Medical Science

pISSN 2321–7359; eISSN 2321–7367

Patient knowledge and adherence to anti-hypertensive medications in Saudi Arabia

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To Cite:
Aljameeli AM, Alanazi MNS, Alanazi SSS, Alsaab MMI, Alanazi MHS, Alanazi SMH, Alshammari TA, Al-Ruwaili TMH, Alharbi SMJ, Ali AMB. Patient knowledge and adherence to anti-hypertensive medications in Saudi Arabia. Medical Science 2022; 26:ms368e2322.
doi: https://doi.org/10.54905/disssi/v26i127/ms368e2322

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Peer-Review History
Received: 29 May 2022
Reviewed & Revised: 31/May/2022 to 02/September/2022
Accepted: 11 September 2022
Published: 15 September 2022

Peer-review Method
External peer-review was done through double-blind method.

URL: https://www.discoveryjournals.org/medicalscience

ABSTRACT

Background: Adherence to anti-hypertensive medication is essential as it has been associated with better health outcomes. *Aim:* This study aims to assess the adherence of hypertensive patients to anti-hypertensive medications, and to correlate adherence with hypertension knowledge. *Methods:* This cross-sectional study, we used the Morisky Medication Adherence Scale (MMAS-8) questionnaire to assess adherence, and the Hypertension Fact Questionnaire (HFQ) to assess hypertension knowledge. We used the Kruskal-Wallis and Mann-Whitney tests for inferential statistics, and Pearson correlation to investigate the correlation between the adherence and knowledge. *Results:* The study included 508 participants, of whom 55.5% were females. Age ranged from 18 to 90 years with an average of 56.9±13.7. Half of participants (50.2%) were married and 51.4% had a university degree or higher. Average MMAS-8 and HFQ scores among respondents with hypertension were 4.5±2.2, and 9.5±2.5, respectively. Our results showed significant association between adherence and educational level (p=0.032), and residency area (p=0.000). Hypertension knowledge was also associated with the type of residency of participants (p=0.001), marital status (p=0.001), source of HTN knowledge (p=0.046), nationality (p=0.001), and number of anti-hypertensive drugs used (p=0.046). *Conclusion:* Our study concludes that adherence to anti-hypertensive medication and hypertension knowledge were proportionally correlated. There is higher adherence among respondents with higher levels of education, residents of urban areas. Hypertension knowledge was better among Saudi nationals, residents of urban areas, singles, those receiving hypertension knowledge from social media, and those taking one or two anti-hypertensive medication.

Keywords: Hypertension; Adherence; Knowledge; Saudi Arabia.

1. BACKGROUND

The World Health Organization (WHO) defines hypertension as "a persistently elevated systolic or diastolic blood pressure (BP) of 140/90 mmHg in individuals aged 18 years and older". Hypertension is commonly referred to as the "silent killer" since it frequently has noalarming signs or manifestations, and many individuals are unaware they have it (Alwan, 2011). Hypertension is a controllable cardiovascular risk factor, and adopting a suitable treatment plan, early identification, adequate management, and control of BP can minimize long-term complications (Carey et al., 2018). More than 26% of adult populations globally have been diagnosed with hypertension, and the occurrence of hypertension increases with age (Kearney et al., 2005). Globally, it is also one of the leading causes of early mortality, with 7.1 million people dying every year from hypertension-related illnesses, and the situation is only getting worse (Mills et al., 2020).

Medication noncompliance is a serious public health problem. Medication adherence has been described in place of the gradationtoward which patients' activities correspond with health care professionals' recommendations for health and medical guidance (Sackett & Haynes, 1978). It may be described as the magnitude to which a patient's medication-administration and takingbehaviour complies with agreed-upon endorsementssince a healthcare supplier (Chakrabarti, 2014). Compelling suggestionsince randomized controlled trials establishes that treating high BP reduces cardiovascular disease-related morbidity and death (Antonakoudis et al., 2007). On the other hand, poor adherence is one of the most significant barriers to high blood pressure therapeutic management (Ismail et al., 2022). Noncompliance with therapy leads to physical and psychological problems, lowers patients' quality of life, and wastes healthcare resources (Bonsa et al., 2014). The efficacy of anti-hypertensive medicines must be accomplished by strict adherence to prescribed drugs as directed by healthcare practitioners (Lee et al., 2013). Although blood pressure management has greatly improved, poor adherence to drug therapy remains a serious issue among hypertensive patients. It has been recognized as one of the primary reasons for failure to achieve blood pressure control (Burnier, 2006). Only 29% of hypertension patients in the United States obtained excellent control, with even lower percentages recorded in Canada and Europe. The overall drug adherence rate is expected to be about 50% (Wolf-Maier et al., 2004; Lee et al., 2013).

Poor medication adherence is one reason for poor blood pressure management in hypertensive patients, and it accounts for a rising significant and severe public health burden. Poor drug adherence accounts for 33% to 69% of all unnecessaryin hospice entrance in the USA, costing an estimated $100 billion per year (Vrijens et al., 2017). Poor adherence has been linked to needless drug over-prescription, considerable disease worsening, unnecessary increases in hospiceentrance rates and longer hospital stay, resulting in a large medical burden (Kleinsinger, 2018). Unsatisfactory obedience has been interrelated to needless drug over-prescription, considerable disease worsening, unwarranted increases in hospital admission rates and longer hospital stay, resulting in a major medical cost. Improving adherence to anti-hypertensive medicines through changes in medication-taking behaviour is a critical public health priority.

Drug adherence barriers involve a variety of variables such as complicated prescription regimens, dosage frequency, behavioural factors, and treatment adverse effects (Dzudie et al., 2020). The most common impediments to medication adherence are within the patient's control, such as the patient's knowledge and attitudes regarding drugs. As a result, focusing on these obstacles is a crucial and vital step in improving adherence (Osterberg et al., 2005). Anti-hypertension drug adherence has been thoroughly studied in many developed nations in the West using various techniques of medication adherence measurement (Degli Esposti et al., 2011); however, there is a shortage of research assessing anti-hypertensive pharmacotherapies adherence levels in the Saudi population.

Study aim

This research paperobjects to consider the knowledge and adherence to anti-hypertensive medications among hypertensive patients in Saudi Arabia.

2. METHODOLOGY

Study design and setting

This study was a cross-sectional study among the general population of Saudi Arabia.

Study duration

The study was conducted between August and December 2021.

Study sampling

Participants comprisedthe general Saudipopulation. The study included 508 participants who consented to participate and filled the form completely. The EpiTools epidemiology was used to compute the sample size (Accessed at: http://epitools.ausvet.com.au/content.php?page=1ProportionandProportion), and a minimum of 500 participants were required. We published the online data collection tool until at least 500 complete responses were obtained.

Data collection tools

An online self-administrated questionnaire was distributed on social media platforms, including Facebook and Twitter. We used the Morisky Medication Adherence Scale (MMAS-8) questionnaire (Morisky et al., 1986) in this study to assess adherence to anti-hypertensive medication. The adapted questionnaire was translated into Arabic by experts and reviewed and agreed upon by the consultant and the research team. The MMAS-8 comprised 8 questions/statements to assess adherence to medication, in addition to socio-demographic data. Respondents filled out their general information, such as gender, occupation, education, age, and marital status, in the first section of the questionnaire.

Scoring system

Items 1 through 7 offer "yes" or "no" response options, while item 8 has a 5-point Likert response option. Each ''no" response is rated as ''one," and each ''no" response is rated as ''zero," except for item 5, where each ''yes" response is scored as ''1," and each ''no" response is evaluated as ''0," If a patient selects response "0," the score is "1," and if they select the response "4", the score is "0." The responses ''1, 2, 3" are scored as ''0.25, 0.75, 0.75" accordingly. MMAS-8 ratings range from zero to eight, with three degrees of adherence: strong adherence (score = 8), medium or average adherence (score of 6 to < 8), and low adherence (score of < 6).

The Hypertension Fact Questionnaire, abbreviated as HFQ, was used to evaluate the patients' knowledge about hypertension in the last section of the questionnaire, developed by (Morisky et al., 1986; Viera et al., 2008) and adapted from Saleem et al., (2011). The patients answered 15 questions on the way todecide whether or not they were aware of the causes of hypertension, as well as its treatment and management. Their answers to each of the questions in this part were graded as 'yes,' 'no,' or 'not sure.'The HFQ was designed with a scoring range of 0 (minimum) to 15. The individual knowledge scores of the participants were added together to calculate the overall knowledge score.

Statistical analysis

Data be situatedto be analyzedvia IBM SPSS, version 26. A P-value less than 0.05 was deemed significant. Numbers and percentages will be used to presents all categorical variables. The Kruskal-Wallis and Mann-Whitney U tests were used with paranormally distributed continuous variables, and Pearson correlation was usedto correlate MMAS-8 and HFQ scores. A p-value of less than 0.05 was regarded as statistically significant.

Ethical consideration

All individuals who volunteered to take part in the study were guaranteed their privacy. Unauthorized access was restricted to protect the data and study findings' privacy and confidentiality. We obtained an ethical approval to conduct the study from the local committee of bioethics at the Northern Border University, KSA with the reference number HAP-09-A-043.

3. RESULTS

The study included a total of 508 participants, of whom 55.5% were females. Age ranged from 18 to 90 years with an average of 56.9±13.7, where 34.1%, 32.9%, and 33.1% were aged 18 – 30, 31 – 50, and 51 – 90 years, respectively. Half of participants (50.2%) were married and 51.4% had a university degree or higher. The majority of participants were Saudi (97.2%), resided in an urban area (96.1%), and had offspring (58.7%). Diagnosis of HTN was reported by 38.2%, of whom 76.8% are currently on one or two anti-hypertensive medication, and 58.5% have been taking the medication for one to five years (table 1).

Table 1 Socio-demographic factors of participants (n=508).

Parameter		Freq. (%)
Age, (years)	18 - 30	173 (34.1%)
	31 - 50	167 (32.9%)

	51 - 90	168 (33.1%)
Sex	Female	282 (55.5%)
	Male	226 (44.5%)
Marital status	Single	156 (30.7%)
	Married	255 (50.2%)
	Divorced	40 (7.9%)
	Widowed	57 (11.2%)
Educational level	Illiterate	40 (7.9%)
	Primary education	31 (6.1%)
	Secondary education	104 (20.5%)
	Intermediate education	72 (14.2%)
	University or more	261 (51.4%)
Occupational status	Governmental section	203 (40%)
	Private section	63 (12.4%)
	Military section	34 (6.7%)
	Other	24 (4.7%)
	Student	67 (13.2%)
	Not occupied	117 (23%)
Nationality	Saudi	494 (97.2%)
	Non-Saudi	14 (2.8%)
Residency	Rural	20 (3.9%)
	Urban	488 (96.1%)
Do you have offspring?	No	210 (41.3%)
	Yes	298 (58.7%)
Number of offspring (n=298)	1 to 4	154 (51.7%)
	5 to 8	114 (38.3%)
	9 to 16	30 (10.1%)
Source of HTN knowledge	Friends and family	172 (33.9%)
	Journals and newspapers	67 (13.2%)
	No specific source	173 (34.1%)
	Social media	96 (18.9%)
Diagnosis of HTN	No	314 (61.8%)
	Yes	194 (38.2%)
Number of anti-HTN drugs (n=194)	1 to 2	149 (76.8%)
	3 to 4	45 (23.2%)
Anti-HTN drugs duration (n=194)	1 to 5	114 (58.8%)
	6 or more	80 (41.2%)

Table 2 shows the MMAS-8 items responses among participants with HTN. Average MMAS-8 score among respondents is 4.5±2.2. The majority of participants reported that they sometimes forget taking the anti-HTN drug (63.9%), missing the drug for other reasons than forgetting (54.6%), stopping the medication without referring to the doctor (64.8%), forgetting the medication while travelling or leaving home (51.5%), taking the medication in the day prior to filling the form (80.9%), continue taking the medication even while blood pressure is controlled (58.8%), not feeling hassled about medication plan (51%), and never or rarely forgetting medication (28.9%, and 25.8%, respectively). Average HFQ score was 9.5±2.5. Table 3 shows the HFQ items responses among participants. Here was a substantialconnotationamongst adherence and educational level (p=0.032) as the MMAS-8 score was higher among participants with higher levels of education. Participants who resided in urban areas scored significantly higher (4.6±2.2) than those residing in rural areas (1.8±1.4) (p=0.000).

Table 2 MMAS-8 items responses among participants with HTN (n=194).

MMAS-8 Item	No	Yes			
1). Do you sometimes forget to take your anti-hypertensive drugs?	70 (36.1%)	124 (63.9%)			
2). People sometimes miss taking their anti-hypertensive medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your anti-hypertensive drugs?	88 (45.4%)	106 (54.6%)			
3). Have you ever reduced the amount of medicine you were administering or clogged administering it altogether without notifying your doctor?	125 (64.8%)	68 (35.2%)			
4). Do you occasionally disremember to carry your anti-hypertensive drugs with you once you mobile or dispense your house?	94 (48.5%)	100 (51.5%)			
5). Did you take your anti-hypertensive drugs yesterday?	37 (19.1%)	157 (80.9%)			
6). Do you ever decide to stop administering your medication once you believe your hypertension is improved?	114 (58.8%)	80 (41.2%)			
7). Intended for certain persons, having to take anti-hypertensive medications daily is a major annoyance. Do you ever struggle to follow your hypertension dealing regimen?	99 (51%)	95 (49%)			
8). How often do you have difficulty remembering to take your anti-hypertensive drugs?	Never	Rarely	Sometimes	Often	Always
	56 (28.9%)	50 (25.8%)	61 (31.4%)	24 (12.4%)	3 (1.5%)
MMAS-8 Score (Mean±SD)	4.5±2.2				

Table 3 HFQ items responses among participants with HTN (n=194).

HFQ Items	No	Yes	Not sure
Do you know the normal values of blood pressure?	40 (20.6%)	150 (77.3%)	4 (2.1%)
Is elevated BP called hypertension?	84 (43.3%)	99 (51%)	11 (5.7%)
Is hypertension a condition which can progress with age?	18 (9.3%)	162 (83.5%)	14 (7.2%)
Are men and women both have equal chance of developing hypertension?	61 (31.4%)	111 (57.2%)	22 (11.3%)
Is hypertension a treatable condition?	58 (29.9%)	122 (62.9%)	14 (7.2%)
Is the older the person, the greater their risk of having hypertension?	25 (12.9%)	159 (82%)	10 (5.2%)
Is smoking a risk factor for hypertension?	29 (14.9%)	155 (79.9%)	10 (5.2%)
Does eating fatty food affect blood cholesterol level which is a risk factor for developing hypertension?	32 (16.5%)	156 (80.4%)	6 (3.1%)
Does being overweight increase risk for hypertension?	26 (13.5%)	158 (81.9%)	9 (4.7%)
Will regular physical activity lower a person's chance of getting hypertension?	36 (18.6%)	138 (71.1%)	20 (10.3%)

Does eating more salt have no effect on blood pressure?	95 (49%)	90 (46.4%)	9 (4.6%)
Does dietary approach to reduce hypertension do no good?	90 (46.4%)	83 (42.8%)	21 (10.8%)
Is white meat as good as red meat in hypertension?	78 (40.2%)	84 (43.3%)	32 (16.5%)
Can medication alone control hypertension?	70 (36.1%)	112 (57.7%)	12 (6.2%)
Can hypertension lead to other life-threatening diseases?	24 (12.5%)	155 (80.7%)	13 (6.8%)
HFQ Score (Mean±SD)	9.5±2.5		

Hypertension knowledge was also associated with residency of participants (p=0.001) as participants from urban areas scored higher (9.7±2.4) than those residing in rural areas (5.7±3.3). Being Saudi was associated with higher HTN knowledge (p=0.025), and being single was associated with higher knowledge score than other marital statuses (p=0.001). Social media as a source of HTN knowledge was associated with higher knowledge score than other sources (p=0.046). Respondents taking one or two anti-HTN medication had better HTN knowledge than those taking three or four (p=0.046) (table 4). Figure 1 demonstrates the correlation between adherence to anti-hypertensive medication and level of HTN knowledge, where it shows a significant correlation (p=0.030) as the knowledge levels are higher, the adherence score is higher.

Table 4 Socio-demographic factors in association with MMAS-8 and HFQ scores among participants with hypertension (n=194).

Parameter		n	MMAS-8 Score	P-value	HFQ Score	P-value
Age, y	18 -	10	4.3±1.8	0.945*	10.2±2.6	0.318*
	31 -	50	4.5±2.2		9.8±2.7	
	51 - 90	134	4.5±2.2		9.4±2.5	
Sex	Female	90	4.7±2.1	0.382**	9.7±2.4	0.944**
	Male	104	4.4±2.3		9.5±2.7	
Marital status	Single	11	4.7±2.4	0.162*	10.7±2.3	0.001*
	Married	116	4.7±2.3		10±2.4	
	Divorced	22	4.4±2.1		9.1±2.8	
	Widowed	45	3.9±1.9		8.3±2.7	
Educational level	Illiterate	31	3.4±2	0.032*	8.9±3.6	0.075*
	Primary education	24	4.3±2		9±2.6	
	Secondary education	47	4.8±2.5		9.7±2.1	
	Intermediate education	52	4.7±2.1		9.3±2.2	
	University or more	40	4.9±2.1		10.5±2.5	
Occupational status	Governmental section	69	4.2±1.8	0.785*	9.6±2.8	0.248*
	Private section	12	4.6±2		8.4±3.5	
	Military section	18	5±2.4		10±1.8	
	Other	16	5.1±2.7		10.7±1.3	
	Student	3	4±2.4		9±2.7	
	Not occupied	76	4.5±2.4		9.4±2.6	
Nationality	Saudi	191	4.5±2.2	0.091**	9.6±2.6	0.025**
	Non-Saudi	3	2.6±0.6		6±2.7	
Residency	Rural	8	1.8±1.4	0.000**	5.7±3.3	0.001**
	Urban	186	4.6±2.2		9.7±2.4	
Do you have offspring?	No	23	4.3±2.1	0.622**	9±2.8	0.217**
	Yes	171	4.5±2.2		9.6±2.6	
Number of offspring (n=298)	1 to 4	60	4.9±2.2	0.133*	9.9±2.4	0.730*
	5 to 8	84	4.5±2.2		9.6±2.5	
	9 to 16	27	3.8±2.4		9.1±3.1	
Source of HTN knowledge	Friends and family	98	4.5±2.3	0.203*	9.3±2.6	0.046*
	Journals and newspapers	33	4.6±2.1		8.9±2.6	
	No specific source	40	5±2.1		10.3±2.4	

	Social media	23	3.4±1.8		10.5±2.6	
Number of anti-HTN drugs	1 to 2	149	4.6±2.3	0.203**	9.8±2.5	0.046**
	3 to 4	45	4±1.7		8.9±2.7	
Anti-HTN drugs duration	1 to 5	114	4.8±2.3	0.076**	9.7±2.6	0.343**
	6 or more	80	4.1±2.1		9.4±2.6	
*Kruskal-Wallis test was used. **Mann-Whitney test was used.						

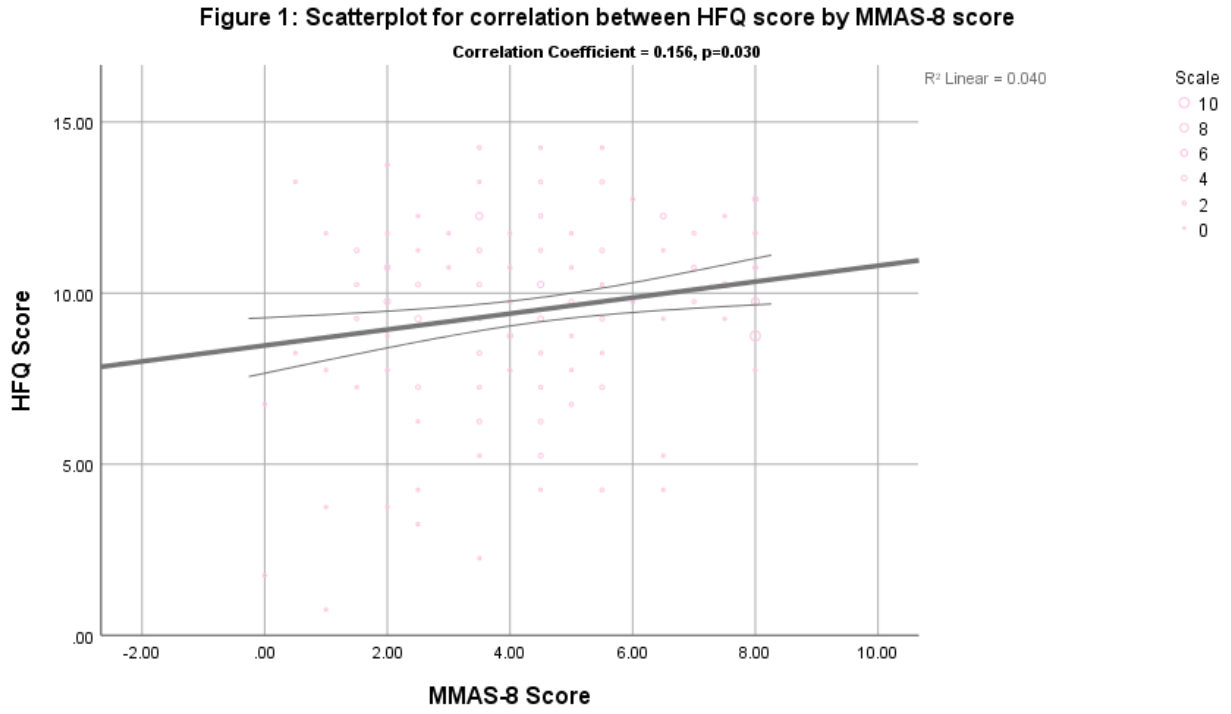

Figure 1: Scatterplot for correlation between HFQ score by MMAS-8 score

4. DISCUSSION

Adherence can be defined as the extent to which patients follow health-care providers' advice (Carpenter, 2005). Adherence to medication is essential as it has been associated with better health outcomes (Mamaghani et al., 2020). This cross-sectional study aimed to assess the adherence to anti-HTN medications as well as HTN knowledge among participants with hypertension and to study their correlation as well as their association with socio-demographic characters of participants. Average MMAS-8 and HFQ scores among respondents with hypertension were 4.5±2.2, and 9.5±2.5, respectively, and both scales were proportionally correlated (p=0.030).

Our study found a significant relationship between adherence and socio-demographic characters asthere is higher adherence among respondents with higher levels of education (p=0.032), andresidents of urban areas (p=0.000). A cross-sectional study has been conducted by Al Solami et al., (2015) to investigate the factors affecting adherence of patients to anti-hypertensive medications across hypertensive patients in Jeddah, Saudi Arabia reported consistent findings as they reported that non-formal education was revealed to be significant predictors of non-adherence in their group of patients. Similarly, Alsaqabi and Rabbani (2020) aimed to study medication adherence and how it relates to the quality of life in (QOL) adults with hypertension who went to primary health care clinics in Buraidah, Saudi Arabia and reported that education up to intermediate was concomitantthruenhancedobedience to anti-HTN medications.

Our results also found that better HTN knowledge was associated with urban residency of participants (p=0.001), single marital status (p=0.001), social media as a source of HTN knowledge (p=0.046), Saudi nationality (p=0.001), and less number of anti-hypertensive drugs used (p=0.046). In Ethiopia, Getenet et al., (2019) conducted a study to determine the factors that influence anti-hypertension drug adherence among hypertensive patients. Medication adherence was found to be poor in their study, and in line

with our findings, patients' adherence behaviour was influenced by factors such as age, location, the existence of comorbidities, and awareness of HTN and its treatment.

Hypertension is a complicated chronic disorder that has been considered as the "silent killer" because of its role in the development of cerebrovascular and cardiovascular complications. The ultimate objective of hypertension management, like that of any other noncommunicable illness, is to achieve target control and avoid complications. This is a multifaceted strategy that includes patient education about the origins, treatment, and consequences of hypertension. Adherence to anti-HTN medication is a key contributor to successful HTN management.

5. CONCLUSION AND RECOMMENDATIONS

We concluded that the HTN knowledge and anti-HTN medication adherence among people with hypertension in Saudi Arabia are average. Anti-hypertensive medication adherence and knowledge of hypertension were proportionately correlated. Respondents with a greater degree of education and those who live in urban areas had a higher level of adherence. Saudi citizens, inhabitants of urban areas, singles, those obtaining hypertension information from social media, and those using one or two anti-hypertensive medications had superior hypertension knowledge. Patients who have risk factors for poor adherence should be regularly monitored in order to optimize their drug-taking behavior. Health education methods focusing on medication adherence should be developed and delivered to hypertension patients and the general public.

Acknowledgement

We thank the participants who were all contributed samples to the study. Author Contributions We certify, as authors, that we have participated sufficiently in the intellectual content, conception and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript, to take public responsibility for it and have agreed to have our name listed as a contributor. All persons who have made substantial contributions to the work reported in the manuscript.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval

Approval to conduct the research was got from the Research Ethics Committee of the Northern Border University with decision letter number (HAP-09-A-043).

Funding

This study has not received any external funding.

Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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