Assessment of Dietary Adherence in Hypertensive Patients Referred to Shahid Sayyad Shirazi Teaching Hospital in Gorgan

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Background: Hypertension is a risk factor for many diseases. Nutritional methods are considered as major tools in lifestyle modification for lowering blood pressure. The present study was conducted to determine the level of dietary adherence in hypertensive patients.

Methods: This descriptive-analytical study was performed in 2015, on hypertensive patients who were referred to Heart Clinic of Sayyad Shirazi Hospital in Gorgan. Overall, 200 patients (62% female) were selected by purposive sampling. The dietary adherence was evaluated in five following groups of salt-, fat-, fruit-, vegetables- -and dairies-intake through daily completion of data collection form within two weeks. This form was designed by the researchers and its validity and reliability were tested in a pilot study. Data were analyzed using Mann-Whitney, Chi-square, and logistic regression analysis tests.

Results: The mean and standard deviation (SD) of age of patients was 48.6±7.51 years. Mean and SD of systolic and diastolic blood pressure in patients were 152.31±9.1 and 93.53±2.87 mmHg, respectively. The results showed that 7% of patients had complete dietary adherence, 66.5% had poor adherence, and rest of the subjects had average dietary adherence. The highest level of dietary adherence was observed in the case of diaries intake (43.5%) and the lowest was related to fruit intake (3.5%).

Conclusion: Given the importance of dietary adherence in controlling hypertension and lack of dietary adherence in hypertensive patients, it is recommended to conduct further studies to identify factors affecting dietary adherence and implement necessary interventions to improve this issue in patients.

Keywords: Adherence, Diet, Hypertension, Systolic Pressure, Diastolic Pressure

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Introduction

Hypertension is one of the most common modifiable risk factors for cardiovascular diseases. It is considered a serious risk for public health and a major cause of heart attacks, stroke, disability, morbidity and mortality (1, 2). Hypertension is a silent and symptomless disease and if not treated appropriately it may have fatal consequences (3).

In 2000, the global prevalence of hypertension was reported as 37%, and it is estimated that this rate reaches 42% by the year 2025 (4). The World Health Organization (WHO) has indicated that 50% of hypertensive patients are aware of their illness, while 25% of them may be treated and it is controlled only in 12% (5). Several studies have been carried out on the prevalence of hypertension in Iran. For instance, Haghdoost (2008) reported the prevalence of hypertension as 22.06% and 49.5% among Iranian adults and individuals aged more than 55 years, respectively (6). Esteghamati et al. (2008) also reported the prevalence of hypertension about 25% in individuals aged 25-64 years (7). According to results of a cohort study in Golestan Province, the prevalence of hypertension was estimated to be 41.8%. However, older age of participants in this study may have affected the high prevalence (8). Studies indicate that failure in control of the disease and lack of response to treatment may be due to factors such as poor diet adherence, obesity, smoking, alcohol abuse, chronic pain, drug interactions, consumption of non-steroid anti-inflammatory drugs, and renal and thyroid diseases (9). Adherence to therapy is a key factor in hypertension control that is associated with amount of prescribed treatment including drug regimen, diet and physical activity by the patient (10). Some studies proposed therapeutic non-compliance as a common complication in treatment of hypertensive patients (4, 11).

Nowadays, treatment of hypertension starts with non-medicinal treatments such as lifestyle modification (12, 13). The interventions used in this regard have favorable effect on blood pressure and are recommended as complementary therapy for hypertension prevention and treatment. Lifestyle modification is recommended to individuals with pre-hypertension as a factor for health promotion that can be used as adjunctive therapy to drug therapy. Even if these interventions do not lead to adequate reduction of blood pressure to avoid drug therapy, they reduce duration and dosage of drug therapy for blood pressure control. The lifestyle interventions include increased physical activity, weight loss, limited alcohol consumption, reduced stress and correction of diet (14).

Dietary modifications that effectively reduce hypertension include reducing salt intake, increasing potassium intake, moderating alcohol consumption and general pattern of healthy nutrition (13).

Nutritional methods are among the fundamental tools of lifestyle modification in blood pressure control. The suggested diet including consumption of grains, fruits, vegetables, low-fat meat, adequate potassium and calcium, adequate fiber and reduced daily fat and sodium intake, have been shown to reduce systolic and diastolic pressure in patients with stage I hypertension (15).

Considering the prevalence of hypertension, important role of diet in its control and lack of studies on pattern of adherence to treatment among hypertensive patients in Iran, the present study aimed to determine the rate of adherence to the recommended diet in five subgroups (salt, fat, fruits, vegetables, and dairy intake) among hypertensive patients.

Methods

This descriptive-analytical study was conducted in 2015, on hypertensive patients who were referred to heart clinic of Shahid Sayyad Shirazi Hospital affiliated to Golestan University of Medical Sciences in Gorgan. Based on previous studies, the sample size was determined as 200 participants (16). Sampling was done using census method from June to November 2015 with respect to inclusion criteria. The subjects were hypertensive patients with confirmed diagnosis who referred to the heart clinic.

The inclusion criteria consisted of the following: age of 18-65 years, literacy, systolic blood pressure ≥140 and diastolic blood pressure ≥90, history of hypertension

for at least 6 months, full consciousness, speech and hearing health, lack of known psychological disorders, absence of known progressive chronic diseases, lack of drug and alcohol abuse, and absence of diabetes. Exclusion criteria included pregnancy at time of the study, unwillingness to continue participating, and relocation of patient.

The data collection tools included demographic and clinical data collection form (duration of hypertension, duration of therapy, underlying disorders, weight, height and blood pressure), and therapeutic information (type, quantity, frequency of drug consumption). In addition, a data-recording tool was used to evaluate adherence to diet in the five subgroups of limited intake of salt, fatty foods, fruits, fresh vegetables, and low-fat dairies.

- The answers in the two subgroups of salt and fatty foods intake were ranging from always to never (always= 0, sometimes = 1, rarely= 2, and never= 3).
- In the subgroup of fruit intake, three time daily intake was scored 3, 2 times daily intake was scored 2, one time daily intake was scored 1, and non-intake of fruit was scored as zero.

Measurement of dietary adherence in these three subgroups ranged from zero to 3 points per day, and zero to 42 in two weeks. Scores ranging between 0-14 was considered as poor, scores ranging between 15-28 was considered as average and scores of 29-42 were considered as complete adherence.

- In the vegetable intake subgroup, scores were given based on the daily consumption of vegetables, ranging from 2 to zero.
- One cup of milk and a small bowl of yogurt were considered as one unit in the dairies subgroup. For intake of two units score of 2 was given, score of 1 was given for one unit intake, and zero score was given for lack of dairy products' consumption. The method of calculation for dairies intake was perfectly explained to the patients.

In the case of consuming fresh vegetables and low-fat dairies, the result of measurement for these two subgroups was given scores of 0-2 every day and the sum of acquired scores by each subject varied from zero to 28 in two weeks. Scores ranging 0-10 was considered as poor adherence level, scores ranging 11-14 as average level of adherence, and 15-28 was considered as complete dietary adherence.

In order to measure general dietary adherence in the five aspects, the scores were calculated in each subgroup. Achieving full score in at least 3 subgroups was considered as complete compliance, achieving full scores in 2 subgroups was considered as average dietary adherence, and achieving full score in one subgroup or less was considered as poor dietary adherence.

The designed form of dietary adherence measurement was analyzed in terms of face validity by 10 experts in chronic diseases and 10 hypertensive patients. The phrases were edited for better understanding by the patients. In order to determine quantitative face validity, the impact of items was calculated based on comments of 10 hypertensive patients where the total impact of all items was more than 1.5. Then, quantitative face validity was measured by calculating content validity ratio (CVR) and content validity index (CVI). The necessity and significance of each item was calculated by experts using CVR for a group of 10 items. Since CVR of all items was more than 0.62 and CVI was higher than 0.79 for all items, the phrases were considered appropriate to be retained.

Reliability of the tools was measured according to preliminary studies and using Cronbach's alpha. Reliability coefficient was calculated by split-half method and Guttman scale. Cronbach's alpha was calculated as 98% for salt intake, 81% for fat consumption, 87% for fruit intake, 76% for fresh vegetable consumption, and 91% for dairies intake. The reliability coefficient using split-half method and Guttman scale was determined as 96% for salt intake, 79% for fat intake, 75% for fruit consumption, 87% for fresh vegetables consumption, and 88% for dairies intake.

The patients received trainings from the researchers and then self-report data were collected via the form after two weeks. The study was approved by the ethics committee and necessary permission were obtained from officials. Written consent was obtained from all patients before start of the study.

Data were analyzed using SPSS (version 16) and chi-square test was used to determine the relationship between variables of gender, marital status, education level, and systolic and diastolic blood pressure. Kolmogorov-Smirnov test showed non-normality of variables of age, Body Mass Index (BMI), systolic blood pressure, and diastolic blood pressure in the two subgroups of complete and partial dietary adherence. Logistic regression was used for multivariate analysis. All variables were entered into regression model and the variables with significance level higher than 0.2 were excluded from the model. For all statistical tests, P-value ≥ 0.05 was considered as statistically significant.

Results

In this study, 62% of the subject were female and the mean age of participants was 48.6±7.51 years (26.5% were aged 51-55 years). All subjects were literate and 44% had high school diploma. Moreover, 27% were unemployed and 91% were Fars. Mean and standard deviation (SD) of systolic and diastolic blood pressure in patients were 152.31±9.1 and 93.53±2.87 mmHg, respectively.

The highest level of adherence was observed regarding the consumption of diaries with complete adherence by 43.5% of the subject, while only 3.5% of the patients had full adherence to the fruit intake. In addition, 40% of patients in the subgroup of limited fat intake had poor adherence to the prescribed diet and the lowest level of poor dietary adherence (25%) was observed in the diaries subgroup. The level of dietary adherence was highest in the subgroup of dairies consumption and lowest in the subgroup of limited fat intake (Table 1).

The results showed that about 65% of patients had poor dietary adherence and only 7% had complete adherence to the prescribed diet. In other words, most patients (66.5%) had dietary adherence to one aspect and only 7% had dietary adherence to at least three aspects. The mean (SD) age of hypertensive patients with complete and partial dietary adherence were 49.9 (±7.74) and 48.5(±7.51) years, respectively. The mean (SD) of BMI in hypertensive patients with complete and partial dietary adherence were 26.67±3.31 and 29.22±4.14, respectively. In order to determine the relationship between complete dietary compliance (for all five dietary aspects), results of Chi-Square and Man-Whitney tests along with demographic attributes indicated no significant relationship between the rate of dietary adherence and variables of gender, age, marital status, education level, BMI, and systolic and diastolic blood pressure (Table 2).

Table 1: Frequency Distribution of Dietary Adherence Rates in Hypertensive Patients, Based on Five Diet Subgroups

Subgroup / Rate of adherence	Salt Intake	Fat Intake	Fruit Consumption	Vegetable Consumption	Dairies Consumption	(Total) Diet
	Number(%)	Number(%)	Number (%)	Number (%)	Number (%)	Number(%)
Poor Compliance	78 (39)	80 (40)	76 (38)	63 (31.5)	50 (25)	133 (66.5)
Average Compliance	82 (41)	91 (45.5)	117 (58.5)	71 (35.5)	63 (31.5)	53 (26.5)
Complete Compliance	40 (20)	29 (14.5)	7 (3.5)	66 (33)	87 (43.5)	14 (7)
Total	200 (100)	200 (100)	200 (100)	200 (100)	200 (100)	200 (100)

Table 2: Frequency Distribution of Hypertensive Patients based on Descriptive Data and Determination of their Relationship with Rate of Dietary Adherence

Variables		Complete Adherence	Partial Adherence	Statistical Test	
		Number (Percent)	Number (Percent)	Type	P-value
Gender	Female Male	8 (6.5) 6 (7.9)	116 (93.5) 70 (92.1)	Chi-Square	0.70
Age	Median (interquartile range)	51 (7.5)	49 (9.25)	Man-Whitney	0.30
Marital status	Single Married	1 (8.3) 13 (6.9)	11 (91.7) 175 (93.1)	Chi-Square	0.85
Education	Non-academic Academic	13 (8.1) 2 (3.9)	137 (91.9) 49 (96.1)	Chi-Square	0.32
BMI	Median (interquartile range)	27.4 (4.98)	28.7 (6.21)	Man-Whitney	0.06
Systolic blood pressure	Median (interquartile range)	153.5 (10.5)	150.0 (16.0)	Man-Whitney	0.80
Diastolic blood pressure	Median (interquartile range)	93 (1.5)	93 (3.0)	Man-Whitney	0.68

Based on the results of logistic regression, there were 0.8 reductions in the rate of dietary adherence per one unit increase in the BMI level (Table 3).

Table 3: Result of logistic regression test of variables with rate of dietary adherence in hypertensive patients

	B	S.E	Wald	df	Sig.	Exp (B)	CI 95%	
							Lower	Upper
Gender	0.35	0.59	0.34	1	0.56	1.4	0.44	4.52
Education	1.53	0.93	2.73	1	0.099	4.6	0.75	28.58
Marital Status	0.67	1.22	0.31	1	0.579	1.96	0.18	21.33
Body Mass Index	-0.21	0.08	6.42	1	0.011	0.80	0.68	0.95
Systolic Blood Pressure	-0.02	0.04	0.23	1	0.630	0.98	0.90	1.06
Diastolic Blood Pressure	0.05	0.07	0.57	1	0.451	1.05	0.92	1.21

Discussion

The findings of this study showed that 66.5% of hypertensive patients had poor dietary adherence. Kooshyar et al. (2013) study on determination of the association between health literacy and dietary adherence and quality of life in old diabetic individuals demonstrated poor dietary adherence in diabetic patients and good dietary adherence in subjects with sufficient literacy skills (17). Similarly, Kwan et al. (2013) study reported poor dietary adherence in hypertensive patients (18). The results of Hadi et al. (2004) study also showed poor dietary adherence among hypertensive patients (19), which is consistent with the results of the present study. However, Hadi et al. investigated all aspects of therapeutic regimen while dietary adherence was assessed in our study. Abbasi et al. (2005) demonstrated that most hypertensive patients follow their therapeutic regimen (20). This difference may be due to the relevant trainings for blood pressure control by healthcare personnel that have been implemented in some medical centers for the past few years, technological advancements and using different information sources. Study of Jafari et al. (2014) confirmed that training positively affects dietary adherence to control blood pressure in

hemodialysis patients (21). Findings of Pourshaban et al. (2013) indicated that appropriate training might be effective in reducing systolic and diastolic pressure in patients (22).

Study of Masroor et al. (23) determined the relationship between therapeutic regimen and quality of life in hypertensive patients and showed that most patients had relatively favorable dietary adherence, which is not consistent with the present study (23). This difference may be due to the fact that the mentioned study generally evaluated dietary adherence using a questionnaire, and high numbers of questions and tiredness of patients may have affected their answers. Meanwhile, the present study measured the daily dietary adherence of patient for two weeks.

There was a significant relationship between systolic blood pressure and dietary adherence. This is consistent with the study of Ghasemi Fard et al. (2014) that indicated adherence to DASH (Dietary Approach to Stop Hypertension) diet reduced hypertension in patients with metabolic syndrome (24). Khan et al. (2012) also reported a significant relationship between blood pressure and dietary adherence (25). However, Koochakpour et al. (2012) declared that unhealthy nutrition pattern in teenagers does not reduce blood pressure and reported no relationship between blood pressure (systolic and diastolic) and any of the dietary patterns (26). The inconsistency in the results of the studies could be due to the difference in mean age of participants.

Controlled dietary salt intake has an essential role in reducing blood pressure (27, 28). Only 20% of the patients in this study had complete adherence in dietary salt intake. Consistent with the present study, Mafutha et al. (2013) showed that about 33% of patients had good compliance to salt intake (29).

The results of this study indicated that patients without academic education might have better adherence in comparison with educated patients. Lily et al. (2009) also showed that educated subjects had lower dietary adherence (30), while Kooshyar et al. reported better dietary adherence in literate subjects, which is inconsistent with our findings (17). Method of evaluating the education levels might be the reason for the difference between the mentioned study and our study.

Various studies such as Landsberg et al. (2013) confirmed the relationship between weight gain and increased blood pressure (31). The results of logistic regression analysis showed that increased BMI leads to significantly decreased dietary adherence. Gajewska et al. (2010) study indicated that hypertensive patients had BMI ≥ 30, which was confirmed by Mansoorian et al. (2012) study (32, 33).

In the present study, the poorest level of adherence was observed in the case of fatty foods consumption, which is in agreement with results of Gajewska et al. (2010) and Mansoorian et al. (2012) studies (32, 33). As described by Mansoorian et al., lack of proper training in hypertensive patients may be an effective factor contributing to non-compliance with low fatty food diet (33).

Conclusion

Dietary adherence plays an essential role in control of hypertension. The hypertensive patients in this study had no dietary adherence. Therefore, it is recommended to conduct further studies to determine factors contributing to non-adherence to diet and implement necessary interventions accordingly.

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