern of Antidiabetics medications were collected.

Data analysis

The data analysis was carried out using Statistical Package for Social Science (SPSS) for Windows version 26.0.The categorical data such as age, gender, duration of disease, body mass index, family history, comorbidities, and level of education are presented as frequency and percentage. Chi-square test was used to test the correlation between adherence and non-adherence. Binary logistic regression analysis was performed to identify factors associated with non-adherence to anti-diabetic medications. P value <0.05 is considered to be statistically significant.

RESULTS

A total of 300 patients in the study, most of them were female 175 (58.3%) and male 125(41.7%). The age was divided to four groups were<40 (4.0%), 40-49 (13.7%), 50-59 (33.3%) and 60+(49.0%).Patients included in the study had been diagnosed with T2DM for 1–30 years. (20.3%) of the study population was diagnosed with T2DM for less than 5 years. The remaining patients had been diagnosed for 6–30 years. Overweight was observed in 50.7% of the patients, whereas 28.3% were obese. (44.0%) of patients had comorbidities with diabetes and (56.0%) had diabetes only. Eighty-seven (29.0%) had graduated at education level. The number of drug taken was 75 patients used one drug, 156 used two drugs, 36 patients used three drugs and 33 patients used more than three drugs.

Tables 1 represent the responses of the patients to MCQ. As mentioned above, the score from 27 or more is classified as adherent while less than 27 as non-adherent. The importance of adherence to antidiabetic medication to control blood glucose and reduce the severity of diabetes complications. There were 169 (56.3%) subjects who were categorized as non-adherent as shown in figure1. The most common reason for non-adherence were forgetting, fear of side effect of drugs, disappearance of symptoms.

Table1.Patient responses to the Medication Compliance Questionnaire (MCQ)

Question	Never	Sometimes	Often	Always
How often do you forget to take your medicine?	3(1.0%)	9 (3.0%)	72 (24.3%)	215(71.6%)
How often do you decide not to take your medicine?	12(4%)	10(3.3%)	98(32.0%)	180(60%)
How often do you miss taking your medicine because you feel better?	10(3.3%)	20(6.6%)	70(23.3%)	200(66.6%)
How often do you decide to take less of your medicine?	6(2.0%)	10(3.3%)	94(31.3%)	190(63.3%)
How often do you stop taking your medicine because you feel sick due to side effects of the medicine?	4(1.3%)	15(5.0%)	69(23.0%)	212(70.6%)
How often do you forget to bring along your medicine when you travel away from home?	10(3.3%)	24(8.0%)	79(26.3%)	187(62.3%)
How often do you not take your medicine because you run out of it at home?	12(4.0%)	11(3.6%)	80(26.6%)	197(65.6%)

According to the Likert scale, "Never" = 4, "Sometimes" = 3, "Often" = 2, "Always" = 1

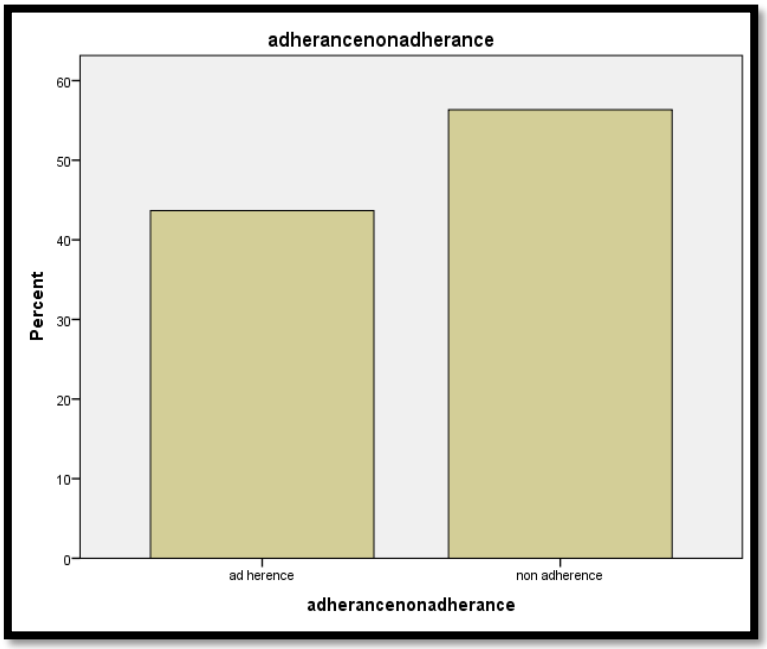

Figure 1. Prevalence of adherence and non-adherence in sample

Table 2 illustrated the prevalence of adherence and non-adherence in our sample and variables that were associated with adherence of medication. In our study, a large number of patients were unable to know their medications that were obtained by calculated medication knowledge score, we found only 46 patients were able to score 100% on medication knowledge as shown in figure2. While regarding the anti-diabetic medications, 104 (34.7%) participants used a single oral hypoglycemic drug, and 69 (23.0%) used combination oral anti-diabetic drugs, and 127 (42.3%) used oral and insulin therapy as shown in figure3.

Table 2. Characteristics associated with adherence and non-adherence (n = 300)

Characteristics	Non-adherent n(%)	Adherent n(%)	P value
Gender			
Male	79(26.3%)	46(15.3%)	0.244
Female	90(30.0%)	85(28.3%)	
Age			
<40	8(2.7%)	4(1.3%)	0.022*
40-49	26(8.7%)	15(5.0%)	
50-59	61(20.3%)	39(13.0%)	

+60	68(22.7%)	79(26.3%)	
BMI			
Normal	35(11.7%)	28(9.3%)	0.088
Overweight	94(31.3%)	58(19.3%)	
Obese	40(13.3%)	45(15.0%)	
Education level			
Never	49(16.3%)	40(13.3%)	
Primary	42(14.0%)	38(12.7%)	0.674
Secondary	28(9.3%)	16(5.3%)	
Graduate	50(16.7%)	37(12.3%)	
Comorbidities			
Yes	66(22.0%)	66(22.0%)	0.422
No	103(34.3%)	65(21.7%)	
Duration of DM			
<5 years	33(11.0%)	28(9.3%)	
6-10	47(15.7%)	36(12.0%)	
11-20	49(16.3%)	33(11.0%)	0.879
>20	40(13.3%)	34(11.3%)	
Medication knowledge score (%)			
20	22(7.3%)	15(5.0%)	
40	37(12.3%)	25(8.3%)	0.043*
60	45(15.0%)	42(14.0%)	
80	38(12.7%)	30(10.0%)	
100	27(9.0%)	19(6.3%)	
Number of taken drug			
1	46(15.3%)	29(9.7%)	
2	90(30.0%)	66(22.0%)	0.070
3	20(6.7%)	16(5.3%)	
>3	13(4.3%)	20(6.7%)	
Pattern of antidiabetic medications			
Monotherapy	61(20.3%)	43(14.3)	0.023*
Combination oral antidiabetic	40(13.3%)	29(9.7%)	
Combination oral and insulin	68(22.7%)	59(19.7%)	

Note: significant at P < 0.05. Abbreviations: BMI, body mass index; DM, diabetes mellitus

To identify the factors that predict the association of non-adherence to medications by using Binary logistic regression and entered the variables individually, of nine factors, only three factors (age P=0.043, medication knowledge P=0.018 and pattern of antidiabetic drugs P=0.034) were significant association, as shown in table 3.

Table 3. Logistic regression for factors predicting non-adherence in T2DM patients

Variables	95% confidence interval	P value
Age	0.940-0.985	0.043
Medication knowledge	0.950-0.984	0.018
Pattern of antidiabetic drug	0.945-0.955	0.034

P value<0.05 is considered to be statistically significant.

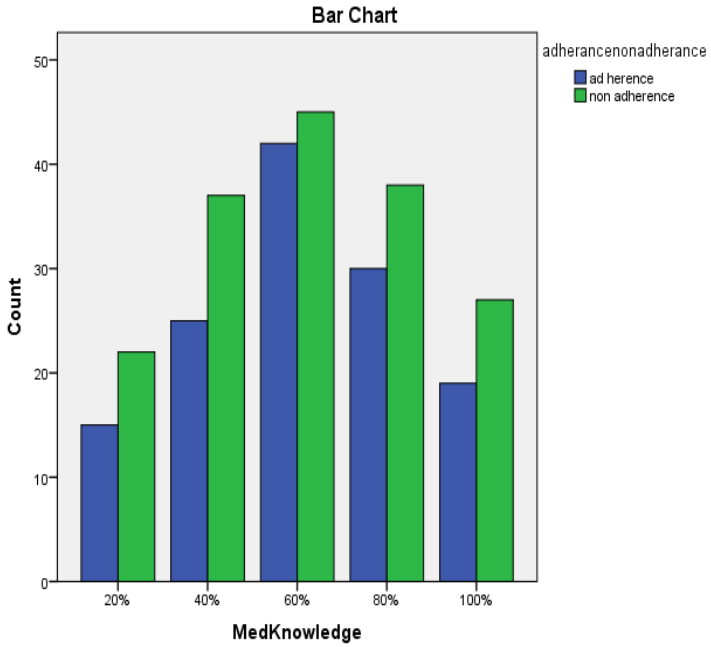

Figure 2. Association between medication knowledge and non-adherence to anti-diabetic medications

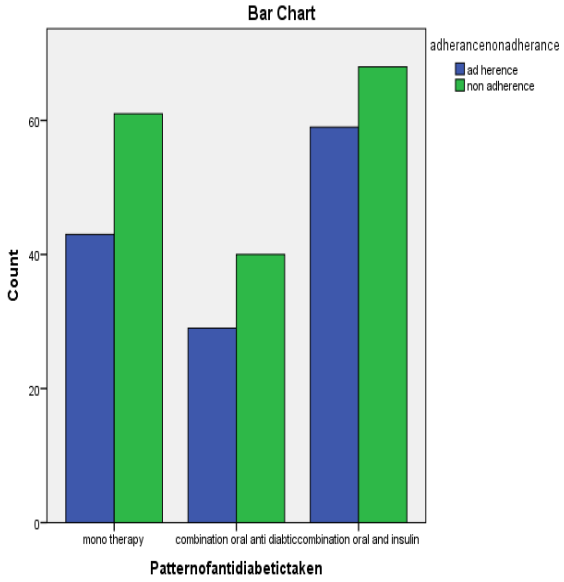

Figure 3. Association between pattern of anti-diabetic drug and non-adherence.

DISCUSSION

In our study, we found the prevalence of adherence to type 2 diabetic medications were 43.7%and this was related to age and medication knowledge of diabetic patients to their treatment. Forgetfulness, fear from side effect of drugs, disappearance of symptoms were the most frequent reasons for their non-adherence to medication. Numbers of previous studies identified that forgetfulness as a common reason for non-adherence to medication [9,10]. That was explained that patients do not have good education about their treatment or not have enough caring from their families. To increase awareness of patients about their treatment and reduce the forgetfulness we need counseling session involving family members and regular follow-up visits [11].

According to previous studies, determine the patient's characteristics may be related to non-adherence to type 2 diabetic medication has been exposed, where gender has not been associated with level of adherence [12]. While level of education has been founded to affect patient adherence [13]. In our study, we found gender, BMI, comorbidities, duration of diabetes, education level and number of drugs did not establish the level of adherence. Number of studies

were reported that type 2 diabetic patients with complex regimen of drugs (more than two medications) were more likely to be non-adherent [14]. as increase of drugs was an indicator of severity of type 2 DM and comorbidities [15]. However, in this study there was no difference between the number of drugs and the level of adherence.

Poor adherence in our sample, where the prevalence of non-adherent to antidiabetic medications was 56.3% (more than half), that may be related to personal factors about not caring about their health or systemic factors, such as no education the patient about their importance of adherence to medication or availability of drugs or limitation on services about diabetes in the study area. Our results were consistent with previous study like Malaysia [9]. Where non-adherent to antidiabetic medications was 53%, another study in Ethiopia reported the prevalence of non-adherent 54.1% [16]. In Libya, previous study in Tripoli by Ashur reported low medication adherence with level of 36.1% [17], another studies in Uganda, Nigeria, and Palestine showed rates of 16.7%, 27.5%, and 42%; respectively [10,18-19]. These variations in the results in the previous studies may be contributed to difference in socio-economic status or methods that were used to determine the prevalence of adherence.

The second aim in our study, was predict the factors that may be associated with non-adherence to type 2 diabetic medication, that was conducted using logistic regression analysis, we found that age, medication knowledge and pattern of ant diabetic drugs were significantly associated with non-adherence. According to age, our study showed that younger patient had higher level of non-adherence, as increase in age is associated with increased adherence level, that is agreement with another study which showed that non-adherence was largely by younger patients [20] and that was related to inadequate disease knowledge, perceived less severity of disease, fear of new disease or side effect of their treatment [21]. As a person gets older, he becomes more aware of the severity of a disease and the importance of controlling blood glucose level to reduce complications of the disease and also obtain family support for managing his diabetes [22]. But when the patient arrives at the age of 70 years, this association may be reduced because of some aging process like cognitive impairments [23].

Another factor that predicted the level of non-adherence was knowledge of patients to medication. The patient may face issues in understanding their treatment with especially those who have a chronic condition with complex regimen of medications [24]. That was agreement with another studies like Friis et al [25] Fredericksen et al [26] and Kvarnström et al [27]. The results were consistent with our results where a large number of patients had difficulties giving information about the name, dose, and frequency of drugs or understanding of the purpose of medication.

Our results also reported that medication knowledge is a stronger predictor for patient adherence, so improved knowledge of patients by educating them about treatment and increases awareness of benefits and risks of medication which improves adherence [28].

Pattern of antidiabetic medication was the third factor that related to non-adherence, our result showed that non-adherence level was higher in patients who received the oral antidiabetic drugs with insulin. Where the route of insulin is subcutaneous injection, the patient fears and pain from injection may cause the patient to skip the dose of insulin. Another reason for insulin adherence may be the inability of some patients to pay the price of insulin in private pharmacies when become unavailable in health centers [29].

Improved glycemic control can be achieved by improved patient adherence to medications that was attained by community health workers and regular follow-up visits on health education. Intervention studies using mobile technology for sending motivational message reminders have exhibited improved medication adherence among patients with HIV [30]. In general, the adherence can be improved by identifying the barriers of patient to medication adherence [31].

CONCLUSION

Our results show that over half of the patients with type 2 DM were non-adherent to their anti-diabetic medication. Non adherence was associated with age, medication knowledge and pattern of anti-diabetic medications. Forgetfulness was the most reason for non-adherence in our sample. To improve adherence to control blood glucose and diminishes complication should be adaption techniques and health professional meeting patients to educating them about their treatment and counseling with focus on a younger patient on pattern of medications with insulin.

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Conflict of interest

There are no financial, personal, or professional conflicts of interest to declare.

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