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**Saudi Medical Journal of Students (SMJS)**

Official Journal of Faculty of Medicine University of Tabuk

ISSN: 1658-8274 (Print version); 1658-8282 (Electronic version)

## AWARENESS, PREVALENCE AND SELF-CONTROL OF HYPERTENSION COMPLICATIONS AMONG HYPERTENSIVE PATIENTS

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**ABSTRACT**

**Background:** The prevalence of hypertension worldwide is of about 40%. In Saudi Arabia it reached 3.2% among those aged between 15-24 years, 51.2% among those aged 55-64 years and up to 70% among those aged 65 years and older. It has been observed that there is an increase in prehypertension cases, reaching 46.5% (3 millions) among males and 34.3% (more than 2 million) among females. Worldwide, raised blood pressure is estimated to cause 7.5 million deaths, about 12.8% of the total of all deaths.

**Aim of the work:** this study aimed to assess knowledge of hypertension and to determine factors affecting the compliance of hypertensive patients to their antihypertensive drugs.

**Methods:** we have conducted a descriptive cross-sectional study in Tabuk city population, Saudi Arabia. This study was conducted during the period from September to December 2019. The participants were selected by random sampling. Sampling included the different geographical areas of the city. The total sample included 395 pupils. All the pupils were approached to obtain the desired sample size. A self-administered questionnaire about hypertension and complications was filled by the participants.

**Results:** In this study, the majority of participants with hypertension were on one medications prescribed for treatment of their high blood pressure and the majority of participants (76.5%) were poorly compliant to their hypertension medication.

**Conclusion:** More attention is needed on preventive educational programs that focus on awareness and assessment of the hypertension medications adherence, complications of hypertension, and the danger of poor control of it.

**Keywords:** Hypertension; Adherence; Antihypertensive treatment; Saudi Arabia

To cite this article: Mirghani HO, Alqahtani YS, Alanazi FF, Alzahrani MDG, Alamri MA, Alrashidi YSA, Albalawi AAS, Ghabban AJR. Awareness, Prevalence and Self-Control of Hypertension Complications among Hypertensive Patients. Saudi Med J Students. 2021;2(2): 40-51

## INTRODUCTION

In 2015, there were 1.13 billion people living with high blood pressure worldwide [1]. The prevalence of hypertension worldwide is of about 40% [1]. In Saudi Arabia it reached 3.2% among those aged between 15-24 years, 51.2% among those aged 55-64 years and up to 70% among those aged 65 years and older. It has been observed that there was an increase in prehypertension cases, reaching 46.5% (3 millions) among males and 34.3% (more than 2 million) among females [2]. Worldwide, raised blood pressure is estimated to cause 7.5 million deaths, about 12.8% of the total of all deaths. This accounts for 57 million disability adjusted life years (DALYS) or 3.7% of total DALYS [3]. Blood pressure tends to rise as people get older, Raised blood pressure is a major risk factor for coronary heart disease and ischemic as well as hemorrhagic stroke. Blood pressure levels have been shown to be positively and continuously related to the risk for stroke and coronary heart disease. In some age groups, the risk of cardiovascular disease doubles for each increment of 20/10 mmHg of blood pressure, starting as low as 115/75 mmHg. In addition to coronary heart diseases and stroke, complications of raised blood pressure include heart failure, peripheral vascular disease, renal impairment, retinal hemorrhage and visual impairment. Treating systolic blood pressure and diastolic blood pressure until they are less than 140/90 mmHg is associated with a reduction in cardiovascular complications [3]. Adherence to prescribed medication is an

imperative issue which can be directly linked with the management of chronic diseases like hypertension; failure to adhere can affect the effectiveness of medication as well as the efficiency of the health care system. There is scarcity of information regarding the level of drug adherence for antihypertensive medications and its determinants in Ethiopia, particularly in the study area [4]. Adherence to antihypertensive medications is a crucial mediator of favorable outcomes in treating HTN, and non-adherence, in turn, halts BP control. A national study was conducted in Canada at 2005 among 1001 men and women older than 40 years of age to determine the level of public awareness, understanding and misconception of hypertension. Thirty-four per cent of respondents had been diagnosed with high blood pressure or hypertension, but only 58% of respondents had ever discussed their blood pressure with a physician, and only 44% were able to identify their own blood pressure or differentiate blood pressure levels considered to be above or below recommended targets. It concluded that respondents had a poor understanding of the complications and consequences of high blood pressure. The majority were unaware of the association between hypertension and heart disease (80%), heart attack (66%), kidney disease (98%), damage to blood vessels (95%) and premature death (74%) [5]. Another study performed in Karachi at 2007 among patients diagnosed with hypertension who attend primary Health Care centers (PHC), it showed that 58% from patients

with hypertension who attended PHC considered hypertension as a risk factor for cardiovascular disease, and 55% from them supposed that hypertension could lead to Cerebrovascular Accident<sup>[6]</sup>. A pilot study done in Poland at 2011 to assess knowledge and awareness of hypertension, the awareness of the hypertension complications was as follows: cerebral stroke (74.8%) and myocardial infarction (65.4%) as well as heart failure (49.6%), while atherosclerosis (36.6%) and renal failure (38.2%) were listed a little less frequently<sup>[7]</sup>.

In this review, we will summarize the available evidence on health-related impacts of adherence to AHD, methods for the evaluation of adherence and potential interventions aimed to improve adherence in hypertensive individuals<sup>[8]</sup>.

Adherence to anti-hypertensive medications has been found to be a major concern. The success of long-term maintenance therapy for hypertension depends largely on the patient's compliance with a therapeutic plan. Appropriate adherence to medication is still a challenging issue for hypertensive patients<sup>[9]</sup>. Therefore, the current study was carried out to assess the adherence to hypertensive medications and to analyze the association between various socio demographic factors and adherence to hypertensive treatment.

## METHODS & PARTICIPANTS

### Study Design and Setting

A cross-sectional study was carried out in Tabuk, Saudi Arabia. The study was done during the period from July to December 2019.

### Sampling and Data Collection

The targeted population was Saudi citizens from the public population of Tabuk city who match the inclusion criteria. The participants were selected by random sampling. Sampling was included from the different geographical areas of the city. All participants were Saudi and diagnosed with hypertension.

Pre-designed disseminated questionnaire was distributed for data collection throughout the two-months period (July – August 2019).

Inclusion criteria: participants enrolled in the study were adults, Saudi, self-reported hypertensive, and completed correct filling of the form.

Exclusion criteria: participants who were not willing to participate, who did not understand the questions properly and incorrectly filled the form.

### Data Collection Tools

Participants were approached with a self-administered multiple-choice computer questionnaire to be filled by them with the guidance of the data collectors. A letter that explains the objectives of the study and asks for participants' consent was attached to the online questionnaire.

The questionnaire required information about Sociodemographic data (gender, age, education), duration of hypertension, knowledge of hypertension complications, number of hypertension medications, perceived control of blood pressure, and eight questions pre-designed and previously validated scale that measure level of adherence to medications, developed by (Morisky D, Lawrence M,...) <sup>[10,11]</sup>.

### Sample Size

The sample size was calculated based on the formula ( $n = Z_{1-\alpha}^2 P(1-P)/d^2$ ), where  $n$  = sample size = 395,  $Z$  = standard normal variate = 1.96 (at 5% type I error,  $p = 0.05$ ),  $P$  = expected proportion = 50%, and  $d$  = precision error = 5%. The total sample obtained was 395 participants. We expected a high response rate, however, we eliminated all invalid, incomplete responses or any responses that did not match the inclusion criteria with a total of 395 participants.

### Data Management and Statistical Analysis

The collected data was entered and analyzed using the Statistical Package for the Social Science (SPSS Inc. Chicago, IL, USA) version 23. Descriptive statistics were performed. Percentages were given for qualitative variables. The determinant factors were determined using the Chi-square test. P-value was considered significant if  $P < 0.05$ .

### Ethical Considerations

The research was approved by the local Research Committee of the Faculty of Medicine, University of Tabuk. The participants were informed that participating is completely voluntary. All the participants were aware that their data will be dealt with confidentially. No names will be written in the forms and the data will be kept safely.

## RESULTS

**Table 1** shows general characteristics of the participants. Participants classified to three groups according to age: less than 40 years

**Table 1: Socio-demographic characteristics of the participants (N=395).**

Variables	Frequency (N=395)	Percent
Sex		
• Male	208	52.7
• Female	187	47.3
Age groups of the Participants		
• Less than 40 year	94	23.8
• From 40 to 65 year	273	69.1
• More than 65 year	28	7.1
Educational level		
• Intermediate or less	32	8.1
• Secondary	160	40.5
• University or more	203	51.4
Family monthly income		
• Less than 6000 SAR	86	21.8
• From 6000 to 15000 SAR	143	36.2
• More than 15000 SAR	166	42.0

old, from 40 to 65 years old, and 65 years old or above. Male and female groups contributed to (52.7%) and (47.3%) respectively. The majority of participants were university graduates (51.4%), and about (40.5%) were secondary education.

**Table 2: General characteristics of hypertension of the participants (N=395).**

Variables	Frequency (N=395)	Percent
Duration of hypertension		
• Less than 5 years	153	38.7
• From 5 to 10 Years	192	48.6
• More than 10 years	50	12.7
Number of prescribed medications		
• No Meds (on diet and exercise)	41	10.4
• One Medication	251	63.5
• Two Medications	70	17.7
• Three or more Medications	33	8.4
Control of Blood Pressure		
• Yes	229	58.0
• No	101	25.6
• I do not know	65	16.5

**Table 2** showed characteristics of high blood pressure among people with hypertension. Almost half of patients had the disease from 5 to 10 years (48.6%), about (38.7%) for less than five years, and only (12.7%) had it for more than ten years. The majority (63.5%) of participants with hypertension were on one medication prescribed for treatment of their high blood pressure, (17.7%) on two medications, and the remaining were on either on three or more medications (8.4%), or on diet and exercise and not using any medications

**Table 3: Knowledge of definition and complication of hypertension (N=395).**

Variables	Frequency (N=395)	Percent
HTN is defined as BP 140/90 or more		
• True	279	70.6
• False	89	22.5
• I do not know	27	6.8
Possible complications of hypertension		
• Atherosclerosis, MI, and PAD	221	55.9
• Congestive heart failure	151	38.2
• Stroke	156	39.5
• Renal failure	157	39.7
• Blindness	98	24.8
Coexisting other chronic illnesses other than hypertension		
• Yes	211	53.4
• No	184	46.6

**Table 4: Adherence of participants to their medication (N=395)**

Variables	Frequency (N=395)	Percent
Adherence to medications		
• Low adherence	302	76.5
• Medium adherence	84	21.3
• High adherence	9	2.3

(10.4%). Participants who reported that their blood pressure is controlled were more than those who reported their blood sugar is uncontrolled, (58%) and (25.6%) respectively, and only 16.5% of them did not know whether their blood pressure was under control.

**Table 3** shows frequency of knowledge regarding the definition and awareness of complications of hypertension. Almost two-thirds (70.6%) agreed to the statement "Hypertension is defined as BP 140/90 or more", while about one-fifth (22.5%) of participants disagreed to that statement. The mostly known and recognizable complications of high blood pressure were "Atherosclerosis, heart attack(MI), and Peripheral Arterial Disease" and it account for (55.9%), while those who were aware about heart failure and stroke as complications to high blood pressure contributed to (38.2%) and (39.5%), respectively. Nearly a third of participants know that renal failure (39.7%) is a complication of high blood pressure and only (24.8%) of them know that hypertension may lead to blindness.

Participants who reported existing of other chronic illness rather than hypertension were (53.4%).

**Table 4** shows adherence of participants to their medication used to treat hypertension. The majority of participants (76.5%) were poorly compliant to their hypertension medication, while (21.3%) were moderately adherent to their hypertension medications. Only (2.3%) were highly adherent to their medications.

**Table 5** shows high significant relation between level of adherence of participants to hypertension medications and gender, age, and education groups. Male participants were more likely to adhere to their medications than females ( $p=0.000$ ).

Level of adherence to hypertension medications among age groups was variable ( $P=0.000$ ). Only 14.3% of those aged over 65 were highly adherent to their hypertensive medications. No one of the middle age groups-from 40 to 65 years-were highly adherent to their medications, and the majority of them were with low adherent to their medication (79.9%).

Regarding the age group less than forty years, only (5.3%) were highly adherent, and the remaining were with medium adherence (30.9%), and low adherence (63.8%).

Level of adherence were inversely related to level of education ( $P=0.000$ ). The higher the educational level, the lower adherence to hypertension medications. The majority of participants who were university graduates or more were with low adherence (85.7%), a tenth of them were with medium adherence (11.8%), and only (2.5%) were highly adherent to medications.

Participants who were with secondary education and with low adherence contributed to (65.0%), and who were with medium adherence contributed to (35.0%). Participants with intermediate education or less have higher levels of adherence to their medications when compared to those with higher education levels.

**Table 5: Adherence of participants to hypertension medications among gender, age, and education groups (N=395)**

Variables		Adherence to HTN medications			Total	P-value
		Low	Medium	High		
Sex	● Male	137	62	9	208	0.000
		65.9%	29.8%	4.3%	100.0%	
	● Female	165	22	0	187	
		88.2%	11.8%	0.0%	100.0%	
Age Groups	● Less than 40 year	60	29	5	94	0.000
		63.8%	30.9%	5.3%	100.0%	
	● From 40 to 65 year	218	55	0	273	
		79.9%	20.1%	0.0%	100.0%	
	● More than 65 year	24	0	4	28	
		85.7%	0.0%	14.3%	100.0%	
Educational level	● Intermediate or less	24	4	4	32	0.000
		75.0%	12.5%	12.5%	100.0%	
	● Secondary	104	56	0	160	
		65.0%	35.0%	0.0%	100.0%	
	● University or more	174	24	5	203	
		85.7%	11.8%	2.5%	100.0%	

**Table 6** shows relation between adherence of participants to hypertension medications and characteristics of high blood of participants. Significant relation between adherence and duration of hypertension of participants ( $p=0.005$ ). Participants who have hypertension for more than ten years were more likely to be poorly adherent to their hypertension medications (90.0%). Those who have the disease from five to ten years were more likely to adhere to their medications when compared the other

groups, as (74.0%) of them were poorly compliant to their medications, and (4.7%) were highly adherent to their medications. Those who have the disease for less than five years, the majority were with low compliance to hypertension medications (75.2%), and the remaining were with medium adherence. The relation between adherence and the number of medications participants on were significant ( $p=0.000$ ). Participants who were on one antihypertensive medication in relation to

**Table 6: Adherence of participants to hypertension treatment among duration of hypertension, number of medications, control of hypertension, and presence of other illnesses (N=395)**

Variables		Adherence to HTN treatment			Total	P-value
		Low	Medium	High		
Duration of hypertension	• Less than 5 years	115	38	0	153	0.005
		75.2%	24.8%	0.0%	100.0%	
	• From 5 to 10 years	142	41	9	192	
		74.0%	21.4%	4.7%	100.0%	
	• More than 10 years	45	5	0	50	
		90.0%	10.0%	0.0%	100.0%	
Number of medications	• No medications (treated with diet and exercise)	36	5	0	41	0.000
		87.8%	12.2%	0.0%	100.0%	
	• One medication	212	34	5	251	
		84.5%	13.5%	2.0%	100.0%	
	• Two medications	40	26	4	70	
		57.1%	37.1%	5.7%	100.0%	
	• Three or more medications	14	19	0	33	
		42.4%	57.6%	0.0%	100.0%	
Control of Blood Pressure	• Controlled	197	27	5	229	0.000
		86.0%	11.8%	2.2%	100.0%	
	• Not controlled	76	25	0	101	
		75.2%	24.8%	0.0%	100.0%	
	• I do not know	29	32	4	65	
		44.6%	49.2%	6.2%	100.0%	
Coexisting other chronic illnesses	• Yes	162	45	4	211	0.862
		76.8%	21.3%	1.9%	100.0%	
	• No	140	39	5	184	
		76.1%	21.2%	2.7%	100.0%	

level of adherence to their medications were as follow: low adherence (84.5%), medium adherence (13.5%), and high adherence (2.0%). Those who were on two medications in relation to level of adherence were as follow: low adherence (57.1%), medium adherence (37.1%), and high adherence (5.7%). Those who were on three medications or more in relation to level of adherence were as follow: low adherence (42.4%), medium adherence (57.6%), and high adherence (0%). Relation between adherence to medications and control of blood pressure of participants were significant ( $p=0.000$ ). Those who reported their blood pressure was under control in relation to adherence to their medications were as follow: (86.0%) of them were with low adherence, (11.8%) of them were with medium adherence and (2.2%) of them were highly adherent to their medications. Those who reported their blood pressure was uncontrolled in relation to adherence to their medications were as follow: (75.2%) of them were with low adherence, (24.8%) of them were with medium adherence, and none of them were at least with high adherence to their medications (0%). Those who were un aware of their blood pressure status wither if it is controlled or uncontrolled in relation to adherence to their medications were as follow: (44.6%) of them were with low adherence, (49.2%) of them were with medium adherence, and only (6.2%) them were with high adherence to their medications. Relation between level of adherence and the presence of other chronic illnesses were insignificant ( $p=0.862$ ). Those who reported the presence of chronic illness rather than hypertension

were less than half participants, and their adherence to hypertensive medications were as follow: (76.8%) of them were with low adherence, (21.3%) of them were with medium adherence and (1.9%) of them were highly adherent to their medications. Those who denied the presence of any other chronic illnesses were more than half the participants, and their adherence to hypertensive medications were as follow: (76.1%) of them were with low adherence, (21.2%) of them were with medium adherence and (2.7%) of them were highly adherent to their medications.

## DISCUSSION

Blood pressure control in hypertension patients considered a long-standing challenge. Adherence to medication is always a matter of concern, especially in chronic diseases. Several recent studies have highlighted the importance of patient medication adherence and have outlined factors that affect patient compliance with prescribed therapy. In the current study, we asked the participants about their blood pressure wither it is controlled or not, 25.6% of them reported uncontrolled blood pressure and 16.5% did not know the status of their blood pressure. Another study was done over one hundred and six hypertensive African-American patients and reported higher results of uncontrolled hypertension<sup>[12]</sup>. The current study revealed a significant relationship between blood control and adherence to medication ( $p=0.000$ ), almost the majority of whom perceived their blood pressure is controlled were poorly adherent to medications. Similar results reported in a study done over

one hundred and two hypertensive patients at the University of Michigan Medical Centers<sup>[13]</sup>. In the current study, The mostly known and recognized complications of high blood pressure were "Atherosclerosis, heart attack (MI), and Peripheral Arterial Disease"(55.9%), while those who were aware about heart failure and stroke as complications to high blood pressure contributed to (38.2%) and (39.5%), respectively. Nearly a third of participants know that renal failure (39.7%) is a complication of high blood pressure and only (24.8%) of them know that hypertension may lead to blindness. A study done in Canada showed higher results of unawareness about hypertension complications, as the majority were unaware of the association between hypertension and heart disease (80%), heart attack (66%), kidney disease (98%), damage to blood vessels (95%) and premature death (74%)<sup>[5]</sup>. Another study done in Poland at 2011 about the awareness of the hypertension complications, and it was as follows: cerebral stroke (74.8%) and myocardial infarction (65.4%) as well as heart failure (49.6%), while atherosclerosis (36.6%) and renal failure (38.2%) were listed a little less frequently<sup>[7]</sup>. Another study performed in Karachi at 2007 among patients diagnosed with hypertension who attend primary Health Care centers (PHC), it showed that 58% from patients with hypertension who attended PHC considered hypertension as a risk factor for cardiovascular disease, and 55% from them supposed that hypertension could lead to Cerebrovascular Accident<sup>[6]</sup>. Regarding the adherence to hypertension medications, this study showed that the

majority of participants were with low adherence to medications (76.5%) and only (2.3%) were with high adherence to their medications. The low level of adherence to hypertension treatment was among all classified groups in this study, including the age group, gender group, education group. This may be a social and awareness issue as it needs to increase the awareness and perception of hypertension and its complication among both genders, all age groups, and to emphasize on the awareness campaigns. Another study was done and reported a higher rate of adherence to their hypertensive medications (67.7%)<sup>[13]</sup>. In the same context, another different study was done among 315 patients and it reported higher results, as 49.8% of the patients were adherent<sup>[14]</sup>. Males were more likely to adhere to their medications when compared to females with a significance ( $p=0.000$ ). A cross-sectional study was conducted in a rural area of the Ardabil city in 2013 showed different results, it showed adherence was slightly high among female respondents than male<sup>[15]</sup>. In the same context, another study was conducted to assess adherence to medications in patients undergoing hypertensive treatment in the Primary Health Clinics of the Ministry of Health in Malaysia, and it showed female patients were found to be more likely to adhere to their medication regime, compared to their male counterparts ( $P < 0.05$ )<sup>[16]</sup>.

## CONCLUSION

The findings suggest that patients' greater perception of control over trying to reduce blood pressure may result in decreased reliance on medications and subsequent non-

adherence to drug therapy. To analyze the association between various socio-demographic factors and adherence to hypertensive treatment, more attention is needed on prevention education programs that focus on awareness and assessment of the hypertension medications adherence, complications of hypertension, and the danger of poor control of it.

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