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Research Article

ADHERENCE OF SAUDI PATIENTS TO ANTIHYPERTENSIVE MEDICATIONS AND RELATED FACTORS: FINDINGS FROM A CROSS-SECTIONAL STUDY

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Abstract:

Background: Low- adherence to antihypertensive medication is the reason for not achieving the target levels in controlling blood pressure. **Aims:** This study Aims to assess the level of adherence of patients with hypertension to their medications and to determine the main socio-demographic factors that associated with the medications non-adherence among patients in Saudi Arabia.

Methodology: This cross-sectional study was conducted online with a convenience sample of 399 Saudi Adults. We used Morisky Medication Adherence Scale (MMAS) and Adherence Barriers Questionnaire to collect data on socio-demographic factors and use of antihypertensive medications.

Results: We received 399 responses to our questionnaire with mean age of 39.44 years old (SD=12.46 years old). Most of the sample were female (68.7 %). The mean score of the sample were 4.23 (SD=2.44) where most of the sample (64.9 %) had low adherence level to their antihypertensive medications, while 30.3 % had moderate adherence and 4.8 % had high adherence rate. Moreover, we found a significant difference between female and male ($p=0.009$) where female seems to be more adherent to their medications than male (4.5 VS 3.65). Likewise, statistically significant associations were also found between number of medications taken for hypertension, suffering from other chronic disease and adherence to antihypertensive medications, where patients with one medication and those with no other chronic conditions were more adherent to antihypertensive medications. The most common barriers reported by patients to affect their adherence toward antihypertensive medications were running of pills, thought that medications are useless, not understanding of antihypertensive medications, depression and travelling.

Conclusions: We found low rate of adherence to antihypertensive medications among patients in Saudi Arabia. Our findings provide evidence on understanding the facilitators and barriers associated with adherence to antihypertensive medications in order to enforce public health interventions to promoting the optimal use of medications.

Keyword: HYPERTENSION, ADHERENCE, BARRIERS, MORISKY

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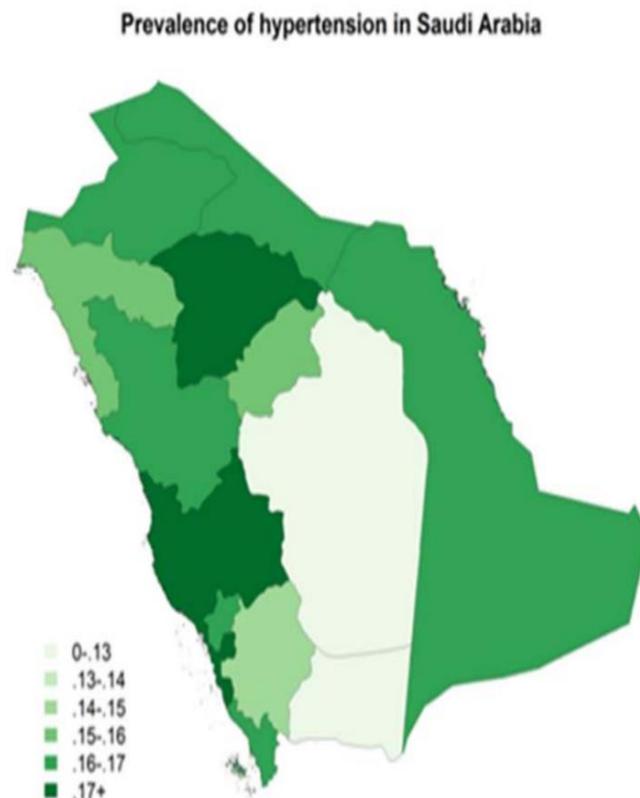
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INTRODUCTION:

Globally, hypertension is one of the major serious public conditions with high morbidity and mortality [1, 2]. It is preventable risk factors for many conditions including cardiovascular diseases as stroke [3]. Patients with systolic blood pressure of 130 mmHg (normal is 120) or diastolic blood pressure of 90 mmHg (normal is 80) are 100 % higher in having stroke or coronary artery compared to normal people [4]. Every year, hypertension is accounting for 9.4 million deaths due to its complications (stroke [51 %] and heart disease [45 %]) [1]. In Saudi Arabia,

prevalence of hypertension is ranged from 26.1 % in 2005 among public (30 – 70 years old) to 25.5 % in 2005 among public (15-64 years old) [5, 6, 7]. According to the national survey of Saudi Health Information for NCDs, which reported a prevalence of 14.1% for hypertension and 40.5% for the borderline of hypertension [8]. Moreover, it is estimated that uncontrolled hypertension is the leading risk factor for death in Saudi Arabia [9] and many studies had found that hypertension is poor controlled in Saudi Arabia [10, 11].

Figure 1: The distribution of prevalence of hypertension among different regions in Saudi Arabia.



To control hypertension, a regimen of exercise, dietary and medication therapy is used [12]. Anti-hypertensive medications are the key component in controlling hypertension in long-term and its effectiveness is well-established and found to reduce the risk of stroke and other cardiovascular diseases and costs of treatment [13]. However, some patients may require the use of more than one anti-hypertensive medications to control their blood pressure. One of the important factors in controlling blood pressure is adhering to therapeutic regimen of medication [14].

Low- adherence to antihypertensive medication is the reason for not achieving the target levels in controlling blood pressure [15] and is associated with increased risk for cardiovascular events [16]. Medications adherence refers to what extent patients taking their medications as prescribed by their physicians in time and dosage form [17]. Adherence to antihypertensive medications is affected with many factors including patients-related factors as socio-demographic factors, beliefs and knowledge and patient-provider factors as

the patient-provider relationship and the support received from healthcare services [18].

Since hypertension is serious disease that is primary controlled with primary care, it is significant to assess the level of antihypertensive medications adherence and determine the factors affecting it therefore, physicians can take measures with patients to improve their adherence to antihypertensive medications preventing long-term consequences of uncontrolled hypertension.

Adherence to antihypertension medications is related to some factors including old age where the risk of non-adherence increases in older patients with about two times than younger one. Other factors include marital status of divorced/separated patients, obese patients, and patients who smoked hookah and cigarettes were more likely to exhibit non-adherence [19].

It was estimated that uncontrolled hypertension is the leading risk factor for death in Saudi Arabia and many studies had found that hypertension is poor controlled in Saudi Arabia. One of the major causes of uncontrolled hypertension according to many studies is non-adherence to antihypertensive medications that is associated with increasing of morbidity and mortality of complication of high blood pressure [20, 21]. Therefore, it is significant to assess the level of adherence of patients with hypertension toward their medications and identifying the main factors related to it in order to improve the control rate of hypertension.

Therefore, the aims of this study are to assess the level of adherence of patients with hypertension to their medications using scales of Morisky Medication Adherence Scale (MMAS) and Adherence Barriers Questionnaire. Besides, determine the main factors that increase the medications non-adherence among patients public in Saudi Arabia.

METHODOLOGY:

Study design:

This was a cross sectional study used to achieve the objectives of this study.

Sample Size:

The estimated sample size will be calculated via sample size formula: $\text{Sample Size} = (\text{Distribution of } 50\%) / ((\text{Margin of Error } 5\% / \text{Confidence Level Score } 95\%)^2)$. The final estimated size was 384 sample.

Study Subjects:

Inclusion criteria

1. Saudi Arabian
2. Aged from 18 – 60
3. Hypertensive patients
4. Take at least one medication for controlling hypertension

Exclusion criteria

1. Non- Saudi Arabian
2. Younger than 18 years
3. Not diagnosed with hypertension
4. Do not use any antihypertensive medications

Sampling Technique:

Simple Random Sampling

Data collection method/tools:

In this study, we depended on prepared questionnaire to assess the demographic factors and adherence rate of antihypertensive medications. Part one of the questionnaire included demographic factors as age, gender, monthly income and other demographic factors. Second part included Arabic version of Morisky Medication Adherence Scale (MMAS) and Adherence Barriers Questionnaire. The both questionnaires were used before to assess the same variable [20]. We prepared the Arabic version and improve the questionnaire to fit with antihypertensive medications. The questionnaire was distributed among public using online methods as family and friend groups in WhatsApp and Facebook.

Data Management and Analysis Plan:

Data analysis was performed using SPSS version 25 (Statistical Package for Social Sciences). Descriptive statistics were conducted for all study variables, which include the measure of prevalence, means, standard deviation, and shape of distribution. T test, ANOVA, chi test were used to assess the relation between different variables.

Table: Distribution of demographic factors among participants (N=399)			
	Variable	Frequency	Percent
Age	Mean	39.44	
	SD	12.46	
Gender	Male	125	31.3
	Female	274	68.7
Crowding index	≤ one person /room	220	55.1
	>one person /room	179	44.9
Education level	Secondary school or below	83	20.6
	University or above	317	79.4
Socio-economic level	Very low	19	4.8
	Low	68	17.0
	Medium	221	55.4
	High	91	22.8
Marital status	Married	194	48.6
	Single	188	47.1
	Divorced/ widow	17	4.3
Occupation	Housewife	74	18.5
	Unskilled manual work	82	20.6
	Skilled manual work	72	18.0
	Trades/business	77	19.3
	Professional/clerk	73	18.3
	Non-working	21	5.3

Ethical approval:

All participants have the right to withdraw from the questionnaire in any points however their data was excluded. We ensured the usage of collected data in purpose of this study and the original data as answers of questionnaire would not be published. Moreover, no personal data as names was asked from any participants. Finally, no reward was provided to anyone for participate in this study.

RESULTS:

In this study, we received 399 responses to our questionnaire with mean age of 39.44 years old (SD=12.46 years old). Most of the sample were female (68.7 %) with ratio of Female/Male of about 3:1. More than half of the sample (55.1 %) reported living alone or with one person in their room while 44.9 % reported living with more than one partner. Moreover, most of the sample had high education level of university while 20.6 % of them had education level of secondary school or below. According to socio-economic level, most of patients reported having medium socio-

economic level while 22.8 % had high level, 17 % had low and 4.8 % had very low socio-economic level. Moreover, 48.6 % were married, 47.1 % were single and 4.3 % were divorced or widow. Considering occupation, 20.6 % were unskilled manual workers, and 5.3 % were not working (Table 1).

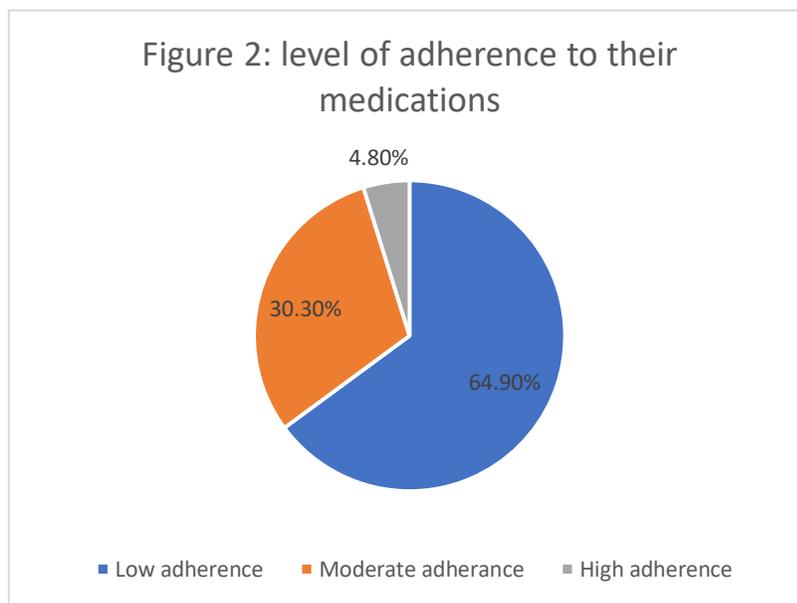
Most of patients in this study reported that their medications were cheap while 11 % thought that is normal and 9 % suffered from very expense of medications. However, 77.7 % of the sample indicated that they had health insurance. Moreover, most of patients reported that they had hypertension for less than one year (44.6 %) and 56.4 % were on only one medications of their hypertension. Almost half of the sample never asked their physicians to change their medications while 35.3 % of them had other chronic medical conditions and 67.4 % did not know their blood pressure during the last 3 months while 14 % reported uncontrolled hypertension and 18.5 % had controlled hypertension (Table 2).

Table 2: description of medical condition related to hypertension in patients

Item	Variable	Frequency	Percent
How expensive of medication you had taken for hypertension?	Very expensive	36	9.0
	Normal	44	11.0
	Cheap	319	79.9
Health Care facilities	More than one source	46	11.5
	Free governmental health services	11	2.8
	Health insurance	310	77.7
	Private health facilities	32	8.0
For how long do you suffer from hypertension?	Less than one year	178	44.6
	One year and up to 5 years	93	23.3
	More than 5 years	128	32.1
How many medications you take for management of hypertension?	One medication	225	56.4
	Two medications	81	20.3
	More than two medications	93	23.3
When was the last time physician asked you to change regimen of your medications?	Last year	106	26.6
	During five years ago	107	26.8
	Never	186	46.6
Do you suffer from any other chronic medical conditions as diabetic mellitus, cardiac disease, renal or hepatic diseases?	Yes	141	35.3
	No	258	64.7
How you describe your blood pressure during last 3 months?	Uncontrolled	56	14.0
	Controlled	74	18.5
	Do not know	269	67.4

According to Morisky Medication Adherence Scale (MMAS) questionnaire, the mean score of the sample were 4.23 (SD=2.44) where most of the sample (64.9 %) had low adherence level to their antihypertensive medications while 30.3 % had moderate adherence and 4.8 % had high adherence rate (Figure 2).

Figure 2: The level of adherence of patients toward their medications according to MMAS questionnaire. Total MMAS-8 scores can range from 0 to 8 and have been categorized into three levels of adherence: high adherence (score = 8), medium or moderate adherence (score of 6 to < 8), and low adherence (score < 6).



In comparing Morisky Medication adherence scores according to demographic factors we had found that there is a significant difference between female and male ($p=0.009$) where female seems to be more adherent to their medications than male (4.5 VS 3.65). Education level is another predictor of adherence to medications where higher educated patients would be more adherent to antihypertensive medications than lower educated patients (4.58 Vs 2.95, $p=0.029$). Price of medications is another predictor where the cheaper the medications, the more adherence will be to it ($p=0.000$). Moreover, those patients who had accessibility to private facilities seems to be more adherent to their medications than other ($p=0.000$).

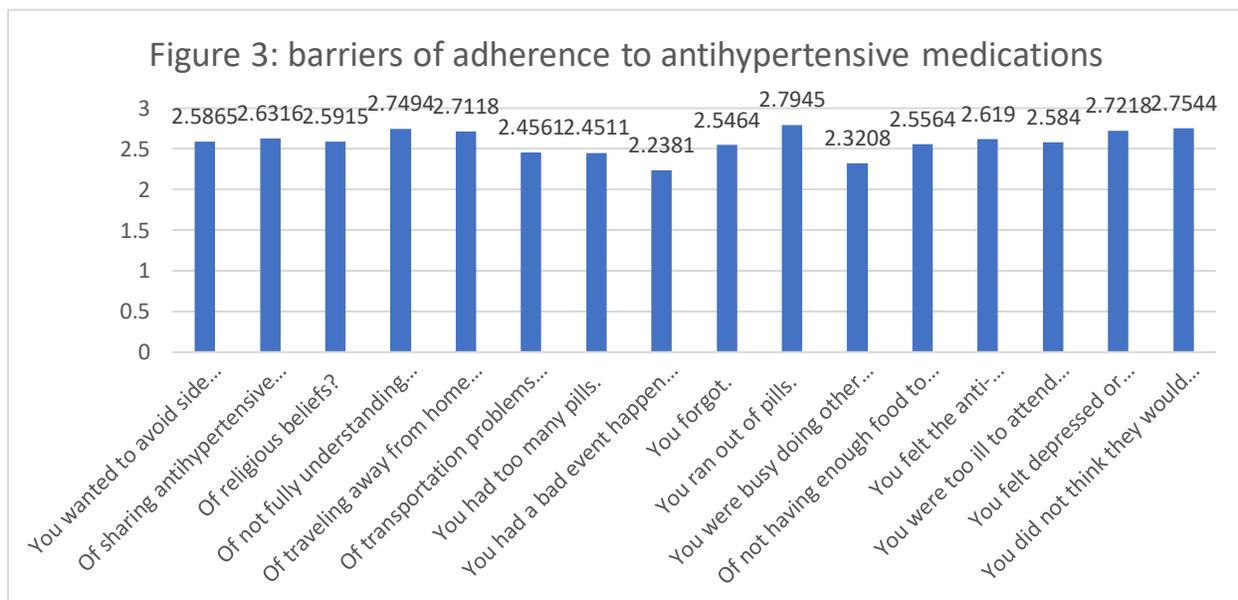
Furthermore, the duration of disease has a significant effect on adherence rate where patients with hypertension with less than 5 years were the most adherent patients over those with hypertension less than one year and for more than 5 years. Other factors include number of medications taken for hypertension and suffering of other chronic diseases and both are significant predictors of adherence where patients with one medication and those with no other chronic conditions were more adherent to antihypertensive medications. On the other hand, crowding index and socio-economic condition of patients did not have effect on adherence rate (Table 3).

Table 3: The relation between demographic factors and adherence scores

Demographic variable		Morisky Medication Adherence Scale (MMAS)		
		Mean	Standard Deviation	P-value
Gender	Male	3.65	2.44	.009
	Female	4.50	2.40	
Crowding index	≤ one person /room	4.22	2.46	.971
	>one person /room	4.25	2.43	
Education level	Secondary school or below	2.95	1.92	.029
	University or above	4.58	2.44	
Socio-economic level	Very low	1.89	1.91	.248
	Low	2.84	1.80	
	Medium	5.32	2.24	
	High	3.11	2.04	
How expensive of medication you had taken for hypertension?	Cheap	5.39	2.31	.000
	Normal	5.57	2.38	
	Very expensive	3.92	2.37	

Health Care facilities	More than one source	2.50	1.93	.000
	Free governmental health services	6.55	.52	
	Health insurance	4.08	2.32	
	Private health facilities	7.41	.80	
For how long do you suffer from hypertension?	Less than one year	3.70	2.50	.019
	One year and up to 5 years	5.41	2.03	
	More than 5 years	4.11	2.36	
How many medications you take for management of hypertension?	One medication	4.77	2.36	.000
	Two medications	3.81	2.34	
	More than two medications	3.28	2.38	
Do you suffer from any other chronic medical conditions as diabetic mellitus, cardiac disease, renal or hepatic diseases?	Yes	2.95	2.00	.000
	No	4.93	2.38	

The most common barriers reported by patients to affect their adherence toward antihypertensive medications were running of pills, thought that medications are useless, not understanding of antihypertensive medications, depression and travelling. Figure 3, show the score of each barrier where higher score indicates the higher impact of this barrier on the patients.



DISCUSSION:

One of the important risk factors for disease progression and failure of treatment in many conditions including hypertension is noncompliance to antihypertensive medications which increase hospitalization and mortality [22,23].

Therefore, we aimed in this study to assess the level of adherence of patients with hypertension to their medications using scales of Morisky Medication Adherence Scale (MMAS) and Adherence Barriers Questionnaire. Besides, determine the main factors that increase the medications non-adherence among patients of public in Saudi Arabia.

One of the main findings of this study is the prevalence of non-adherence to antihypertensive medications was 64.9 % which is similar to results of M. Ahmed in Egypt who found that the prevalence of non-adherence was 61 % among hypertensive patients using the same scale of ours [22]. Moreover, Sarah A Hamza who used another scale of Hill Bone Scale found that 62.7 % of hypertensive patients were non-adherent to their medications [25]. However, our finding is higher than found in other studies including the study of Abdulrahim M. Alkhamis among Saudi Arabian who found that the prevalence of non-adherence to antihypertensive medications was 49 % [26] and the study by Khanam M A et. al. among people of rural Bangladesh where the prevalence of non-adherence to treatment was 26.2 % [27] besides other studies which conducted nationally and internationally and reported non-adherence rate of 54 % and 54.2 % [28,29].

In this study, we had found that female had more adherence rate than male, this may be because our sample was mostly composed of female and therefore, results may need more investigations. Moreover, we had found a positive relation between educational level and adherence rate where patients with higher educational level would have higher adherence rate to antihypertensive medications. This is similar to other studies including study of Sarah Hamza where the patients' level of education is a significant predictor of adherence to antihypertensive medications [25] and another study which found that the educated patients would report better adherence to medications compared to patients with less or no education background [30]. Poor education is related with low-estimation of importance of antihypertensive medications and increase the myths about the medications and this explains why high educated patients are more adherent to their medications. Moreover, the price of the medications itself is related to the adherence rate to medications where the lower the cost of antihypertensive medications, the more adherent rate to medications. The relation between cost of medications and the adherence rate of it is discussed in many conditions however, studies showed similar results of ours in other conditions [31,32]. Moreover, patients who deal with private health facilities had the higher adherence rate followed by those who had free governmental health services. This can be explained by that who can afford the price of medications would be more adherent to it compared with those who did not afford it.

Previous studies show that poor adherence to medication is higher in the first six months after initial diagnosis however this inconsistent adherence

behavior can continue for longer time [25]. In our study, patients at first duration after diagnosis and having the disease for longer time had poor adherence to antihypertensive medications. Moreover, one of the important predictors to non-adherence found in this study is poly-pharmacy and presence of other chronic conditions where patients with one medication and those with no other chronic conditions were more adherent to antihypertensive medications. This is similar to finding of other studies where the presence of other chronic conditions was highly significant predictor of non-adherence to antihypertensive medication where patients with hypertension only are more adherent to antihypertensive medications more than hypertension with other comorbidities [25] and in international study conducted in northwest Ethiopia, Mekonnen et al. showed that participants who had no comorbidity were four times more likely to adhere to antihypertensive medications than their counterparts [33]. Moreover, the study of Alkhamis had found a positive association between number of medications taken and the non-adherence of antihypertensive medication [26] which is in contrast to the finding of other studies that did not find an association between number of medications and adherence level [34,35]. Considering of barriers that prevent patients from adherence to their medication, running of pills, thought that medications are useless, not understanding of antihypertensive medications, depression and travelling were the most common one which is in contrast to other studies including study of M Ahmed who had found that the most common barriers included; cost (74%), depression (68%), dementia (65%), need help (61%), forgetfulness (55%), fear from side effect (45%) and experience from side effect barrier (33%) [22].

This study had some un-avoided limitations that could affect the study including the high percentage of female over male which not represent distribution of Saudi Population however, according to our random selection of the sample, it was difficult to target a particular population over the other. Moreover, the depending of self-reported questionnaire may cause some bias where some patients may respond in the way they thought that authors need not in their own way which may represent personal bias. On the other hand, this was one of the little studies in Saudi Arabia was done to assess the prevalence of non-adherence to antihypertensive medications.

In conclusion, we found low rate of adherence to antihypertensive medications among patients in Saudi Arabia. Our findings provide evidence on understanding the facilitators and barriers associated

with adherence to antihypertensive medications in order to enforce public health interventions to promoting the optimal use of medications.

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