

Factors Affecting Adherence to Medications among Hypertension Patients

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Abstract: Non-adherence to management of chronic illness is a global concern of prominent degree. Information on adherence to antihypertensive drugs (AHDs) and blood pressure control among hypertension patients in Jordan is scanty. This study will be conducted to assess the rate of adherence and to explore factors associated with non-adherence to AHDs among ambulatory patients with hypertension in a King Hussein Medical Centre (KHMC) at the Royal Medical Services (RMS) in Jordan/Amman. A descriptive cross-sectional design will be used to collect quantitative data. Structured questionnaire containing the Morisky Medication Adherence Scale (MMAS) will be utilized to collect information necessary to assess medication adherence. Demographic and clinical data will be taken from the patients' medical records. The self-reported adherence rate to AHDs was 25.9 %. The adherence rate was approximately similar in both genders, and the most common reasons for non-adherence were multiple drug therapy and forgetfulness. Patients with governmental job, higher educational level (Bachelor's and beyond) and higher monthly income reported greater adherence rate to AHDs. Morisky Medication Adherence Scale revealed poor adherence to AHDs among the study participants. Inadequate BP control was associated with low level of adherence. Future projects on strategies to improve adherence rate should be considered.

Keywords: Adherence, Antihypertensive Drugs, Hypertension, Blood Pressure Control.

INTRODUCTION

Hypertension (HTN) is one of the chronic diseases that necessitate continuing therapies and regular self-care [1].

Antihypertensive drugs (AHDs) adherence is a vital constituent of HTN treatment schedules with guideline consistent adherence being associated with adequate blood pressure (BP) control, lower disease-related health-care costs, and decreased mortality. Identifying factors associated with poor adherence to AHDs is key step toward developing interventions that improve adherence in management of high BP [2].

Non-adherence to medical recommendations is a significant problem in health care, since adherence to medical treatments regimens is essential to the success of the treatment. Given the significance of adherence behaviors in the potential success of treatments, non-adherence to treatment is an important problem to address, and the risk of non-adherence to treatment is costly and sometimes lethal [3]. The problem of patient's poor adherence to treatment regimens is one of the main barriers in therapeutic management BP for the health care providers. As a result of non-adherence to the recommended treatment plan, more patients will not achieve the profit from medical treatment, which consequently, results in inferior treatment outcomes, poorer quality of life (QOL), and increased health care load [4]. The level of adherence is decreased markedly

after the first six months of treatment among patients suffering from chronic diseases such as BP while adherence rates are usually greater in patients with acute situations [5].

Ensuring patient's adherence of the recommended medication in is a key dimension of successful management of BP because of the strong association between adherence, patient outcomes, and treatment budgets [6]. According to the World Health Organization (WHO), Adherence is 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 health care provider" [7].

Poor adherence to medication therapy is currently one of the most critical obstacles facing HTN care delivery especially in BP. It has been reported that BP patients, who fail to take at least 80% of their AHDs within one year period, are at risk of frequent hospital admissions during the next year [8]. Non-adherence to AHDs leads to increased risk of the incidence of cardiovascular complications. Other consequences of poor adherence to the prescribed drugs are cost of

medications, deteriorating of the disease, therapeutic plan failure, decreased functional abilities, lower QOL, increased mortality and enlarged healthcare budget [9].

Patients' adherence to AHDs is commonly suboptimal and challenging to keep even in a population with satisfactory access to health care facilities and drug coverage [10]. The general objective of this study is to assess factors affecting adherence to AHDs among patients with HTN among ambulatory patients with hypertension in King Hussein Medical Centre (KHMC) at the Royal Medical Services (RMS) in Jordan/Amman.

Specific Objectives

- To determine the percentage of AHDs adherence among study participants
- To detect factors associated with AHDs non-adherence and BP control.
- To find out the influence of poor adherence on the level of BP control.
- To identify barriers to AHDs adherence among study participants.

PATIENTS AND METHODS

The study was conducted in King Hussein Medical Centre (KHMC) at the Royal Medical Services (RMS) in Jordan/Amman. All patients with HTN attending the general internal medicine clinics during the study period were considered to be the source population. The study was descriptive cross-sectional design. Ethical approval has been obtained from the IRB committees at the JRMS. The study population was all HTN patients who are taking AHDs for 6 months at least, attending the general internal medicine clinics during the study period, and fulfilled the inclusion criteria. A five parts structured questionnaire including the Morisky Medication Adherence Scale (MMAS-8) used to collect information necessary to assess medication adherence. Part I will be aimed at collecting information on basic socio-demographic variables. Part II will consist of questions required to gather information on the different patient disease related characteristics. Part III will be about the different non-pharmacological approaches of HTN care and Part IV will include questions important to assess AHDs adherence, which is the MMAS-8. Part V included questions used to assess the reasons for medication non-adherence. The MMAS-8 consists of eight items; seven questions that could be answered as "No=1" and "Yes=0". Item 8 has a five-item rating scale (0-4 score) to assess how frequently the patients have difficulty in remembering to take all their medication. Adherence level was measured by summing scores of items 1-7, then summated to item 8 (which has been calculated by divided it by 4, when calculating a summated score) [8]

: the total score determine the adherence level (as the following):

- Low adherence level (< 6)
- Medium Adherence (6 and 7)
- High Adherence (8)

Inclusion Criteria

- Patients of age 18 years and above.
- Participants with a confirmed diagnosis of HTN for at least 6 months with or without other comorbidities.
- Participants who have been prescribed AHDs treatment for at least 6 months.
- Patients who are not seriously ill.
- Patients who agreed to participate in the study.

Exclusion Criteria

- Patients less than 18 years of age
- Patients who are seriously ill and cannot respond.
- Patients who will not agree to participate in the study.

Simple random sampling method was used to pick out the study participants. The sample size was determined by using Krejcie & Morgan table [37], because the population is expected to be finite.

DATA ANALYSIS

Data analysis will be performed using SPSS software program version 22. Descriptive analyses will be reported as mean \pm standard deviation (SD), and percentage to summarize the socio-demographic data for the project participants. Qualitative categorical variables will be compared using chi-square test. Statistical significance will be considered at p -value < 0.05 .

RESULTS

Socio-demographic Characteristics

A total number of 322 HTN patients from the age 18 years and above were screened, 155 patients met the inclusion criteria and were eligible to be enrolled. Twenty patients refused to participate in the study for lack of interest. A total of 135 patients of both genders agreed to be enrolled in the study. The socio-demographic characteristics of the respondents are shown in Table 1. Females comprised 44.4% of the sex category. Patients aged > 60 years accounted for 54.1%. The mean age of the studied population was 67.6 (SD=14.17) years (range 44 to 82 years). Being a retired (40, 29.6%) accounted for the highest percentage of occupation. Patients with Bachelor and beyond degree education (80, 59.2%) constituted the highest percentage of educational status category. Majority of the patients (92, 68.1%) earned above average monthly family income.

Table-1: Socio-demographic characteristic of the patients

Variables	Frequency	Percent
Sex		
Male	75	55.6
Female	60	44.4
Age		
≤ 60	62	45.9
> 60	73	54.1
Marital Status		
Single	4	2.9
Married	82	60.7
Divorced	3	2.2
Widowed	46	34
Occupation		
House Wife	18	13.4
Gov't Employee	20	14.9
Retired	40	29.6
Merchant/Trade	22	16.4
Unemployed	9	6.6
Farmer	10	7.4
Daily Laborer	4	2.9
Others*	12	8.8
Educational Status		
Cannot Read and Write	2	1.4
Primary	14	10.3
Secondary	24	17.7
Associate degree	15	11.1
Bachelor and beyond	80	59.2
Monthly Income (in JD)		
Very low (<200)	1	0.74
Low (200-500)	6	4.4
Average (500-1000)	22	16.2
Above average (1000-2500)	92	68.1
High (>2500)	14	10.3

*Carpenter, Construction, Driver, Teacher working in private school

Disease Related Characteristics

Overall, patients had been diagnosed with HTN for an average of 10.53 (SD= 7.72) years, ranging from under five years (37, 27.4 %) through 5-10 years (55, 40.8%) to over ten years (43, 31.8%).

Ninety three (68.8%) patients knew at least one HTN complications. Among this, knowledge about cardiovascular complications ranked the first among the complications, for which 95.6% of patients knew about (Table 2).

Table-2: Knowledge about HTN complications

Variables	Frequency	Percent
At least knows one HTN Complication		
No	42	31.2
Yes	93	68.8
Knowledge on Specific HTN Complications (n=93)		
Stroke	81	87.1
Kidney Complications	85	91.3
Eye Complications	73	78.4
Heart Complications	89	95.6
Headache	77	82.7
Others*	32	34.4

* Hearing, Mental.

On patient medical record review, 82 (60.7%) patients were found to have at least one long term HTN complication, among which cardiovascular accounted for the highest percentage (61, 74.3%).

Similarly, 92 (68.1%) patients had at least one co-morbid condition, Diabetes Mellitus (DM) being the major type of co-morbidity (87, 94.5%) (Table 3).

Table-3: Presence of co-morbidities and HTN complications

Variables	Frequency	Percent
Complications		
HTN Complications		
Absent	53	39.3
Present	82	60.7
Specific HTN Complications (n=82)		
Stroke	33	40.2
Headache	37	45.1
Heart Complications	61	74.3
Retinopathy	25	30.4
Others *	19	23.1
Co-morbidities		
Co-morbidities		
Absent	43	31.8
Present	92	68.2
Specific Co-morbidities (n=92)		
DM	87	94.5
Heart Disease	33	35.8
Dyslipidemia	45	48.9
Obesity	43	64.7
Others**	22	23.9

*Hearing problems, **COPD, Asthma

Blood Pressure Control

Among 135 participants in the project, 79 participants perform BP home measuring regularly every day (Table 4). The most recent BP values were regarded as the measure of BP control in this study. The

mean level of BP (systolic /diastolic) was (159.95/91.8) with a range value for systolic BP of 141.4 mmHg to 178.3 mmHg and 84.3 mmHg to 99.3 mmHg for diastolic BP. Accordingly, only 40 (29.6%) patients attained adequate BP control (Table 4).

Table-4: Blood Pressure Control

Frequency of BP Measurement	Frequency	Percentage
Every day	79	58.5
Every week	30	22.2
Every month	15	11.1
Not regularly	11	8.1
Level of BP control		
Adequate	40 (29.6)	6.8±(2.1)
Inadequate	95 (70.4)	9.9±(4.2)

Non-pharmacological Approaches of HTN Care

The non-pharmacological treatment modalities practiced by patients included: diet restriction (87, 64.4%), exercise (23, 17%), self-monitoring of BP (25,

18.5%), and never smoke (73, 54.1%). None of the patients had dietary plans prepared with their physicians but majority of them were simply told to cut off salty and fatty meals (Table 5).

Table-5: Non-pharmacological approaches of care among HTN Patients

Variables	Frequency	Percent
Diet		
Dietary Approach		
Cut off salty Meals	114	84.4
Cut off Fatty Meals	91	67.4
Overall Dietary Adherence		
No	48	35.5
Yes	87	64.4
Exercise		
Presence of agreed Exercise plan with physicians		
No	99	73.3
Yes	36	26.7
Exercising According to Plan (n=36)		
No	20	55.5
Yes	16	45.5
Days per Week Doing Moderate Intense Exercise		
< 3 Days	105	77.7
≥3 Days	30	22.3
Duration of Moderate Intense Exercise per Week in Minutes		
< 150 Minutes	110	81.5
≥150 Minutes	25	18.5
Overall Exercise Adherence		
No	112	
Yes	23	
Cigarette		
Smoking		
Never smoked	73	54.1
ex-smoker	20	14.8
Current smoker	42	31.1
Amount of Cigarettes Per Day in Packs (n=42)		
< Half a Pack	12	28.5
Half a Pack	15	35.7
> Half a Pack	15	35.7
Self-Monitoring of Blood Pressure		
Presence of sphygmomanometer		
No	112	82.9
Yes	23	17.1
Number of Blood pressure (n=23)		
<1 Time Per day	17	73.9
≥ 1 Time Per day	6	26.1

Rate of AHDs Adherence and Reasons for Non-Adherence

Assessment of patients' responses to the 8-item Morisky adherence predictor scale showed that

35 (25.9%) patients were highly adherent to the prescribed regimen of their AHDs (Table 8).

Table-6: Summary of HTN patients’ responses to the 8-item Morisky Instrument

Question	Frequency (%)	
	Response	
	Yes (0)	No (1)
1-Do you sometimes forget to take your medications?	100 (74.1)	35 (25.9)
2- Thinking over the past two weeks, were there any days when you did not take your medicines?	90 (66.6)	45 (29.4)
3- Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	78(57.7)	57 (42.2)
4- When you travel or leave home, do you sometimes forget to bring along your medications?	85 (62.9)	50 (37.1)
5- Did you take your medications yesterday?	133 (98.5)	2 (1.5)
6- When you feel like your condition is under control, do you sometimes stop taking your medicine?	75 (55.5)	60 (44.5)
7- Do you ever feel hassled about sticking to your treatment plan?	78(57.7)	57 (42.2)
8- How often do you have difficulty remembering to take all your medications? Never Almost Never Sometimes Frequently Always		35 (25.9) 10 (7.4) 49 (36.2) 17 (12.5) 24 (17.7)
Medication adherence (MMAS score)	Frequency (%)	
High adherence (8)	35 (25.9)	
Medium adherence (6 -<8)	41 (30.3)	
Low adherence (<6)	59 (43.8)	

Upon evaluation of the reasons for AHDs non-adherence, it was identified that 54 (91.5%) patients mentioned that multiple medications as the reason for their nonadherence. For each of 25 (42.3%) and 28

(47.4%) patients, complex regimen and forgetfulness were the reasons for nonadherence, respectively. Others included busyness, fasting, sleeping and lack of access to medications (Table 7).

Table-7: Reasons for AHDs non-adherence

Reason for AHDs Non- adherence	Frequency	Percentage
Cost of medication too expensive	22	37.2
Forgetfulness	28	47.4
Feeling well without medications	21	35.5
Complex regimen	25	42.3
Physicians mode of approach	12	20.3
Lack of trust on the efficacy of medications	26	44
Experiencing side effects	33	55.9
Multiple medications	54	91.5
Other reason, if any	23	38.9

Factors Associated with AHDs Non-adherence

The result of using Chi-square correlation test analysis on the association between different types of independent variables and AHDs adherence showed that patients who were government employees had a significant association with their adherence condition and more likely to adhere compared with patients who

were farmers/daily laborers. Similarly, patients who had a high monthly income were more likely to adhere compared to those who had very low income and also patients who attended higher level of education were more likely to adhere compared to those who could not read and write (Table 8).

Table-8: Chi-square correlation test analysis of factors associated with AHDs non-adherence

Variables	Frequency	Low & medium Adherence (n=100)	High Adherence (n=35)	p-value
Sex				
Male	75	51 (51)	19 (54.2)	0.51
Female	60	49 (49)	16 (45.7)	
Age				
≤ 60	62	53 (53)	9 (25.7)	0.03**
> 60	73	6 (6)	26 (74.2)	
Marital Status				
Single	4	3 (3)	1 (2.8)	0.065
Married	82	55 (55)	27 (77.1)	
Divorced	3	2 (2)	1 (2.8)	
Widowed	46	40 (40)	6 (17)	
Occupation				
House Wife	18	12 (12)	6 (17.1)	0.041**
Gov't Employee	20	8 (8)	12 (34.3)	
Retired	40	38 (38)	2 (5.7)	
Merchant/Trade	22	11 (11)	11 (31.4)	
Unemployed	9	8 (8)	1 (2.8)	
Farmer	10	9 (9)	1 (2.8)	
Daily Laborer	4	4 (4)	0 (0)	
Others*	12	10 (10)	2 (5.7)	
Educational Status				
Cannot Read and Write	2	2 (2)	0 (0)	0.034**
Primary	14	11 (11)	3 (8.5)	
Secondary	24	18 (18)	6 (17)	
Associate degree	15	8 (8)	7 (20)	
Bachelor and beyond	80	61 (61)	19 (54)	
Monthly Income (in JD)				
Very low (<200)	1	1 (1)	0 (0)	0.04**
Low (200-500)	6	6 (6)	0 (0)	
Average (500-1000)	22	18 (18)	4 (11.4)	
Above average (1000-2500)	92	74 (74)	18 (51.4)	
High (>2500)	14	1 (1)	13 (37)	

*Carpenter, Construction, Driver, Teacher working in private school** statistically significant

Adherence and Blood Pressure Control

Among 35 (25.9%) patients who reported high adherence level to their AHDs, 24 (68.6%) of them

attained adequate BP control. Table (10) illustrates the correlation between attaining adequate BP control and the level of adherence using chi-square test.

Table-9: Chi-square correlation test analysis between adequate BP control and the level of adherence to medications.

	Low & medium Adherence (n=100)	High Adherence (n=35)	p-value
Adequate BP control	10 (10)	30 (85.7)	0.013*

* Statistically significant

DISCUSSION

This study among patients with HTN assessed the patients' self-reported adherence to their AHDs. In the current study, high level of adherence to AHDs was observed in 25.9 % of the study participants. In comparison to this finding, a study performed to assess medication adherence in HTN documented a relatively consistent self-reported adherence rates to AHDs of 24% [11]. Similar studies carried out to assess the rate

of adherence to AHDs reported a higher adherence rate of 53.4% [12] and 91% [13], and 77% [14] to which the current study was not comparable with. The rate of adherence in the present study is below the reported level in the literature.

The adherence rates were similar in both genders in the present project, which is not consistent with a study performed to explore factors contributing

to non-compliance among HTN patients, which reported lower adherence rates among female patients [15].

In this study, results showed that age, career, educational level and monthly income were found to have a significant association with AHDs adherence. As the age of patients increased over 60 years, the adherence rate increase, which implies that younger patients were more unlikely to adhere to their AHDs compared to older patients. This finding was consistent with a study performed in Malaysia [12], which found that as the age increase, the adherence to AHDs enhanced. Similar findings were also documented from researches performed among HTN patients in USA [16], France [17], and India [18] which showed that the majority of adherents were older patients. Possible explanation for this result, which older patients were more aware of their disease and were thus more likely to be more adherent. In contrast, younger patients showed low adherence level as they might have less severe form of the disease when compared to older patients. Occupation was another demographic variable that was significant associated with AHDs adherence in the current study. Patients who had a governmental career were more adherent compared to other kinds of occupation. In explanation for this result, governmental employees have a higher educational level than farmers and laborers, so they are more aware of their medical status and the significance of AHDs adherence. With regard to the educational level, patients with graduation (bachelor's degree and beyond) reported a higher adherence rates in our study. Many researchers reported similar findings in which patients with higher educational level has better adherence rate [18-20]. As the complexity of the disease therapy increases, it's required that patients should recognize the prescribed medications to adhere to therapeutic plan; therefore, it would be well comprehended by those with higher educational levels. According to our study results, low monthly income negatively influenced the rate of adherence. Various studies demonstrated that income has been identified as major socioeconomic factors influencing the rate of adherence to AHDs [21-24]. These studies reported that high and above average income has been associated with higher scores of adherence which is consistent with our findings.

In this study, patients with poor adherence reported a number of reasons for not adhering to AHDs. The most common reasons were found to be multiple medications, complex regimen and forgetfulness. Patients on complex treatment regimen were found to be poor adherent when compared to patients on one drug. This finding is comparable with other studies which also revealed that poly pharmacy is negatively influencing the rate of adherence [25-27]. Regarding the number of prescribed drugs, as the number of increased, patients was found to be less likely to adhere to their therapeutic regimen. An enormous number of literatures

are consistent with our finding which describe as pill burden negatively influences patient adherence to the prescribed drugs [28-30]. Moreover, researchers have previously verified that patients with more than two drugs were less likely to be adherent, particularly the elderlies [31-33]. AHDs adherence was significantly associated with BP control. Patients, in our study, who adhered to their AHDs, had adequate BP control compared to other study participants. Several studies reported a direct relationship between the BP control and the level of adherence in which their findings were in agreement with our study results [34-36].

CONCLUSION

In conclusion, The project showed that adherence to AHDs treatment was generally low (25.9%) among study participants. The study findings also suggest that increasing age, governmental occupation, high monthly income and high educational level were significantly associated with adherence. Younger age, low monthly income, low educational level and job being a farmer/daily laborer were significantly associated with non-adherence. Multiple drug therapy was the most important obstacle preventing optimum adherence to prescribed medications. In spite of the use of multiple AHDs, only 29.6 % of patients achieved adequate BP control, and 85.7% of these patients who attained high adherence level achieved adequate BP control which indicated that there was a significant association between adherence and BP control.

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