

Adherence to antihypertensive drugs and its determinants in an urban setting

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Abstract

Background and objective: Adherence to antihypertensive drugs is very important for controlling blood pressure and preventing its complications. This study aimed to assess the adherence level to antihypertensive drugs in adult hypertensive patients in Erbil city and examine its association with socio-demographic characteristics and access to medications.

Methods: A household survey was carried out in 20 quarters of Erbil city using a multi-stage sampling method. Adult patients known to have hypertension were identified. A questionnaire designed for this purpose was used to collect data about the socio-demographic and clinical characteristics, access to antihypertensive drugs, and adherence to drugs.

Results: Of 373 study participants known to have hypertension, 87.9% were taking their antihypertensive treatment regularly, 5.9% were taking the treatment irregularly, while 6.2% were not taking any treatment. Around 77% of the patients were obtaining their drugs from private pharmacies, and the rest were getting them for free from the public hospitals. A statistically significant association was found between adherence to drugs, and increasing age, duration of having hypertension, and economic status.

Conclusion: The antihypertensive drug adherence among our sample was relatively good. Access to free drugs was limited. Drug adherence was significantly associated with increasing age, increased the duration of hypertension, and economic status. Similar studies need to be conducted in rural areas for comparison purposes.

Keywords: Antihypertensive; Drugs; Adherence; Erbil; Urban Setting.

Introduction

Hypertension is one of the major public health problems in different parts of the world.¹ It is one of the leading causes of death and frequent outpatient visits.² In 2010, reports indicated that worldwide 1.2 billion people had hypertension and that the prevalence will increase by 60% in 2025.³ According to a WHO statistics report in 2014, 50% of the global deaths from coronary heart diseases are due to uncontrolled hypertension.⁴ According to global data analysis, around 80% of these deaths occur in low and middle-income countries.⁵ It is well known that appropriate treatment of hypertension is required to reduce the risk of cardiovascular disease. This can be attained through a combination

of medication and lifestyle intervention.^{6,7} Blood pressure in developing countries is poorly controlled. Based on a systematic review of a number of studies achieved between 2001 and 2007, only 13% of hypertensive patients had controlled blood pressure.⁸ It is obvious that the key factor in achieving long-term control of blood pressure level is the use of antihypertensive drugs.⁹ Therefore, an important step in controlling hypertension and preventing its complications is adherence to antihypertensive drugs.¹⁰ In 2001, the WHO adherence meeting defined adherence as "the extent to which a person's behavior taking medication, following a diet, and/or executing lifestyle changes corresponds with agreed

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recommendations from a health care provider.¹¹ Non-adherence could be intentional when the patient decides not to take a treatment due to his/her own belief or it could be unintentional when the patient, for example, simply forget to take medications.¹² Patients' belief and their health conditions are the main factors contributing to their non-adherence to the treatment regimen.¹³ Factors affecting patients' adherence to antihypertensive therapy could be categorized into two main categories. The first category includes the factors that are related to the patient, such as socio-demographics, knowledge about hypertension, its treatment, and the patient's belief about the treatment. The second category includes the factors related to the provision of antihypertensive medications, such as the relationship between hypertensive patients and healthcare providers. Other relevant factors include the number of pills, side effects, and comorbidities.¹⁴ The degree of non-adherence to antihypertensive treatment is assumed to be higher in developing countries compared to developed countries. This can be attributed to the health resources shortage and healthcare access difficulties.¹⁵ Studies carried out in Cameron in 2014,¹⁶ Nigeria in 2010¹⁷ and Pakistan in 2008,¹⁸ showed an adherence rate to antihypertensive drugs of 33.3%, 32.1%, and 48.3%, respectively. A study conducted in Turkey in 2017 revealed a relatively higher adherence rate (78.2%) to the pharmacological treatment of hypertensive patients.¹⁹ In a study conducted in Garmian province of the Iraqi Kurdistan in 2014, the levels of drug adherence among hypertensive and diabetic patients were 29.8% for high-level adherence compared to 50.6% and 19.6% for moderate and lower adherence levels respectively.²⁰ Adherence to antihypertensive drugs is very crucial in controlling blood pressure and preventing its complications, but studies addressing this important topic are rare in Erbil. Therefore, this study aimed to assess the

level of adherence to antihypertensive drugs among the Erbil patients, and examine the association between patient's adherence to antihypertensive drugs and a range of factors like socio-demographic characteristics and access to drugs.

Methods

The study was conducted in Erbil city, Iraq, from April to June 2017. This study reports part of the data collected from a wider household survey to assess hypertension in the adult population in Erbil city. A multi-stage sampling method was used to collect the study subjects. In the first stage, Erbil city was divided into 20 quarters based on the administrative map of the city. Later on, a systematic random sampling method was used to collect 30 households per each quarter. The first household in each quarter was selected randomly, and the next households were selected by systematic random sampling. The study population included all the adult inhabitants of these households, aged 18 years and more. Data collection was done through direct interviews using a special questionnaire designed for this purpose. The questionnaire included personal and socio-demographic information such as age, gender, marital status, educational level, occupation, smoking status, alcohol consumption, dietary habits, physical activities, family history of having hypertension, and questions on adherence to antihypertensive drugs, duration of hypertension, access to drugs, and types of antihypertensive drugs. The blood pressure was measured in the sitting position using calibrated mercury instruments. Systolic and diastolic blood pressure was measured for each participant on two occasions; the first reading after at least five minutes rest, and the second one after five minutes of the first reading. We used the 2017 American College of Cardiology/American Heart Association new guidelines for the prevention, detection, evaluation, and management of high blood pressure in

adults that set a cut point of 130/80 mm Hg for hypertension.²¹ Ethical approval was obtained from the Research Ethics Committee at the College of Medicine, Hawler Medical University. Informed consent was obtained from the participants who were assured about the anonymity of the study. The participants were informed about their blood pressure status, and those with elevated blood pressure, especially the newly diagnosed hypertensive were advised about seeking appropriate health care for that. This study reports the data obtained from the known hypertensive cases among the total sample. The statistical package for the social sciences (version 19) was used for data entry and analysis. Chi-square test was used for comparing proportions. A *P* value equal to or less than 0.05 was considered statistically significant.

Results

Of 373 study participants who were already diagnosed as having hypertension, 56.8% were 60 years old and older, 23.9% 50-59 years old, and 19.3% 20-49 years old. The mean \pm SD age of the participants was 46.36 ± 16.27 , with a minimum age of 20 and a maximum of 92 years. Females comprised 81.8% of the participants, 88.7% were unemployed, and 98.9% were married. With regard to their educational level, 68.9% were illiterate, 16.1% had primary education level and 3.8%, and 11.3% for secondary and tertiary levels, respectively. Most of the participants (92.2%) assessed themselves as having a medium socioeconomic level, as shown in Table 1. With regard to patients' adherence to taking antihypertensive drugs, 87.9% were taking their antihypertensive treatment regularly, 5.9% were taking the treatment irregularly, while 6.2% were not taking any treatment. Around 77% of these hypertensive patients get their antihypertensive treatment from private pharmacies, and only around 12.6% of them get the treatment free of charge from the public hospitals. Regarding the

category of antihypertensive drugs the patients receive, most of them (42.4%) receive angiotensin receptor blockers, 16.6% calcium channel blockers, 11.3% beta blockers, 4% angiotensin-converting enzyme inhibitors, 3.5% diuretic drugs, and the rest were receiving a combination of two or three of the above-mentioned categories. Around one-quarter of the participants were diagnosed with hypertension for 11 and more years, compared to 28.2% for 6-10 years and 46.9% for five years and less. Only 46.6% had a positive family history in the family, and 34.4% had controlled blood pressure on examination. Only 7.5% of the participants had normal weight compared to 26.5% and 66% of overweight and obese nutritional status, respectively. Around 95% were nonsmokers, 99.5% nonalcoholics, 98.1% don't add table salt to their food, 87.2% had an active lifestyle, and 97.1% didn't perform any form of exercises as shown in Table 2. There was a statistically significant association between compliance with antihypertensive drugs and increasing age, increasing the duration of having hypertension and economic status. A nonsignificant association was found with gender, educational level, access to drugs, or the source of obtaining antihypertensive drugs and the family history of hypertension, as shown in Table 3.

Table 1: The socio-demographic characteristics of the studied sample.

Variable	Frequency	Percentage
Age		
20-29	4	(1.1)
30-39	16	(4.3)
40-49	52	(13.9)
50-59	89	(23.9)
≥60	212	(56.8)
Gender		
Male	68	(18.2)
Female	305	(81.8)
Employment		
No	331	(88.7)
Yes	42	(11.3)
Education		
Illiterate	257	(68.9)
Primary	60	(16.1)
Secondary	14	(3.8)
Tertiary	42	(11.3)
Marital status		
Single	4	(1.1)
Married	369	(98.9)
Religion		
Muslim	360	(96.5)
Christian	13	(3.5)
Ethnicity		
Kurd	354	(94.9)
Arab	3	(0.8)
Turkman	3	(0.8)
Chaldean/Assyrian	13	(3.5)
Socioeconomic status (self assessment)		
Poor	24	(6.4)
Medium	344	(92.2)
Well	5	(1.3)
Accommodation		
Own house	355	(95.2)
Rented	18	(4.8)
Total	373	(100)

Table 2: Clinical characteristics of the study participants.

Characteristic	Frequency	Percent
Compliance with antihypertensive treatment		
Regularly take treatment	328	(87.9)
Irregularly take treatment	22	(5.9)
Do not take treatment	23	(6.2)
Access to antihypertensive drugs		
Public hospital	47	(12.6)
Private pharmacy	288	(77.2)
Missing data	38	(10.2)
Antihypertensive drug class		
Angiotensin receptor blocker	158	(42.4)
Angiotensin converting enzyme inhibitors	15	(4.0)
Calcium channel blockers	62	(16.6)
Diuretic	13	(3.5)
Beta blockers	42	(11.3)
Angiotensin receptor blocker + calcium channel blockers	15	(4.0)
Angiotensin receptor blocker + beta blockers	3	(0.8)
Angiotensin receptor blocker + diuretic	23	(6.2)
Angiotensin converting enzyme inhibitors + calcium channel blockers	2	(0.5)
Angiotensin converting enzyme inhibitors + diuretic	23	(6.2)
Angiotensin converting enzyme inhibitors + beta blockers	2	(0.5)
Diuretic + beta blockers	1	(0.3)
Angiotensin receptor blocker+ calcium channel blockers + diuretic	6	(1.6)
Missing data	30	(8.0)
Duration of hypertension		
≤5 years	175	(46.9)
6-10 years	105	(28.2)
≥11 years	93	(24.9)
Family history of hypertension		
No	199	(53.4)
Yes	174	(46.6)
Blood pressure on examination		
Controlled	129	(34.6)
Uncontrolled	244	(65.4)
Weight status		
Normal weight	28	(7.5)
Overweight	99	(26.5)
Obese	246	(66.0)
Smoking		
No	355	(95.2)
Yes	18	(4.8)
Alcohol consumption		
No	371	(99.5)
Yes	2	(0.5)
Table salt intake		
No	366	(98.1)
Yes	7	(1.9)
Lifestyle		
Sedentary	48	(12.9)
Active	325	(87.2)
Performing exercise		
No	362	(97.1)
Yes	11	(2.9)
Total	373	(100)

Table 3: Association between patients' adherence to treatment and other variables.

Variables	Compliance			P value
	Yes No. (%)	No No. (%)	Total No. (%)	
Age groups				
< 60 years	135 (83.9)	26 (16.1)	161(100)	0.035
≥ 60 years	193 (91.0)	19 (9.0)	212 (100)	
Gender				
Male	60 (88.2)	8 (11.8)	68 (100)	0.933
Female	268 (87.9)	37 (12.1)	305 (100)	
Education level				
Illiterate	225 (87.5)	32 (12.5)	257 (100)	0.947
Primary	53 (88.3)	7(11.7)	60 (100)	
Secondary	13 (92.9)	1 (7.1)	14 (100)	
Tertiary	37 (88.1)	5 (11.9)	42 (100)	
Economic status				
Poor	16 (66.7)	8 (33. 3)	24 (100)	0.004
Medium/Well	312 (89.4)	37 (10.6)	349 (100)	
Access to drugs				
Public hospitals	43 (91.5)	4 (8.5)	47 (100)	0.428
Private pharmacies	272 (94.4)	16 (5.6)	288 (100)	
Family history of hypertension				
No	177 (88.9)	22 (11.1)	199 (100)	0.522
Yes	151 (86.8)	23 (13.2)	174 (100)	
Duration of hypertension				
≤5 years	142 (81.1)	33 (18.9)	175 (100)	<0.001
6 - 10 years	95 (90.5)	10 (9.5)	105 (100)	
≥11 years	91 (97.8)	2 (2.2)	93 (100)	

Discussion

Hypertension or high blood pressure is a well-known risk factor among other important factors for cardiovascular diseases. Worldwide, it is also considered to be the leading cause of premature adult deaths.⁴ Studies showed that deaths' number due to hypertension increased from 7.6 to 9.4 million from the year 2000 to 2013.²² Poor adherence to hypertensive medications is an important barrier among other barriers in front of achieving an appropriate blood pressure control.²³ We undertook this study to assess the hypertensive patients' adherence to the prescribed antihypertensive drugs in Erbil city and explore factors that may affect this adherence. This study showed that 87.9% of the studied sample were adherent to their treatment compared to only 12.1% of the hypertensive patients who were either not or incompletely adherent to their antihypertensive treatment. The low non-adherence rate might be attributed to the fact that the study was conducted in the city and did not include other rural or semi-rural areas where it is expected to have higher non-adherence rates. Around 77% of the patients enrolled in this study stated that their main access to antihypertensive drugs was from private pharmacies rather than public hospitals. This may also explain to some extent the low non-adherence rate since patients do not wait to get drugs from public hospitals or through other governmental health care delivery institutions. These results were somehow close to those of a study conducted in Turkey, which showed a rate of 78.2% adherence of patients to antihypertensive drugs,¹⁹ but a study conducted in Shiraz, Iran revealed a much lower (39.6%) adherent rate compared to our study.²⁴ Our results were also much higher than those of a study conducted in Saudi Arabia in which only 27.9% of the patients were classified as a perfect adherent to antihypertensive drugs.²⁵ A significant statistical association was found in this study, between

adherence to treatment and participants' age. Those whose age was equal or more than 60 years had a 91% adherence rate compared to 83.9% rate for those whose age is less than 60 years. This might be because older adults are more concerned about their health status to decrease the probability of complications that may arise from hypertension control failure. These results were consistent with those of a study conducted in the general teaching hospitals in Erbil, which revealed compliance is significantly higher among old age (> 65 years) patients.²⁶ Although insignificant, other studies conducted in the Ardabil city in Iran,²⁷ Turkey,²⁸ Saudi Arabia,²⁵ Cameron,²⁹ and Finland³⁰ also showed a higher rate of adherence to antihypertensive drugs among older patients. Gender wise, although statistically insignificant, our results showed a slightly higher adherence rate among males (88.2%) compared to females (87.9%). Generally, females are more mindful than males in following physician's instructions, particularly in relation to medications taking. Similar insignificant association results were also reported in a number of studies like those in Iran,²⁷ Saudi Arabia,²⁵ Cameron,²⁹ and Finland.³⁰ A significant association was reported in a study conducted in Turkey with a higher rate of adherence among females compared to males.²⁸ Unlikely, in a study conducted in Erbil in 2015, males had a significantly higher (63.7%) compliance rate compared to females (38.3%).²⁶ A higher insignificant adherence level was reported among those with secondary education level (92.9%), compared to illiterates (87.5%), primary (88.3%), and tertiary (88.1%) education levels. Ideally, those with higher educational levels should have a higher adherence rate, but because most (68.9%) of the participants were illiterate, the results did not come as expected. The study results were consistent with those of Cameron²⁹ and Finland³⁰ studies, which showed an insignificant association between drug compliance and education

level. However, our results were inconsistent with those of the Saudi Arabia study, which revealed a significantly higher rate of perfect adherence to antihypertensive drugs among patients with formal education (40.4%) compared to non-formal education (25.7%).²⁵ Unexpectedly, the study conducted in Erbil in 2015, revealed a significantly higher rate of compliance among illiterate patients (70%) compared to those who only read and write (64%), primary (9.8%) and secondary (36%) education levels.²⁶ With regard to the economic situation of the patients, a significantly higher adherence level was found among those with medium and higher economic situations (89.4%) compared to the poor patients (66.7%). Non significant results were reported in the study conducted in Saudi Arabia²⁵ which showed an insignificant association of compliance with antihypertensive treatment among low income and high-income patients, and that conducted in Cameroon which showed an insignificant association of treatment compliance among employed and unemployed patients.²⁹ The duration of having or being diagnosed as having hypertension was also tested, and the study revealed a significantly higher compliance rate (97.8%) among those who are diagnosed as having hypertensive for eleven and more years, compared to 6-10 years (90.5%) and five or fewer years (81.1%). Unlikely, the study conducted in Erbil in 2015 revealed a higher significant compliance rate (65.8%) among those having hypertension for ten or fewer years compared to more than ten years (42%).²⁶ A non-significant association was reported between compliance and the duration of having hypertension in the study conducted in Finland.³⁰ This study is limited by the low male representation and lack of adequate and reliable data regarding comorbidities. For the assessment of adherence, we depended on interviewing the patients using a questionnaire. More accurate data can be obtained by using other methods of assessing adherence like pill count,

electronic monitoring, or therapeutic drug monitoring. There are many other important factors that can affect the adherence to antihypertensive drugs and be not assessed by this study. Examples of these factors include the cost of medication, the frequency of daily medication, the presence of comorbidities, and the simultaneous admission of other drugs.

Conclusion

The antihypertensive drug adherence among our sample was relatively good and higher compared to other studies conducted in a number of our neighboring countries. Access to drugs from public facilities was limited. Adherence to medications was significantly associated with the increasing age, increased the duration of being hypertensive and the economic status. Doctors should always assess and improve adherence by adapting the drug regimen that is simple, easy to follow, and fits the patient's lifestyle. More comprehensive future studies are required to assess the other factors that could be associated with adherence that were not covered by this study and to find and assess methods of improving adherence.

Competing interests

The author declares no competing interests.

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