

Self-Care Behaviors and Related Factors in Hypertensive Patients

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Abstract

Background: An assessment of an individual's hypertension self-care behavior may provide clinicians and practitioners with important information regarding how to better control hypertension.

Objectives: The objective of this study was to investigate the self-care behaviors of hypertensive patients.

Patients and Methods: This cross-sectional study was conducted in 2014 in a sample of 1836 patients of both genders who had been diagnosed with hypertension in urban and rural health centers in the Kohgiluyeh Boyer-Ahmad Province in southern Iran. They were randomly selected and were invited to participate in the study. Self-care activities were measured using the H-hypertension self-care activity level effects.

Results: The mean age of the respondents was 63 (range: 30 - 92), and 36.1% reported adherence to the recommended levels of medication; 24.5% followed the physical activity level guidelines. Less than half (39.2%) met the criteria for practices related to weight management, and adherence to low-salt diet recommendations was also low (12.3%). Overall, 86.7% were nonsmokers, and 100% abstained from alcohol. The results of a logistic regression indicated that gender was significantly associated with adherence to physical activity (OR = 0.716) and non-smoking (OR = 1.503) recommendations; that is, women were more likely to take part in physical activity than men. There was also a significant association between age and adherence to both a low-salt diet (OR = 1.497) and medication (OR = 1.435).

Conclusions: Based on our findings, it is crucial to implement well-designed educational programs to improve hypertension self-care behaviors.

Keywords: Self-Care, Hypertension, Behavior, Patient

1. Background

Hypertension is a chronic disease that has become a public health challenge (1) and shortens the lives of many people around the world (2). It is considered to be an important risk factor for cardiovascular disease, stroke, and kidney disease (3), as well as the most common risk factor for death and the main cause of disability worldwide (1, 4). Out of the 17 million global deaths per year that result from cardiovascular disease (5), 9.4 million are due to hypertension (6).

It has been predicted that the total number of hypertensive patients will rise from 1 billion in 2008 to 1.54 billion in 2025; 29% of these are adolescents who mostly live in developing countries (7, 8). Three-fourths of hypertensive patients (639 million) reside in developing countries with limited resources; these people have very little knowledge about hypertension and usually also have poor control of the condition (9, 10). Africa (46%) and the Middle East (41%) have the most hypertensive patients above the

age of 25 (11). The prevalence of hypertension has been attributed to numerous risk factors, such as population growth, aging, and behavioral factors, including poor nutrition, the disadvantages of drinking alcohol, physical inactivity, overweight, and being exposed to ongoing stress (11). Failure to manage hypertension is a potential risk factor for cardiovascular disease and also increases the likelihood for these kinds of diseases. Therefore, it is of high importance to control hypertension and therefore decrease the chance of these consequences (11-13). According to the world health organization (WHO), one way to better control hypertension is to involve patients in their own self-care surveillance (14, 15). Self-care can be defined as the capability of people, families, and communities to take part in health promotion and protection, disease prevention, and dealing with illness and disability either with or without the support of a health care provider (16). Thus, the joint national committee on the prevention, detection, evaluation, and treatment of high blood pressure (JNC 7)

provides six self-care behavior recommendations considered to be vital to control high blood pressure: 1, compliance with medication regimens; 2, involvement in physical activities; 3, healthy diets low in fat and salt, similar to dietary approaches to stop hypertension (DASH); 4, maintaining a healthy weight; 5, reducing alcohol consumption; and 6, avoidance of tobacco (17). Moreover, various studies have reported self-care behaviors as one of the main factors for controlling high blood pressure (14, 18-22). Despite the benefits of these behaviors, many hypertensive patients are not willing to make these changes (21, 23-27). An examination of self-care behaviors in patients with hypertension may reveal important information for medical practitioners and health experts to control high blood pressure and also to allow policy makers to better support these patients. However, little knowledge about self-care behaviors (i.e., medication adherence, regular physical activity, a healthy diet, and weight management) that may help control high blood pressure exists in southern Iran.

2. Objectives

Considering the importance of its topic, this study aimed to evaluate the status of self-care behaviors in patients with high blood pressure in southern Iran.

3. Patients and Methods

3.1. Participants

This cross-sectional study was conducted in 2014 using a sample of patients with hypertension in urban and rural health centers affiliated with Yasuj University of Medical Science in the Kohgiluyeh Boyer-Ahmad Province in southern Iran.

All participants were randomly selected from the available records in health centers and were invited to participate in the study. They were recruited either via phone or by referring to their place. They all met the inclusion criteria (six months had passed since a physician made their diagnosis, they had a record at the health center, and they were at least 30 years of age); those who could not communicate effectively with the study personnel or did not provide informed consent were excluded. Finally, out of the 2,400 invited patients, 1836 (76.52%) signed the consent form and voluntarily agreed to participate in the study.

3.2. Measures

The questionnaire included three sections: sociodemographic characteristics, risk factors for hypertension, and hypertension self-care activities.

3.3. Sociodemographic Characteristics

The sociodemographic characteristics of the participants were: age, sex, marital status, education, occupation, and household income. The following classifications were made for the characteristics: Marital status: single, married, divorced or widowed; Education: illiterate, elementary, middle, high school, diploma, and university; Employment status: employed, unemployed, farmer, housekeeper, and retired.

3.4. Risk Factors for Hypertension

The measured risk factors for hypertension were as follows: family history of hypertension, duration of time that had passed since being diagnosed with hypertension, blood pressure monitoring, history of other diseases, body mass index: height (using a wall-mounted stadiometer) and weight (using calibrated scales), which were recorded by a nurse. (Weight and height were measured after the participants removed their shoes and any heavy outer garments). Body mass index (BMI; calculated as $\text{weight}/\text{height}^2$) was classified into four categories: (BMI < 18.5), normal weight ($18.5 \leq \text{BMI} < 25.0$), overweight ($25.0 \leq \text{BMI} < 30.0$), and obese ($\text{BMI} \geq 30.0$) (28).

3.5. Self-Care Activities

Self-care activities were ascertained using the hypertension self-care activity level effects (H-scale). This is a 31-item scale and was prepared by Findlow (29). The H-scale is designed to help primary care physicians better counsel hypertensive patients who are seeking to achieve blood pressure control (30). It is recommended by the JNC 7 and has been used in several different studies (31-33).

The H-scale examines the level of self-care by asking about the number of days per week on which an individual performs a self-care activity. These response categories were chosen specifically to enable hypertension researchers to explore the dose-response relationship between the various hypertension self-care activities and blood pressure and to ultimately determine the relative contribution of each activity to blood pressure management. For dietary practices, several items were developed to assess adherence to daily activities related to reducing salt intake and eating healthier foods. A separate group of items was created to assess weight management activities within a 30-day time frame.

To examine the content validity and identify whether the items were well representative of the self-care activity level of patients with hypertension, ten experts in the fields of health education, epidemiology, and medicine were asked to assess the questionnaire. The obtained values for CVI and CVR were X and Y, respectively. Accordingly,

four items were excluded from the questionnaire. All items were evaluated in terms of clarity and expression by considering the expert's opinions, and relevant changes were made at their suggestion.

Following an expert panel review, a pilot study was conducted using the H-SCALE with a convenience sample of adults with hypertension ($n = 30$). Cronbach alphas were as follows: medication adherence ($\alpha = 0.91$), eating a low-salt diet ($\alpha = 0.72$), physical activity ($\alpha = 0.96$), smoking ($\alpha = 0.91$), and weight management ($\alpha = 0.85$). Thus, the final version of the questionnaire contained 27 items for the assessment of hypertension self-care activities with the following breakdown: medication adherence (3 items), physical activity (2 items), low-salt diet (10 items), smoking (2 items), alcohol (1 item), and weight management (9 items).

3.5.1. Medication Adherence

Three items assessed the number of days in the last week that the respondent displayed adherence: Do you take your blood pressure pills? Do you take your blood pressure pills at the same time every day? and Do you take the recommended number of blood pressure pills? The responses were summed (range: 0 - 21), and the participants who reported that they had followed these three recommendations on all weekdays were considered adherent (score = 21).

3.5.2. Low-Salt Diet

Ten items assessed the attempts at eating a healthy (low-fat and low-salt) diet, avoiding salt while cooking and eating, and avoiding foods high in salt content along with eating the recommended number of servings of fruits and vegetables. All the items were based on a 7-point Likert scale ranging from 0 - 7 days. The responses were summed for all items to create a continuous variable, with possible scores ranging from 0 - 70.

3.5.3. Physical Activity

Exercise was assessed by 2 items based on a 7-point Likert scale ranging from 0 - 7 days: On how many of the past 7 days did you do at least 30 minutes of physical activity? and On how many of the past 7 days did you do a specific exercise activity (such as swimming, walking, or biking) other than what you do around the house or as part of your regular work? The responses were then summed (range: 0 - 14).

3.5.4. Smoking

The participants' smoking status was assessed using 2 items based on a 7-point Likert scale ranging from 0 - 7 days: On how many of the past 7 days did you smoke a cigarette or cigar, even just one puff? and On how many of the past

7 days did you smoke hookah (even just one puff)? The responses were summed (range: 0 - 14). Any respondents who reported 0 days were considered nonsmokers, and the rest were classified as smokers.

3.5.5. Alcohol

Alcohol intake was assessed by one single question ranging from 0 - 7 days: On average, how many days per week do you drink alcohol?

Weight management: Nine items assessed activities undertaken to manage weight through dietary practices specifically intended to lose weight. These activities were compiled from patient recall during the past 30 days and were based on a 5-point Likert scale ranging from strongly disagree 1; to strongly agree 5; with a sum ranging from 9 - 45. Those participants who agreed to all 9 items (score ≥ 35) were considered to be good followers of weight management practices.

3.6. Statistical Analysis

A logistic regression model was used to obtain the odds ratios as a measure of the association between risk factors and adherence to self-care behaviors and their confidence intervals. All the analyses were carried out using the statistical package for the social sciences (SPSS version 16, SPSS Inc., Chicago, IL, US). The significance level was set at 0.05.

4. Results

A total of 1836 patients with high blood pressure participated in this study, and their demographic characteristics are indicated in [Table 1](#). The mean age of participants was 60.26 years (range: 30 - 92) with a standard deviation of 12.66 years; 60.7 % were female, and 55.2% lived in rural areas. Furthermore, 15.1% had a manometer in their homes, and 45.3% reported a family history of hypertension. Our results revealed that, 36.1 % to their drug regimen, but only 12% avoided salt both while cooking and eating. Moreover, 24.5 % in physical activity on most weekdays, and 86.7% were non-smokers. None were alcohol consumers, and 39.2% managed their weight. There were more self-care behaviors of all types in individuals over the age of 60 compared to other ages and also in females compared with males ([Tables 2 - 4](#)).

The results of the logistic regression ([Table 5](#)) indicated that gender was significantly associated with adherence to physical activity (OR = 0.716) and non-smoking (OR = 1.503); that is, women were more likely to make time for regular exercise than men. However, women were less likely to adhere to non-smoking behavior than men. There was also a significant association between age and adherence to both

Table 1. Demographic and Health Characteristics of the Study Participants (n = 1836)

Variables	No. (%)
Gender	
Male	722 (39.3)
Female	1114 (55.2)
Age groups	
30 - 39	95 (5.2)
40 - 49	262 (14.3)
50 - 59	534 (29.1)
> 60	945 (51.5)
Marital status	
Single	25 (1.4)
Married	1488 (81)
Divorced	323 (17.6)
Region	
Urban	822 (44.8)
Rural	1014 (55.2)
Education level	
Illiterate	1149 (62.2)
Primary school	362 (19.7)
Secondary school	114 (6.2)
High School	46 (2.5)
Diploma	90 (4.9)
University	75 (4.1)
Manometer at home	
Yes	278 (15.1)
No	1558 (84.9)
Occupation	
Farmer	201 (10.9)
Employed	111 (6.0)
Retired	184 (10.0)
Unemployed	269 (14.7)
Housekeeper	1071 (58.3)
Income	
Poor	1655 (90.1)
Medium	148 (8.1)
Good	33 (1.8)
Body mass index (BMI)	
< 18.5	15 (0.8)
18.5 - 25	655 (35.7)
25 - 30	736 (40.1)
≥ 30	430 (23.4)
Family history of hypertension	
Yes	832 (45.3)
No	1004 (54.7)
Duration of diagnosis	
< 5	955 (52.0)
5 - 9	366 (19.9)
10 - 14	298 (16.2)
15 - 19	129 (7.0)
> 20	88 (4.8)

Table 2. Self-Care Behavior Prevalence Rates (n = 1836)

Self-Care Behavior	Male	Female	Total
Medication adherence	35.7	36.4	36.1
Eating a low salt diet	12.2	12.4	12.3
Physical activity	28.3	22	24.5
Smoking	83.8	88.6	86.7
Weight management	38.5	39.7	39.2
Alcohol abstinence	0	0	0

a low-salt diet (OR=1.497) and medication (OR=1.435). This relationship indicates that people under 50 had a more rigorous adherence to a low-salt diet than those over 50 years of age. Participants under 50 also had better adherence to their medication regimens than the other group. Married people displayed significantly more adherence to a low-salt diet than single people (OR = 0.603). Again, patients living in rural areas exhibited a higher rate of non-smoking behavior than those residing in cities (OR = 0.602). The results also revealed that individuals who had a manometer at home (OR = 0.680) and used it to take blood pressure measurements (OR = 0.721) had significantly greater adherence to their medications compared to those with no access to home monitoring. BMI was associated with weight management (OR = 0.803); patients with a BMI between 25 and 30 were more likely to manage their weight than those whose BMI was under 25. A significant relationship was also found between the amount of time that had passed since their diagnosis and adherence to physical activity (OR = 0.730), which indicates that patients who had been diagnosed more than 5 years previously had greater adherence to physical activity than those with less than 5 years since their diagnosis. The other factors (educational level, family history, and income) were not significantly associated with either type of self-care behavior.

5. Discussion

The aim of this study was to determine the prevalence of self-care behaviors among patients with high blood pressure. The ratios for these behaviors were low in terms of medication adherence, healthful diet, physical activity, and weight management (less than 50%) and were moderate regarding non-smoking (more than 50%).

Based on our results, there was an absence of a healthful diet (i.e., a low-fat and low-salt diet, including the avoidance of salt while both cooking and eating as well as increased fruit and vegetable consumption) in 87.7% of the participants. They reported that they added extra salt to their food while cooking (87.3%) and eating (61.3%). In their study on African-American participants, Warren-Findlow et al. found that 22% of patients had tried a low-salt diet (29). Hu conducted a study of high blood pressure among Chinese patients and showed that 81% of them did not avoid salt consumption, which is in line with the findings of the present study (27). The WHO suggests that every adult should consume less than 5 grams (2000 mg) of sodium each day (34); however, in most countries, the daily consumption of salt per person is between 9 - 12 grams on average (35). Iran is not an exception in this case, which is also in line with the present study. The consumption of

Table 3. [Part 1] Differences Between Adherers and Non-Adherers to Self-Care Behaviors

Characteristics	Medication Adherence		Low-Salt Diet		Physical Activity		Nonsmoking		Weight Management	
	Adherers (n = 663)	Non-Adherers (n = 1173)	Adherers (n = 226)	Non-Adherers (n = 1610)	Adherers (n = 449)	Non-Adherers (n = 1387)	Adherers (n = 1592)	Non-Adherers (n = 244)	Adherers (n = 720)	Non-Adherers (n = 1116)
Gender										
Male	258 (38.9)	464 (39.6)	88 (39.4)	634 (38.9)	204 (45.4)	518 (37.3)	605 (38.0)	117 (48.0)	278 (38.6)	444 (39.8)
Female	405 (61.1)	709 (60.4)	138 (60.6)	976 (61.1)	245 (54.6)	869 (62.7)	987 (62.0)	127 (52.0)	442 (61.4)	672 (60.2)
Age groups										
30 - 39	25 (3.8)	70 (6.0)	8 (3.5)	87 (5.4)	20 (4.5)	75 (5.4)	84 (5.3)	11 (4.5)	37 (5.1)	58 (5.2)
40 - 49	81 (12.2)	181 (15.4)	21 (9.3)	241 (15)	62 (13.8)	200 (14.4)	228 (14.3)	34 (13.9)	105 (14.6)	157 (14.1)
50 - 59	188 (28.4)	346 (29.5)	61 (27)	473 (29.4)	130 (29)	404 (29.1)	458 (28.8)	76 (31.1)	210 (29.2)	324 (29)
> 60	369 (55.7)	576 (49.1)	136 (60.2)	809 (50.2)	237 (52.8)	708 (51.1)	822 (51.6)	123 (50.4)	720 (51.1)	577 (51.7)
Marital status										
Single	8 (1.2)	17 (1.4)	5 (2.2)	20 (1.2)	6 (1.3)	19 (1.4)	23 (1.4)	2 (0.8)	9 (1.3)	16 (1.40)
Married	533 (80)	955 (81.4)	166 (73.5)	1322 (82.1)	376 (83.8)	1112 (80.2)	1291 (81.1)	197 (80.7)	583 (81.0)	905 (81.10)
Divorced	122 (18.4)	201 (17.1)	55 (24.3)	268 (16.6)	67 (14.9)	256 (18.4)	278 (17.5)	45 (18.4)	128 (17.8)	195 (17.5)
Region										
Urban	279 (42.1)	543 (46.3)	101 (44.7)	721 (44.8)	205 (45.7)	617 (44.5)	737 (46.3)	85 (34.8)	338 (46.9)	484 (43.4)
Rural	384 (57.9)	630 (53.7)	125 (55.3)	889 (55.2)	244 (54.3)	770 (55.5)	855 (53.7)	159 (65.2)	382 (53.1)	632 (56.6)
Education level										
Illiterate	448 (67.6)	701 (59.8)	153 (67.7)	996 (61.9)	276 (61.5)	873 (62.9)	1000 (62.8)	149 (61.1)	445 (61.8)	704 (63.1)
Primary school	107 (16.1)	255 (21.7)	38 (16.8)	324 (20.1)	87 (19.4)	275 (19.8)	302 (19)	60 (24.6)	150 (20.8)	212 (19)
Secondary school	37 (5.6)	77 (6.6)	12 (5.3)	102 (6.3)	28 (6.2)	86 (6.2)	96 (6)	18 (7.4)	43 (6)	71 (6.4)
High School	16 (2.4)	30 (2.6)	4 (1.8)	42 (2.6)	11 (2.4)	35 (2.5)	44 (2.8)	2 (0.8)	23 (3.2)	23 (2.1)
Diploma	29 (4.4)	61 (5.2)	12 (5.3)	78 (4.8)	24 (5.3)	66 (4.8)	79 (5)	11 (4.5)	33 (4.6)	57 (5.1)
University	26 (3.9)	46 (4.2)	7 (3.1)	68 (4.2)	23 (5.1)	52 (3.7)	71 (4.5)	4 (1.6)	26 (3.6)	49 (4.4)

foods containing high fat and salt along with the insufficient consumption of fruits and vegetables are influential factors that lead to high blood pressure and its ineffective management (11, 36). Thus, there is a need to implement necessary educational interventions to limit salt expenditure in traditional foods and to increase the consumption of fruits and vegetables instead. There is also a need for guidelines to be set by health service providers to encourage people to improve their diets.

Our results indicated that few participants adhered to their medication protocols. Although 74.8% of the participants had been prescribed medications, only 36.1% of them were adherent, which is lower than the rate reported in the studies of Warren-Findlow et al. (59.8%) (29) and Hu et al. (51.9%) (27). It seems that taking medications and adhering to them is of little importance to patients with high blood pressure.

Based on the outcomes of this and other corresponding studies (14, 29, 37, 38), as age increases, the adherence to medication also rises. It seems that as one ages, he/she becomes more sensitive about his/her disease and starts to take medications in a regular manner in order to control it. Similar to other studies (27, 29), women in this study demonstrated greater adherence to their medica-

tions than men. Based on the low drug adherence rates among the participants of this study, treatment programs that focus on health education, the importance of medication adherence, and maintaining an effective relationship between patients and physicians are essential in this population to control high blood pressure.

We found a higher rate of smoking in men than in women and also in elderly participants compared with youths, which is in line with the findings of similar studies (27, 29, 39). However, 1592 (86.7%) patients in this study avoided tobacco use, which is a higher incidence compared to other studies. This finding might be due to the social and cultural differences between Iran and other countries (27, 29). For example, none of the participants in the present study consumed alcohol because alcoholic drinks are banned in Iran, as it is a Muslim country.

Less than one-fourth of the participants took part in physical activity at least 30 minutes almost every day. This rate is much lower than what has been suggested and also what has been reported by other studies. Various researchers have indicated that a low level of physical activity is associated with hypertension (36, 40, 41). The WHO has suggested 30 minutes of physical activity five days a week to prevent and control high blood pressure (11); exer-

Table 4. [Part 2] Differences Between Adherers and Non-Adherers to Self-Care Behaviors

Characteristics	Medication Adherence		Low-Salt Diet		Physical Activity		Nonsmoking		Weight Management	
	Adherers (n = 663)	Non-Adherers (n = 1173)	Adherers (n = 226)	Non-Adherers (n = 1610)	Adherers (n = 449)	Non-Adherers (n = 1387)	Adherers (n = 1592)	Non-Adherers (n = 244)	Adherers (n = 720)	Non-Adherers (n = 1116)
Occupation										
Farmer	79 (11.9)	122 (10.4)	27 (11.9)	174 (10.8)	59 (13.1)	142 (10.2)	155 (9.7)	46 (18.9)	83 (11.5)	118 (10.6)
Employed	38 (5.7)	73 (6.2)	10 (4.4)	101 (6.3)	31 (6.9)	80 (5.8)	99 (6.2)	12 (4.9)	43 (6)	68 (6.1)
Retired	62 (9.4)	122 (10.4)	19 (8.4)	165 (10.2)	56 (12.5)	128 (9.2)	167 (10.5)	17 (7)	66 (9.2)	118 (10.6)
Unemployed	91 (13.7)	178 (15.2)	40 (17.7)	229 (14.2)	66 (14.7)	203 (14.6)	222 (13.9)	47 (19.3)	99 (13.8)	170 (15.2)
Housekeeper	393 (59.3)	678 (57.8)	130 (57.5)	941 (58.4)	237 (52.8)	834 (60.1)	949 (56.6)	122 (50)	429 (56.9)	642 (57.5)
Income										
Poor	603 (91)	1052 (89.7)	211 (90.4)	1444 (89.7)	406 (90.4)	1249 (90.1)	1429 (89.8)	226 (92.6)	647 (89.9)	1008 (90.3)
Medium	52 (7.8)	96 (8.2)	11 (4.9)	137 (8.5)	35 (7.8)	113 (8.1)	134 (8.4)	14 (5.7)	52 (7.2)	96 (8.6)
Good	8 (1.2)	25 (2.1)	4 (1.8)	29 (1.8)	8 (1.8)	25 (1.8)	29 (1.8)	4 (1.6)	21 (2.9)	12 (1.1)
Body mass index (BMI)										
< 18.5	4 (0.6)	11 (0.6)	1 (0.4)	14 (0.9)	3 (0.7)	12 (0.9)	12 (0.8)	3 (1.2)	6 (0.8)	9 (0.8)
18.5 - 25	239 (36)	416 (35.5)	79 (35)	576 (35.8)	170 (37.9)	485 (35)	561 (35.2)	94 (38.5)	270 (37.5)	385 (34.5)
25 - 30	250 (37.7)	486 (41.4)	94 (41.6)	642 (39.9)	185 (41.2)	551 (39.7)	642 (40.3)	94 (38.5)	265 (36.8)	471 (42.2)
≥ 30	170 (25.6)	260 (22.2)	52 (23)	387 (23.5)	91 (20.3)	339 (24.4)	377 (23.7)	53 (21.7)	179 (24.9)	251 (22.5)
Duration since diagnosis (years)										
< 5	315 (47.5)	640 (54.6)	106 (46.9)	849 (52.7)	260 (57.9)	695 (50.1)	826 (51.9)	126 (52.9)	389 (54)	566 (50.7)
5 - 9	135 (20.4)	231 (19.7)	40 (17.7)	326 (20.2)	89 (19.8)	277 (20)	314 (19.7)	52 (21.3)	134 (18.6)	232 (20.8)
10 - 14	118 (17.8)	180 (15.3)	49 (21.7)	249 (15.5)	61 (13.6)	237 (17.1)	264 (16.6)	34 (13.9)	124 (17.2)	174 (15.6)
15 - 19	54 (8.1)	75 (6.4)	13 (5.8)	116 (7.2)	22 (4.9)	107 (7.7)	109 (6.8)	20 (8.2)	41 (5.7)	88 (7.9)
20	41 (6.2)	47 (4.0)	18 (8.0)	70 (4.3)	17 (3.8)	71 (5.1)	79 (5.0)	9 (3.7)	32 (4.4)	56 (5.0)

cise is an extensive, available, cheap, and effective intervention that can be done in one's leisure time and according to one's own personal needs and preferences (42).

Our results indicated that 1166 (63.5%) of the individuals were overweight and obese, and only 39.2% of the sample managed their weight. People often become obese and overweight as they age, which is why older people are more subject to hypertension, a topic that needs more attention from physicians and health service providers but instead seems to have been ignored by them. This trend has been reported by numerous studies (29, 43). Investigators have shown that losing weight leads to a greater decrease in blood pressure than pharmacological treatment alone (44-47). In addition, losing about 5 - 10 percent of one's body weight can have a positive impact on controlling blood pressure (44). Thus, interventions should be carried out with hypertensive patients to reduce their weight.

The strength of the present study was that it investigated a large urban and rural population with a high response rate. However, as more than 80% of the participants were over 50 years old and 62% of patients were illiterate, there was not a normal distribution of all possible age groups, which was considered a limitation of the study.

5.1. Conclusion

There was minor adherence in terms of nutrition/diet, medication intake, weight management, and physical activity. Self-care providers should therefore improve their actions and also their communications with the patient to ensure a better influence on self-care behaviors. Educational programs for the youth and also the elderly should also be expanded

Footnotes

Authors' Contribution: Study concept and design, Sayed Fazel Zinat Motlagh; analysis and interpretation of data, Reza Chaman; drafting of the manuscript, Sayed Fazel Zinat Motlagh; critical revision of the manuscript for important intellectual content, Ahmad Ali Eslami; statistical analysis, Fortes and Mastroeni, Erfan Sadeghi.

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Table 5. Associations Between Demographic and Health Characteristics and Hypertension Self-Care Behaviors

Characteristics	Low-Salt Diet OR (95% CI)	Medication Adherence OR (95% CI)	Physical Activity OR (95% CI)	Nonsmoking OR (95% CI)	Weight Management OR (95% CI)
Gender					
Male	1.019 (0.766 - 1.355)	1.027 (0.845 - 1.249)	0.716 (0.577 - 0.888)	1.503 (1.146 - 1.970)	1.050 (.867 - 1.273)
Female	1.00	1.00	1.00	1.00	1.00
Age groups					
< 50	1.497 (1.037 - 2.161)	1.435 (1.133 - 1.818)	1.104 (0.852 - 1.430)	0.826 (0.590 - 1.157)	0.896 (0.717 - 1.120)
> 50	1.00	1.00	1.00	1.00	1.00
Marital status					
Single	0.603 (0.437 - 0.831)	0.936 (0.735 - 1.192)	1.274 (0.960 - 1.691)	1.023 (0.727 - 1.441)	0.992 (0.781 - 1.260)
Married	1.00	1.00	1.00	1.00	1.00
Region					
Urban	1.004 (0.759 - 1.328)	1.186 (0.979 - 1.438)	0.954 (0.770 - 1.181)	0.620 (0.468 - 0.822)	.8660 (0.717 - 1.045)
Rural	1.00	1.00	1.00	1.00	1.00
Education level					
University	1.492 (0.673 - 3.309)	0.830 (0.509 - 1.355)	0.078 (0.578 - 1.030)	2.645 (0.952 - 7.348)	0.839 (0.514 - 1.370)
Diploma	1.174 (0.518 - 2.663)	0.699 (0.568 - 0.861)	0.759 (0.759 - 1.226)	0.853 (0.644 - 1.130)	1.085 (0.888 - 1.326)
Illiterate	1.00	1.00	1.00	1.00	1.00
Family					
No	0.988 (0.747 - 1.307)	0.939 (0.776 - 1.137)	1.055 (0.851 - 1.306)	0.989 (0.755 - 1.297)	1.003 (0.831 - 1.210)
Yes	1.00	1.00	1.00	1.00	1.00
Manometer					
No	0.867 (0.596 - 1.261)	0.680 (0.525 - 0.881)	1.124 (0.830 - 1.522)	0.793 (0.531 - 1.183)	0.884 (0.682 - 1.146)
Yes	1.00	1.00	1.00	1.00	1.00
Measurement					
No	0.885 (0.578 - 1.353)	0.721 (0.538 - 0.967)	0.907 (0.652 - 1.262)	0.671 (0.414 - 1.086)	0.857 (0.639 - 1.149)
Yes	1.00	1.00	1.00	1.00	1.00
Income					
< 1000000	0.618 (0.358 - 1.070)	0.865 (0.625 - 1.198)	0.959 (0.669 - 1.374)	1.432 (0.863 - 2.377)	1.053 (0.770 - 1.440)
> 1000000	1.00	1.00	1.00	1.00	1.00
Body mass index(BMI)					
30	1.015 (0.699 - 1.472)	1.149 (0.895 - 1.474)	1.399 (0.841 - 2.328)	1.204 (0.841 - 1.724)	1.018 (0.796 - 1.302)
30 - 25	1.080 (0.785 - 1.485)	0.904 (0.726 - 1.126)	1.027 (0.817 - 1.291)	1.156 (0.852 - 1.569)	0.803 (0.648 - 0.996)
< 25	1.00	1.00	1.00	1.00	1.00
Duration of diagnosis					
< 5	1.263 (0.956 - 1.669)	1.327 (1.096 - 1.606)	0.730 (0.589 - 0.905)	1.040 (0.794 - 1.363)	0.876 (0.726 - 1.057)
5 >	1.00	1.00	1.00	1.00	1.00

References

1. Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. World-

wide prevalence of hypertension: a systematic review. *J Hypertens.* 2004;22(1):11-9. [PubMed: 15106785].

2. WHO . Preventing chronic diseases: A vital investment 2006. [cited 26 March 2012]. Available from: <http://www.who.int/chp/chronicdiseasesreport/presentation/en/index.htm>.
3. Law MR, Morris JK, Wald NJ. Use of blood pressure lowering drugs in the prevention of cardiovascular disease: meta-analysis of 147 randomised trials in the context of expectations from prospective epidemiological studies. *BMJ*. 2009;**338**:b1665. doi: [10.1136/bmj.b1665](https://doi.org/10.1136/bmj.b1665). [PubMed: [19454737](https://pubmed.ncbi.nlm.nih.gov/19454737/)].
4. WHO . Global health risks: mortality and burden of disease attributable to selected major risks [cited June 30, 2013]. Available from: http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf.
5. WHO . Causes of Death 2008. Available from: [Http://www.who.int/healthinfo/global_burden_disease/cod_2008_sources_methods.pdf](http://www.who.int/healthinfo/global_burden_disease/cod_2008_sources_methods.pdf).
6. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;**380**(9859):2224-60. doi: [10.1016/S0140-6736\(12\)61766-8](https://doi.org/10.1016/S0140-6736(12)61766-8). [PubMed: [23245609](https://pubmed.ncbi.nlm.nih.gov/23245609/)].
7. WHO . Global status report on non communicable diseases 2010. [cited 2011].
8. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. *Lancet*. 2005;**365**(9455):217-23. doi: [10.1016/S0140-6736\(05\)17741-1](https://doi.org/10.1016/S0140-6736(05)17741-1). [PubMed: [15652604](https://pubmed.ncbi.nlm.nih.gov/15652604/)].
9. WHO . The world health report : reducing risks, promoting healthy life 2002.
10. WHO . Preventing chronic disease: a vital investment 2005.
11. WHO . A global brief on Hypertension Silent killer Global public health crisis; 2013. [cited April]. Available from: http://www.who.int/cardiovascular_diseases/publications/global_brief_hypertension/en/.
12. Marquez-Contreras E, Coca A, de la Figuera V, Divison JA, Llisterri JL, Sobrino J, et al. [Cardiovascular risk profile of uncontrolled hypertensive patients. The Control-Project study]. *Medicina clinica*. 2007;**128**(3):86-91.
13. Rosendorff C, Black HR, Cannon CP, Gersh BJ, Izzo JJ, et al. Treatment of hypertension in the prevention and management of ischemic heart disease: a scientific statement from the American Heart Association Council for High Blood Pressure Research and the Councils on Clinical Cardiology and Epidemiology and Prevention. *Circulation*. 2007;**115**(21):2761-88. doi: [10.1161/CIRCULATIONAHA.107.183885](https://doi.org/10.1161/CIRCULATIONAHA.107.183885). [PubMed: [17502569](https://pubmed.ncbi.nlm.nih.gov/17502569/)].
14. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JJ, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*. 2003;**289**(19):2560-72. doi: [10.1001/jama.289.19.2560](https://doi.org/10.1001/jama.289.19.2560). [PubMed: [12748199](https://pubmed.ncbi.nlm.nih.gov/12748199/)].
15. Yang SO, Jeong GH, Kim SJ, Lee SH. Correlates of self-care behaviors among low-income elderly women with hypertension in South Korea. *J Obstet Gynecol Neonatal Nurs*. 2014;**43**(1):97-106. doi: [10.1111/1552-6909.12265](https://doi.org/10.1111/1552-6909.12265). [PubMed: [24354464](https://pubmed.ncbi.nlm.nih.gov/24354464/)].
16. Webber D, Guo Z, Mann S. Self-care in health: we can define it but should we also measure it. *Self Care*. 2013;**4**(5):101-5.
17. National Institutes of Health. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. NIH Publication; 2004.
18. Bosworth HB, Dubard CA, Ruppenkamp J, Trygstad T, Hewson DL, Jackson GL. Evaluation of a self-management implementation intervention to improve hypertension control among patients in Medicaid. *Transl Behav Med*. 2011;**1**(1):191-9. doi: [10.1007/s13142-010-0007-x](https://doi.org/10.1007/s13142-010-0007-x). [PubMed: [24073040](https://pubmed.ncbi.nlm.nih.gov/24073040/)].
19. Dickinson HO, Mason JM, Nicolson DJ, Campbell F, Beyer FR, Cook JV, et al. Lifestyle interventions to reduce raised blood pressure: a systematic review of randomized controlled trials. *J Hypertens*. 2006;**24**(2):215-33. doi: [10.1097/01.hjh.0000199800.72563.26](https://doi.org/10.1097/01.hjh.0000199800.72563.26). [PubMed: [16508562](https://pubmed.ncbi.nlm.nih.gov/16508562/)].
20. McManus RJ, Mant J, Bray EP, Holder R, Jones MI, Greenfield S, et al. Telemonitoring and self-management in the control of hypertension (TASMINH2): a randomised controlled trial. *Lancet*. 2010;**376**(9736):163-72. doi: [10.1016/S0140-6736\(10\)60964-6](https://doi.org/10.1016/S0140-6736(10)60964-6). [PubMed: [20619448](https://pubmed.ncbi.nlm.nih.gov/20619448/)].
21. Mellen PB, Gao SK, Vitolins MZ, Goff DJ. Deteriorating dietary habits among adults with hypertension: DASH dietary accordance, NHANES 1988-1994 and 1999-2004. *Arch Intern Med*. 2008;**168**(3):308-14. doi: [10.1001/archinternmed.2007.119](https://doi.org/10.1001/archinternmed.2007.119). [PubMed: [18268173](https://pubmed.ncbi.nlm.nih.gov/18268173/)].
22. Weir MR, Maibach EW, Bakris GL, Black HR, Chawla P, Messerli FH, et al. Implications of a health lifestyle and medication analysis for improving hypertension control. *Arch Intern Med*. 2000;**160**(4):481-90. [PubMed: [10695688](https://pubmed.ncbi.nlm.nih.gov/10695688/)].
23. Bosworth HB, Dudley T, Olsen MK, Voils CI, Powers B, Goldstein MK, et al. Racial differences in blood pressure control: potential explanatory factors. *Am J Med*. 2006;**119**(1):70. e9-70. e15.
24. Ndumele CD, Shaykevich S, Williams D, Hicks LS. Disparities in adherence to hypertensive care in urban ambulatory settings. *J Health Care Poor Underserved*. 2010;**21**(1):132-43. doi: [10.3353/hpu.0.0259](https://doi.org/10.3353/hpu.0.0259). [PubMed: [20173260](https://pubmed.ncbi.nlm.nih.gov/20173260/)].
25. Oster NV, Welch V, Schild L, Gazmararian JA, Rask K, Spettell C. Differences in self-management behaviors and use of preventive services among diabetes management enrollees by race and ethnicity. *Dis Manag*. 2006;**9**(3):167-75. doi: [10.1089/dis.2006.9.167](https://doi.org/10.1089/dis.2006.9.167). [PubMed: [16764534](https://pubmed.ncbi.nlm.nih.gov/16764534/)].
26. Kressin NR, Wang F, Long J, Bokhour BG, Orner MB, Rothendler J, et al. Hypertensive patients' race, health beliefs, process of care, and medication adherence. *J Gen Intern Med*. 2007;**22**(6):768-74. doi: [10.1007/s11606-007-0165-9](https://doi.org/10.1007/s11606-007-0165-9). [PubMed: [17364243](https://pubmed.ncbi.nlm.nih.gov/17364243/)].
27. Hu H, Li G, Arao T. Prevalence rates of self-care behaviors and related factors in a rural hypertension population: a questionnaire survey. *Int J Hypertens*. 2013;**2013**.
28. WHO . Obesity: preventing and managing the global epidemic: report of a WHO consultation. 1999.
29. Warren-Findlow J, Seymour RB. Prevalence rates of hypertension self-care activities among African Americans. *J Natl Med Assoc*. 2011;**103**(6):503.
30. Warren-Findlow J, Basalik DW, Dulin M, Tapp H, Kuhn L. Preliminary validation of the Hypertension Self-Care Activity Level Effects (H-SCALE) and clinical blood pressure among patients with hypertension. *J Clin Hypertens (Greenwich)*. 2013;**15**(9):637-43. doi: [10.1111/jch.12157](https://doi.org/10.1111/jch.12157). [PubMed: [24034656](https://pubmed.ncbi.nlm.nih.gov/24034656/)].
31. Warren-Findlow J, Seymour RB, Brunner Huber LR. The association between self-efficacy and hypertension self-care activities among African American adults. *J Community Health*. 2012;**37**(1):15-24. doi: [10.1007/s10900-011-9410-6](https://doi.org/10.1007/s10900-011-9410-6). [PubMed: [21547409](https://pubmed.ncbi.nlm.nih.gov/21547409/)].
32. Warren-Findlow J, editor. Examining the relationship between hypertension self-care activities and blood pressure in a primary care setting. 141st APHA Annual Meeting. 2013; APHA.
33. Warren-Findlow J, editor. Translation and testing of a scale to assess hypertension self-care activities among latinos. 143rd APHA Annual Meeting and Exposition. 2015; APHA.
34. WHO . Guideline: Sodium intake for an adults and children. 2012.
35. WHO . Reducing salt intake in populations-Report of a WHO forum and technical meeting. 2007.
36. Sun Z, Zheng L, Detrano R, Zhang X, Xu C, Li J, et al. Risk of progression to hypertension in a rural Chinese women population with prehypertension and normal blood pressure. *Am J Hypertens*. 2010;**23**(6):627-32. doi: [10.1038/ajh.2010.41](https://doi.org/10.1038/ajh.2010.41). [PubMed: [20300074](https://pubmed.ncbi.nlm.nih.gov/20300074/)].
37. Hekler EB, Lambert J, Leventhal E, Leventhal H, Jahn E, Contrada RJ. Commonsense illness beliefs, adherence behaviors, and hypertension control among African Americans. *J Behav Med*. 2008;**31**(5):391-

400. doi: [10.1007/s10865-008-9165-4](https://doi.org/10.1007/s10865-008-9165-4). [PubMed: [18618236](https://pubmed.ncbi.nlm.nih.gov/18618236/)].
38. Tran JH, Mirzaei M, Leeder S, editors. Hypertension: its prevalence and population-attributable fraction for mortality from stroke in the Middle East and north Africa. *Circulation*. 2010; Lippincott williams and wilkins; p. E174.
 39. Li Q, Hsia J, Yang G. Prevalence of smoking in China in 2010. *N Engl J Med*. 2011;**364**(25):2469-70. doi: [10.1056/NEJMc1102459](https://doi.org/10.1056/NEJMc1102459). [PubMed: [21696322](https://pubmed.ncbi.nlm.nih.gov/21696322/)].
 40. Wang H, Cao J, Li J, Chen J, Wu X, Duan X, et al. Blood pressure, body mass index and risk of cardiovascular disease in Chinese men and women. *BMC Public Health*. 2010;**10**:189. doi: [10.1186/1471-2458-10-189](https://doi.org/10.1186/1471-2458-10-189). [PubMed: [20384993](https://pubmed.ncbi.nlm.nih.gov/20384993/)].
 41. Abed Y, Abu-Haddaf S. Risk factors of hypertension at UNRWA primary health care centers in Gaza governorates. *ISRN Epidemiology*. 2013;**2013**.
 42. Barengo NC, Hu G, Tuomilehto J. Physical activity and hypertension: evidence of cross-sectional studies, cohort studies and meta-analysis. *Current Hypertension Reviews*. 2007;**3**(4):255-63.
 43. Clune A, Fischer JG, Lee JS, Reddy S, Johnson MA, Hausman DB. Prevalence and predictors of recommendations to lose weight in overweight and obese older adults in Georgia senior centers. *Prev Med*. 2010;**51**(1):27-30. doi: [10.1016/j.ypmed.2010.04.003](https://doi.org/10.1016/j.ypmed.2010.04.003). [PubMed: [20382178](https://pubmed.ncbi.nlm.nih.gov/20382178/)].
 44. Stevens VJ, Obarzanek E, Cook NR, Lee IM, Appel LJ, Smith West D, et al. Long-term weight loss and changes in blood pressure: results of the Trials of Hypertension Prevention, phase II. *Ann Intern Med*. 2001;**134**(1):1-11. [PubMed: [11187414](https://pubmed.ncbi.nlm.nih.gov/11187414/)].
 45. Shihab HM, Meoni LA, Chu AY, Wang NY, Ford DE, Liang KY, et al. Body mass index and risk of incident hypertension over the life course: the Johns Hopkins Precursors Study. *Circulation*. 2012;**126**(25):2983-9. doi: [10.1161/CIRCULATIONAHA.112.117333](https://doi.org/10.1161/CIRCULATIONAHA.112.117333). [PubMed: [23151344](https://pubmed.ncbi.nlm.nih.gov/23151344/)].
 46. Gelber RP, Gaziano JM, Manson JE, Buring JE, Sesso HD. A prospective study of body mass index and the risk of developing hypertension in men. *Am J Hypertens*. 2007;**20**(4):370-7. doi: [10.1016/j.amjhyper.2006.10.011](https://doi.org/10.1016/j.amjhyper.2006.10.011). [PubMed: [17386342](https://pubmed.ncbi.nlm.nih.gov/17386342/)].
 47. Hu G, Barengo NC, Tuomilehto J, Lakka TA, Nissinen A, Jousilahti P. Relationship of physical activity and body mass index to the risk of hypertension: a prospective study in Finland. *Hypertension*. 2004;**43**(1):25-30. doi: [10.1161/01.HYP.0000107400.72456.19](https://doi.org/10.1161/01.HYP.0000107400.72456.19). [PubMed: [14656958](https://pubmed.ncbi.nlm.nih.gov/14656958/)].