

Medication Adherence in Hypertensive Diabetic Patients

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Abstract

Background: Diabetes-related hypertension increases mortality risk by 7.2 times in the underdeveloped countries such as Iraq, with a greater risk of death. In developing countries, patients' adherence to chronic illness treatments such as hypertension and diabetes is low. Nonadherence is linked to higher rates of hospitalization and poor health outcomes. **Objectives:** The aim of this study to determine the prevalence of medication adherence among the hypertensive diabetic patients and to identify factors that associated with poor or nonadherence to medications. **Materials and Methods:** This is a hospital-based descriptive cross-sectional study. The study included a sample of 385 hypertensive diabetic patients of both gender, their ages above 18 years. The study was carried out from February 2022 to the end of May 2022 at the consultation clinics at Imam Al-Sadiq and Marjan Teaching Hospitals, Babylon, Iraq. Following verbal consent, the participants were interviewed using a prepared structured validated and reliable questionnaire will be use that includes demographic characteristics using the Morisky 8 Item Medication Adherence Scale (MMAS-8) was used to assess medication adherence. **Results:** This study showed that more than half of the patients (51.2%) had low adherence, whereas 22.9% had medium adherence. Those with high adherence constituted 26.0%. There were statistically significant associations between good adherence and high level of education, younger age, and nonsmoking. Patients with good adherence to medications have better blood pressure and blood sugar control. **Conclusion:** The level of medication adherence among diabetic hypertensive patients in Babylon province is low.

Keywords: Adherence, blood pressure, glycemic control, hypertensive diabetic

INTRODUCTION

Patients with type 2 diabetes mellitus commonly display a cluster of metabolic abnormalities called the cardiometabolic or cardiorenal metabolic syndrome.^[1]

The coexistence of hypertension and diabetes significantly increases the risk of cardiovascular disease, cerebrovascular accident, retinopathy, and nephropathy.^[2] The prevalence of diabetes co-occurring with hypertension is rising globally.^[3]

The rise in the number of diabetic, hypertensive patients causes burden, particularly in the Middle East.^[4] Controlling hypertension in diabetics can have a significant impact on cardiovascular disease outcomes.^[3]

Diabetes-related hypertension raises the probability of death by 7.2 times, with a greater chance in the underdeveloped countries including Iraq.^[5,6] Furthermore, in this developing nation, patients' adherence to chronic illness treatments such as hypertension and diabetes is low.^[7]

Pharmacotherapy, in conjunction with lifestyle changes, remains the cornerstone in the treatment of hypertension and diabetes mellitus. Adherence to medication is critical for achieving the desired clinical outcomes. It is vital to assess medication adherence and the factors that influence it so that required steps may be adopted within primary care settings to enhance patients' medication adherence, minimize long-term negative consequences of nonadherence, and lessen the load on the secondary care.^[8]

The World Health Organization defines medication adherence as "the degree to which a person's conduct conforms with the agreed-upon instructions from a health care practitioner." This most frequently relates to medication or drug compliance.^[9]

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Patients with chronic diseases, particularly those that are asymptomatic, such as hypertension and diabetes mellitus, are more likely to be noncompliant.

The lack of knowledge about the importance of adherence is a factor that contributes significantly to medication nonadherence.^[10] In Iraq, the adherence to antihypertensive medication is about 28.36%^[11] and to antidiabetic agents is about 45%.^[12] This means that adherence to treatment is low.

Objectives

The objective was to determine the prevalence of medication levels of medication adherence among the hypertensive diabetic patients and to identify factors that associated with poor or nonadherence to medications.

MATERIALS AND METHODS

This is a hospital-based descriptive cross-sectional study. The study was conducted at the consultation clinics in Imam Al-Sadiq and Marjan Teaching Hospitals, during the period from the beginning of February through the end of May 2022. The study includes 385 hypertensive, diabetic individuals over the age of 18 who attended internal medicine consultation clinics. A prepared structured questionnaire was used that includes questions about demographic characteristics and the medication compliance (adherence); the scale of adherence was based on the Morisky 8 items. The Morisky 8 Item Medication Adherence Scale (MMAS-8) was created to assess the patient's compliance with their prescribed course of therapy. There are eight questions on it. The response options for questions 1 through 7 are "yes" or "no." For the first seven items, the score was "yes" = 0 and "no" = 1, with the exception of item number five, when the values of "yes" and "no" were switched.^[13]

Responses to the eighth questions are given on a five-point scale, with never, almost never, occasionally, frequently, and always being the correct choice. There are a total of 0–8 points on this scale. Patients are classified based on their ratings as follows: less than 6 (poor adherence), 6 or 7 (moderate adherence), and 8 (adherent or high adherence).

Through a direct interview, a questionnaire form was filled up for each patient after obtaining his or her verbal consent. The investigator measures the blood pressure in a standard way. HbA1c results of all diabetic patients were studied or asked to be done.

The Statistical Package for the Social Sciences was used to analyze the data (SPSS IBM, version 26). The chi-square test was used to test the association between categorical variables. P value < 0.05 was considered statistically significant.

Ethical approval

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. Official approval of the research work was approved by the scientific committee of the Department of Family and Community Medicine in College of Medicine, Babylon University; ethical approval was obtained from the ethical research committee of Babylon Medical College; official approval was obtained from Imam Al-Sadiq and Marjan Teaching Hospitals according to the document number 646 (including the number and the date in 11/5/2022), and verbal consents from the participants were obtained after explaining to them the purposes of the study.

Current smoker

Current smokers are those who smoke cigarettes at the time of interview or those who used to smoke within the last 6 months. Nonsmokers are those who never smoked.

Ex-smoker

Ex-smokers are previous smokers who had quit smoking for at least 6 months from the time of the study.^[14]

Poor control of blood sugar (poor glycemic control)

When a patient's HbA1c was greater than 7.0%, a patient was regarded to have poor glycemic control.^[15]

Uncontrolled hypertension

Uncontrolled hypertension is defined as systolic blood pressure >130 and diastolic blood pressure >80 (the target of blood pressure in diabetic patients is <130/80).^[16]

RESULTS

This study included a total of 385 patients who were diagnosed as hypertensive and type 2 diabetic for duration of 6 months or longer. Gender distribution was almost equal between males and females. The vast majority of them are above 40 years of age (92.5%). Most of them have a secondary level of education and above [Table 1].

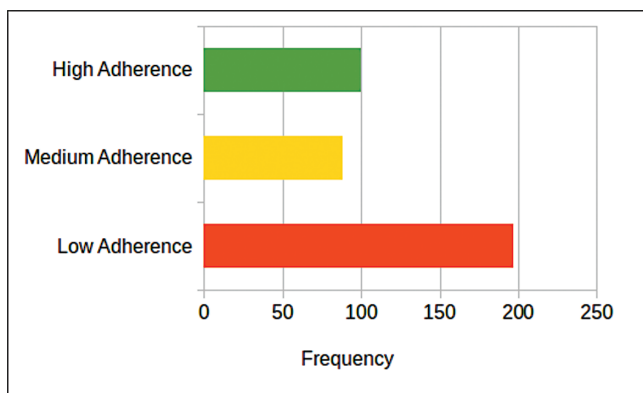
More than half of the patients (197 patients, forming 51.2%) had low adherence, whereas 88 patients (22.9%) had medium adherence. Those with high adherence were 100 patients, forming 26.0% of the total study sample [Figure 1].

There was a highly significant association between age group (<40 years) and level of medication adherence ($P < 0.001$). Younger patients had a higher level of adherence [Table 2].

Females showed a highly significant level of adherence compared with males ($P < 0.001$). Other demographic variables that were found to have significant relationship with the level of adherence are educational level,

Table 1: Demographic characteristics of study patients (n = 385)

Characteristics	Frequency	%
Age (years)	<40	29
	40–65	232
	>65	124
Gender	Male	192
	Female	193
Marital status	Single	16
	Married	264
	Divorced	18
	Widow	87
Residence	Urban	227
	Rural	158
Education	Illiterate	46
	Read and write	17
	Primary	73
	Secondary	113
Occupation	Higher	136
	Employee	83
	Retired	70
	Free worker	85
Income level	Housewife/not working	147
	Well/enough	99
	Medium	172
	Poor/not enough	114

**Figure 1: Levels of adherence of study patients (n = 385)**

occupation, and monthly income level ($P < 0.001$ for each). Higher education level was associated with higher adherence, so as the employment.

Smoking was also found to exhibit a statistically significant relationship with medication adherence ($P = 0.030$). More than 62% of active smokers had low adherence compared with 43.9% among nonsmokers [Table 3].

Regarding the control of blood pressure and glycated hemoglobin (HbA1c), both are significant and highly associated with the level of adherence ($P < 0.001$ for each). Sixty percent of patients with high adherence have controlled blood pressure, whereas only 17.3% of

those with low adherence have controlled blood pressure [Table 4].

Similarly, a proportion of patients (63%) with high adherence have controlled blood sugar ($\text{HbA1c} \leq 7\%$) compared with only 15.7% among those with low adherence [Table 5].

DISCUSSION

The findings of this study revealed that only 26% of patients in this study had good adherence to their antihypertensive and antidiabetic medications, whereas 51.2% of patients had poor adherence.

This low rate of antihypertensive medication adherence is lower than that reported by other studies^[11,12,17,18]; these differences may be related to different factors such as sample sizes, health-care services levels, health insurances, availability of drugs in low prices, and other socio-economic status such as the level of public and health-care awareness about the importance of medication adherences for chronic diseases.

The rate of adherence in the current study is higher than that reported by other researchers.^[19–22]

In our study, the age range (<40 years) was significantly associated with medication adherent, whereas other researchers^[12,20,23] reported the opposite finding. Young age group in this study has a high level of education; they are knowledgeable about the importance of regular use of treatment to avoid complications of diabetes mellitus and hypertension.

Females in our study appeared to have better medication adherence than males, this agrees with the findings of other reporters.^[17,24]

Generally, females are more mindful than males in following physician's instructions, particularly in relation to taking medications.

Our study found no significant relationship between marital status and medication adherence, which goes in line with other local study^[25] and a study performed in Iran,^[26] but disagrees with another study.^[27]

This study confirms the findings of other local studies by finding no connection between study participants' residences and their level of medication adherence.^[28] This may be related to the high proportion of the participants are living in urban areas which reflects the no difference of this independent variable, or may be due to the absence of clear-cut between rural and urban areas during the last years related to the economic cultural and social situation of the participants.

In the current study, high levels of education were significantly linked to patients' adherence; this finding is consistent with those of other Iraqi study conducted^[20] and

Table 2: Levels of adherence by demographic characteristics

Demographic characteristics		Adherence			Total	P value
		High (n = 100)	Medium (n = 88)	Low (n = 197)		
Age (years)	<40	17 (58.6%)	3 (10.3%)	9 (31.0%)	29 (100%)	<0.001*
	40–65	62 (26.7%)	54 (23.3%)	116 (50.0%)	232 (100%)	
	>65	21 (16.9%)	31 (25.0%)	72 (58.1%)	124 (100%)	
Gender	Male	30 (15.6%)	49 (25.5%)	113 (58.9%)	192 (100%)	<0.001*
	Female	70 (36.3%)	39 (20.2%)	84 (43.5%)	193 (100%)	
Marital status	Single	4 (25.0%)	2 (12.5%)	10 (62.5%)	16 (100%)	0.161
	Married	79 (29.9%)	59 (22.3%)	126 (47.7%)	264 (100%)	
	Divorced	4 (22.2%)	5 (27.8%)	9 (50.0%)	18 (100%)	
	Widow	13 (14.9%)	22 (25.3%)	52 (59.8%)	87 (100%)	
Residence	Urban	69 (30.4%)	51 (22.5%)	107 (47.1%)	227 (100%)	0.051
	Rural	31 (19.6%)	37 (23.4%)	90 (57.0%)	158 (100%)	
Education level	Illiterate	2 (4.3%)	5 (10.9%)	39 (84.8%)	46 (100%)	<0.001*
	Read and write	1 (5.9%)	1 (5.9%)	15 (88.2%)	17 (100%)	
	Primary	13 (17.8%)	12 (16.4%)	48 (65.8%)	73 (100%)	
	Secondary	39 (34.5%)	26 (23.0%)	48 (42.5%)	113 (100%)	
	Higher	45 (33.1%)	44 (32.4%)	47 (34.6%)	136 (100%)	
Occupation	Employee	31 (37.3%)	26 (31.3%)	26 (31.3%)	83 (100%)	<0.001*
	Retired	21 (30.0%)	25 (35.7%)	24 (34.3%)	70 (100%)	
	Free worker	9 (10.6%)	15 (17.6%)	61 (71.8%)	85 (100%)	
	Housewife/not working	39 (26.5%)	22 (15.0%)	86 (58.5%)	147 (100%)	
Income level	Well/enough	17 (17.2%)	43 (43.4%)	39 (39.4%)	99 (100%)	<0.001*
	Medium	66 (38.4%)	26 (15.1%)	80 (46.5%)	172 (100%)	
	Poor/not enough	17 (14.9%)	19 (16.7%)	78 (68.4%)	114 (100%)	

*Significant at $P < 0.05$ **Table 3: Levels of adherence by smoking habit**

Smoking history	Adherence			Total	P value
	High	Medium	Low		
Active smoker	17 (15.3%)	25 (22.5%)	69 (62.2%)	111 (100%)	0.030*
Passive smoker	19 (28.8%)	13 (19.7%)	34 (51.5%)	66 (100%)	
Ex-smoker	7 (20.0%)	10 (28.6%)	18 (51.4%)	35 (100%)	
Nonsmoker	57 (32.9%)	40 (23.1%)	76 (43.9%)	173 (100%)	
Total	100 (26.0%)	88 (22.9%)	197 (51.2%)	385 (100%)	

Table 4: Control of blood pressure by the level of adherence

Level of adherence	Blood pressure		Total	P value
	Controlled	Uncontrolled		
High	60 (60.0%)	40 (40.0%)	100 (100%)	<0.001*
Medium	37 (42.0%)	51 (58.0%)	88 (100%)	
Low	34 (17.3%)	163 (82.7%)	197 (100.0%)	
Total	131 (34.0%)	254 (66.0%)	385 (100%)	

*Significant at $P < 0.05$

the finding reported by an international study conducted by many researchers.^[29] However, it disagrees with studies that show that patients with a low level of education have a higher rate of adherence.^[25,26] This could be explained that well-educated patients may have more knowledge about hypertension and diabetes mellitus, as well as the

Table 5: Control of glycated hemoglobin by the level of adherence

Level of adherence	HbA1c		Total	P value
	Controlled	Uncontrolled		
High	63 (63.0%)	37 (37.0%)	100 (100%)	<0.001*
Medium	37 (42.0%)	51 (58.0%)	88 (100%)	
Low	31 (15.7%)	166 (84.3%)	197 (100.0%)	
Total	131 (34.0%)	254 (66.0%)	385 (100%)	

*Significant at $P < 0.05$

benefits of using drugs regularly to control these chronic diseases to avoid future complications.

The relationship between occupational status and drug adherence is well established; the rate of nonadherence

is higher among unemployed and housewives compared with the employed participants. This finding is comparable to that reported by study conducted in Iraq^[25] and other study conducted in the United States,^[30] but disagrees with other study.^[31]

This could be due to financial constraints, which make the employed person more concerned about his or her health, as well as their ability to afford the cost of antihypertensive and antidiabetic medications.

More than 62% of active smokers have low medication adherence compared with nonsmokers, who are highly adherent; this finding agrees with other local study^[11] and with findings of an international study.^[32]

In this study, 60% of patients with high medication compliance had normal blood pressure, whereas 82.7 % of the patients with low medication adherence had a poor control of blood pressure; this difference is highly and significantly statistical association. This outcome was rationally sound and supported by research done in Iraq^[11,20] and other international studies.^[23,25]

In this study, 63% of patients with high medication adherence had a good glycemic control (HbA1C < 7%), whereas those with low adherence, 84.2% of them, have a poor glycemic control (HbA1C > 7%); this result agrees with findings explained by different studies.^[33,34]

Glycemic control is hence the ultimate objective of any diabetes mellitus therapy. A good glycemic control among type 2 diabetes mellitus patients involves an interplay of self-management measures including physical activity and diet in addition to medication adherence.^[35] This can explain the discrepancy between the better medication adherence scores and poorer glycemic control outcome in this study group.

CONCLUSION

This study concludes that the level of medication adherence among diabetic hypertensive patients in Babylon province is low; female patients are more adherent than males; patients with higher education level are more adherent than those with low educational levels; and high level of medication adherence led to blood pressure and type 2 diabetes mellitus control. We recommend urgent education campaigns to increase the level of public awareness about the crucial importance of medication adherence as well as the awareness of health-care providers; further large scale studies are strongly recommended.

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Conflicts of interest

There are no conflicts of interest.

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