Research Article

Comparative Study of Dietary Pattern in Patients with and without Hypertension

Mohammad Hosseinzadeh Hesari,[1] Shirin Hejazi,[2,*] Akram Kooshki,[3] and Mohammad Hassan Rakhshani[4]

[1]MSC, Member of Paramedicine College, Sabzevar University of Medical Sciences, Sabzevar, IR Iran
[2]MSC, School of Nursing, Tehran Medical Branch, Islamic Azad University, Tehran, IR Iran
[3]Associate Professor, School of Medicine, Sabzevar University of Medical Sciences, Sabzevar, IR Iran
[4]PhD in Biostatistics, Member of Health College, Sabzevar University of Medical Sciences, Sabzevar, IR Iran

[*]*Corresponding author*: Shirin Hejazi, MSC, School of Nursing, Tehran Medical Branch, Islamic Azad University, Tehran, IR Iran. E-mail: hejazi.shirin@yahoo.com

Abstract

Background: Hypertension is one of the most deadly chronic diseases in worldwide. Following the special diet can be effective in reducing the incidence of hypertension. The present study aimed to compare the dietary pattern in people with and without hypertension at selected health clinics was designed in Sabzevar.

Methods: In this case-control study, 50 people with and 48 without hypertension who were admitted to health clinics of Sabzevar in 1394 were examined. Dietary intake was assessed by a food frequency questionnaire which includes a healthy diet and western diatry pattern. To analyze the data, non-parametric tests was used, using Spss software version 20.

Results: Significant difference was observed between two groups in consumption of healthy foods like low-fat milk and dairy products ($P < 0.022$), white meat ($P < 0.007$) eggs ($P < 0.002$) and liquid oil ($P < 0.001$) and no significant difference was observed between two groups in consumption of Western foods like red meat ($P < 0.014$), refined grains ($P < 0.001$), solid oil ($P < 0.05$), sugar ($P < 0.05$), and coffee ($P < 0.001$).

Conclusions: Our results suggested that use of a healthy diet can help prevent hypertension and useful.

Keywords: Dietary Pattern, Hypertension

1. Background

Hypertension is one of the most important problems in health, in both developed and developing countries (1). Rapid social and economic changes in recent decades have led to the prevalence of cardiovascular risk factors such as hypertension, which increases daily (2). According to the world health organization (WHO), it can be estimated that one in every three adults in the world has hypertension, and the prevalence of the disease is around 40%. A study by WHO found that about 80% of deaths in developing and poor countries are associated with hypertension, and 3.17 million deathsin 2008 were due to the disease, directly or indirectly (3). According to WHOs analysis, one-fifth of the total population of the United States spent $20 billion annually in treating hypertension (4). Studies have shown the prevalence of this disease in different areas in Iran; for example, the prevalence of hypertension in Tehran is reported at 22% (5), in the city of Semnan it is 24.35% (6), in Jahrom 58.4% (7), and in the city of Zabol 12.24% (8). Found that several factors such as lack of exercise, smoking, alcohol and drugs, lifestyle and habits of poor health are the most important causes of high blood pressure and control

the risk factors for decreased nearly 50% of deaths early mediate these patients (9). Correct nutrition is one of the main factors in the prevention and control of cardiovascular diseases (10). Food habits are rooted in cultural, social, economic, environmental, and religious factors, and are one of the contributors to chronic diseases (11). As diet could be considered for its dietary patterns, a recent approach to investigate the relationship between nutrition and disease has raised a lot of attention (12). Identifying dietary patterns allows us to examine diet as a whole (rather than its ingredients). This helps to identify the relationship between diet and disease, and to communications on what is achieved by the nutrients or foods described (13).

Changing dietary patterns and tendency to consume high-calorie and low-value food, including examples of lifestyle syndrome, is a whole new world. In an epidemiological study, developing countries will put at risk all of this syndrome. Hence the correct diet, as one of the most important factors formodification of lifestyle and to prevent non-communicable diseases such as hypertension, requires special attention (14). Finally, with regard to the above, the role of dietary habits and nutritional factors in

the incidence of diseases is undeniable, and investigating the habits in each community is essential to understanding these factors (15). Given the diversity of food consumption in the country and due to the high prevalence of the disease, we decided to investigate healthy and west diet in two groups of those with hypertension and those without hypertension, in the city of Sabzevar.

2. Methods

This case-control study on 98 men and women patrons to health clinics in Sabzevard University of Medical Sciences the second six month in 1394 was located. Of six health clinics located in Sabzevar three clinic was chosen as a draw. Random sampling was conducted and inclusion criteria in the study group were: age 30 to 60 years; hypertension for at least six months; old and suffering; and using drugs for lowering blood pressure. The control group of patrons non-hypertensive that mobile or other diseases such as dental care or obstetric clinic were selected. Exclusion criteria for both groups were diabetes and kidney failure, and impaired memory. The two groups (with and without hypertension) were matched in terms of age, gender and geographic location. After obtaining the informed consent of all patients who met the inclusion and exclusion criteria, a questionnaire was administered that consisted of demographics such as age, gender, weight, height, history, education, jobs, drugs, smoking, and interviews were completed. The weight of each patient with a minimum of clothes and without shoes, using a digital scale (spicial-china) measuring approximately 100 g of cholera, were recorded error. And their height without shoes using a tape measure and a standard situation (sicma-Germany) non-reaction without imposing any pressure took the body with precision of 1 cm. Body mass index (BMI) was calculated by dividing weight by the square of height in meters.

Food intake patterns of the patients were assessed using a semi-quantitative food frequency self-made questionnaire, and its validity by 10 members of the faculty and a nutritionist was confirmed. Cronbach's alpha was performed with test reliability of this model higher than 7.0. The questionnaire was designed with 104 options and the standard unit of consumption of each food item was selected on the basis of the studies (16, 17). Food overall was divided into two patterns, healthy and Western dietary, that were based on studies performed (18-20). And forms based on intake of food over the past year; daily such as bread, weekly such as rice, monthly such as fish, and annually such as camel meat, were completed by patients. After collection of the questionnaires, data were entered quantitatively by statistical package of social sciences (SPSS) version 20. For data analysis, descriptive statistics (distribution and frequency) and analytical tests (chi-square, Fisher, and Mann-Whitney) were used. $P < 0.05$ was considered statistically significant.

3. Results

A total of 98 people with and without hypertension, according to exclusion criteria, were enrolled: 50 patients and 48 healthy people. Among them, 26 were women and 24 were men in the intervention group, and in the control group 24 were women and 24 were men. Chi-square test, Fisher's exact test, and Mann-Whitney test were used to compare the results of case and control groups. After reviewing the information on demographic variables, gender ($P = 0.84$), age ($P = 0.12$), weight ($P = 0.12$), and BMI ($P = 0.89$) had no significant relation in the two groups of patients and control, but with variables such as education ($P = 0.001$), jobs ($P = 0.001$), and height ($P = 0.03$), a significant relationship was observed between the two groups. This study showed the mean and standard deviation of a healthy diet in patients with the 23.67 ± 3.09 and in the control group equal to 24.59 ± 3.21, and with a Western dietary pattern in patients it was 9.62 ± 2.04, and in the control group equal to 9.71 ± 2.09 (Tables 1 and 2).

Table 1. Distribution of Meaningful Demographic Variables and Mean[a]

Variables	Case	Control	P Value
Education (illiterate) level	43 (86)	11 (22.9)	0.001
Job (employee)	32 (64)	22 (45.8)	0.001
length	160.49 ± 0.98	165.76 ± 1.47	0.003

[a]Values are expressed as mean ± standard deviation or No. (%).

Table 2. Distribution of Mean and Insignificant Demographic Variables[a]

Variables	Case	Control	P Value
Sex			0.84
Male	24 (48)	24 (48)	
Female	26 (52)	26 (52)	
Age	50.82 ± 1.04	49.83 ± 0.66	0.12
Weight	69.03 ± 1.83	72.09 ± 1.93	0.20
BMI	26.69 ± 0.70	26.54 ± 1.93	0.20

[a]Values are expressed as mean ± standard deviation or No. (%).

The study of a healthy dietary pattern in two groups with and without hypertension showed that consumption of foods such as white meat ($P < 0.05$), eggs ($P < 0.01$) and

low-fat milk (P < 0.001) was higher in the patient than in the control group (Table 3), and with the Western dietary pattern, in the control group consumption of foods such as red meat (P < 0.01) and intake of refined grains (P < 0.001) was higher than in the patient group, but consumption of coffee (P < 0.001) and sugar (P < 0.05) intake were higher in the patient group (Table 4).

Table 3. Variables of Healthy Diet in People with and without Hypertension[a]

Variables of Healthy Dietary Patterns, Unit Per Day	Case	Control	Mann-Whitney P Value
Whole grains	6.10 ± 0.67	6.76 ± 0.76	0.84
Beans	0.99 ± 0.12	0.98 ± 0.12	0.64
Fruits	2.45 ± 0.29	3.46 ± 0.61	0.57
Nuts	0.70 ± 0.21	1.26 ± 0.59	0.92
White meat	0.38 ± 0.07	0.70 ± 0.04	0.007[b]
Egg	0.29 ± 0.04	0.51 ± 0.08	0.002[b]
Milk low-fat	1.83 ± 0.20	2.35 ± 0.18	0.022[c]
Vegetable	6.31 ± 0.80	4.78 ± 0.32	0.65
Liquid oil	0.75 ± 0.25	1.37 ± 0.24	0.001[d]
Water	3.87 ± 0.44	2.68 ± 0.27	0.091
Total	23.67 ± 3.09	24.59 ± 3.21	0.96
Mann-Whitney Test			

[a]Values are expressed as mean ± standard deviation.
[b]P ≥ 0.01.
[c]P ≥ 0.05.
[d]P ≥ 0.001.

4. Discussion

The present study aimed to determine and compare the patterns of consumption of healthy and Western food in two groups of patients; those with and without hypertension. The results showed that the pattern of average consumption of Western dietary food in hypertensive patients was more than patients in the healthy group. This study showed people who had high blood pressure are slow in following a healthy diet and are lower educated, which is consistent with a study conducted by Rezazadeh et al. In 2010 that specified people who have higher education have a healthy diet that contains fruits, vegetables, meat, nuts and low-fat dairy (20). In another study conducted in Italy in 2008 by Paula et al. they showed that diet is related to education. This means that people who use more red meat, sauce, and solid oil have lower education than those who use vegetables, white meat, and low-fat dairy. This finding is consistent with the results of the

Table 4. Western Dietary Pattern Variables in Patients with and without Hypertension[a]

Variables of Western Dietary Pattern, Unit Per Day	Case	Control	Mann-Whitney P Value
Red meat	0.80 ± 0.24	43.0 ± 11.1	0.014[b]
Meat products	0.13 ± 0.070	087.0 ± 16.0	0.182
Refined grains	1.22 ± 0.17	2.56 ± 0.29	0.001[c]
Drinks	0.59 ± 0.11	0.56 ± 0.11	0.86
Sold oil	1.33 ± 0.23	1.65 ± 0.27	0.06
Milk fat	0.79 ± 0.17	0.62 ± 0.10	0.36
Fast food	0.77 ± 0.22	0.06 ± 0.01	0.132
Coffee	0.37 ± 0.12	0.05 ± 0.04	0.001[c]
Sugar	1.12 ± 0.15	0.59 ± 0.12	0.057
Salt	1.27 ± 0.19	0.85 ± 0.11	0.70
Sauce	0.22 ± 0.07	0.14 ± 0.05	0.56
Potato	1.01 ± 0.56	1.36 ± 0.58	0.94
Total	9.62 ± 2.04	9.71 ± 2.09	0.74
Test Mann-Whitney			

[a]Values are expressed as mean ± standard deviation.
[b]P ≤ 0.05.
[c]P ≤ 0.001.

present study (21). In the present study, no significant relationship was found between dietary patterns and BMI, which was also found in the study by MacNaughton et al. in 2008 (22). Of course, in another study conducted by Ismail-Zadeh et al. in 2008, a significant association was found between dietary patterns and BMI (23). The difference can probably be explained by differences in the sample examined in the linked two studies. The current study showed that of patients without hypertension, more follow a healthy diet and in the cohort study conducted in 2015 by Mottaghi et al. they revealed that people who follow a healthy diet are 26% less likely to have hypertension (24). Another study showed that people who have a diet of vegetables, fruits, meat, and nuts are less prone to obesity and high blood pressure (25). A study conducted in 2014 in Korea showed that the Western dietary pattern may increase the prevalence of hypertension. The present study shows that the average consumption of the Western dietary pattern is more consistent in patients with hypertension (26). In this study, consumption of whole grain cereals, refined in both groups higher than the food, which already by Ghassemi et al. in 2002 and zero in 2007 examined the same data achieved (27, 28). The consistency of the findings of the abovementioned studies with the present

study has indicated that the dietary habit of the people of this country is the eating of bread and rice, probably due to the relative price of food relative to other food resources in Iran.

4.1. Conclusions

The results of this study indicate that modification of dietary patterns, including less use of red meat, sugar, salt, fast food, and meat and more use of fruits, vegetables, white meat, whole grains, milk and low-fat dairy, and nuts, can somewhat prevent hypertension. It seems that necessary training is needed in order to increase community awareness of proper nutrition and health for prevention of hypertension.

Acknowledgments

References

1. Kasper D, Fauci A, Hauser S, Longo D, Jameson J, Loscalzo J. Harrison's principles of internal medicine, 19e. Mcgraw-hill; 2015.
2. Esmaillzadeh A, Azadbakht L. Anthropometric assessment to predict hypertension among women in Tehran, Iran. *Tehran Univ Med Sci.* 2008;**66**(6).
3. Worms L, Zander M. World Stroke Day: Key Risk Factors Atrial Fibrillation and Hypertension Need Detection and Treatment. *World.* ;**10**:28–2015.
4. Brunner LS, Smeltzer SC, Bare BG, Hinkle JL, Cheever KH. Brunner & Suddarth's textbook of medical-surgical nursing. 1. Lippincott Williams & Wilkins; 2010.
5. Ghanbarian A, Madjid M, Rahmani M, Sarrafzadeh A, Azizi F. Distribution of blood pressure and prevalence of hypertension in Tehran adult population: Tehran Lipid and Glucose Study. Tehran Lipid and Glucose Study; 2004.
6. Ghorbani R, Askandarian R, Malek M, Rashidy-Pour A. Prevalence of hypertension among the adult population of Semnan province. *Iran J Endocrinol Metab.* 2009;**10**(5):495–503.
7. Beygizadeh SH, Zareei S, Pourahmadi M. The prevalence of hypertension and factors affecting it in Jahrom City. ; 2009.
8. Goodarzi MR, Badakhsh B, Masinaei Nejad N, Abbas Zadeh M. Hypertension prevalence in over 18-year-old population of Zabol. *Razi J Med Sci.* 2004;**11**(43):821–7.
9. Shafieyan Z, Qorbani M, Rastegari Mehr B, Mahboubi M, Rezapour A, Safari O, et al. Association Between Lifestyle and Hypertension in Patients Referred to Health Care Centers of Ilam City in 2014. *Glob J Health Sci.* 2015;**8**(6):161–7. doi: 10.5539/gjhs.v8n6p161. [PubMed: 26755476].
10. Bye DJ. The Gale Encyclopedia of Diets: A Guide to Health and Nutrition200933Edited by Jacqueline L. Longe. The Gale Encyclopedia of Diets: A Guide to Health and Nutrition. Detroit, MI: Thomson Gale 2008. , ISBN: 978 1 4144 2991 5 $415 2 vols Also available as an e-book (ISBN 978 1 4144 2994 6). *Ref Rev.* 2009;**23**(1):42–4. doi: 10.1108/09504120910925779.
11. Zaribaf F, Haghighatdoost F, Azadbakht L, Esmaillzadeh A. Home use of vegetable oils, markers of systemic inflammation and endothelial dysfunction among women. *Iran J Nutr Sci Food Technol.* 2011;**6**(1):69–80.
12. Okubo H, Sasaki S, Murakami K, Takahashi Y, Freshmen in Dietetic Course Study I. Nutritional adequacy of four dietary patterns defined by cluster analysis in Japanese women aged 18-20 years. *Asia Pac J Clin Nutr.* 2010;**19**(4):555–63. [PubMed: 21147718].
13. Rasmussen MA, Maslova E, Halldorsson TI, Olsen SF. Characterization of dietary patterns in the Danish national birth cohort in relation to preterm birth. *PLoS One.* 2014;**9**(4):e93644. doi: 10.1371/journal.pone.0093644. [PubMed: 24747715].
14. Thompson OM, Ballew C, Resnicow K, Must A, Bandini LG, Cyr H, et al. Food purchased away from home as a predictor of change in BMI z-score among girls. *Int J Obes Relat Metab Disord.* 2004;**28**(2):282–9. doi: 10.1038/sj.ijo.0802538. [PubMed: 14647177].
15. Mirmiran P, Mohammadi-Nasrabadi F, Omidvar N, Hosseini-Esfahani F, Hamayeli-Mehrabani H, Mehrabi Y, et al. Nutritional knowledge, attitude and practice of Tehranian adults and their relation to serum lipid and lipoproteins: Tehran lipid and glucose study. *Ann Nutr Metab.* 2010;**56**(3):233–40. doi: 10.1159/000288313. [PubMed: 20375546].
16. Azadbakht L, Esmaillzadeh A. Red meat intake is associated with metabolic syndrome and the plasma C-reactive protein concentration in women. *J Nutr.* 2009;**139**(2):335–9. doi: 10.3945/jn.108.096297. [PubMed: 19074209].
17. Esmaillzadeh A, Azadbakht L. Food intake patterns may explain the high prevalence of cardiovascular risk factors among Iranian women. *J Nutr.* 2008;**138**(8):1469–75. [PubMed: 18641193].
18. Kerver JM, Yang EJ, Bianchi L, Song WO. Dietary patterns associated with risk factors for cardiovascular disease in healthy US adults. *Am J Clin Nutr.* 2003;**78**(6):1103–10. [PubMed: 14668271].
19. Esmaillzadeh A, Kimiagar M, Mehrabi Y, Azadbakht L, Hu FB, Willett WC. Dietary patterns, insulin resistance, and prevalence of the metabolic syndrome in women. *Am J Clin Nutr.* 2007;**85**(3):910–8. [PubMed: 17344515].
20. Rezazadeh A, Rashidkhani B, Omidvar N. Association of major dietary patterns with socioeconomic and lifestyle factors of adult women living in Tehran, Iran. *Nutrition.* 2010;**26**(3):337–41. doi: 10.1016/j.nut.2009.06.019. [PubMed: 19819112].
21. Pala V, Sieri S, Masala G, Palli D, Panico S, Vineis P, et al. Associations between dietary pattern and lifestyle, anthropometry and other health indicators in the elderly participants of the EPIC-Italy cohort. *Nutr Metab Cardiovasc Dis.* 2006;**16**(3):186–201. doi: 10.1016/j.numecd.2005.05.009. [PubMed: 16580586].
22. McNaughton SA, Ball K, Mishra GD, Crawford DA. Dietary patterns of adolescents and risk of obesity and hypertension. *J Nutr.* 2008;**138**(2):364–70. [PubMed: 18203905].
23. Esmaillzadeh A, Azadbakht L. Major dietary patterns in relation to general obesity and central adiposity among Iranian women. *J Nutr.* 2008;**138**(2):358–63. [PubMed: 18203904].
24. Mottaghi A, Hosseini Esfahani F, Mirmiran P, Azizi F. Assessment of Relationship between Dietary Patterns and Incidence of Hypertension: Tehran Lipid and Glucose Study. *Iran J Endocrinol Metab.* 2015;**16**(6):433–40.
25. Haidari F, Shirbeigi E, Cheraghpour M, Mohammadshahi M. Association of dietary patterns with body mass index, waist circumference, and blood pressure in an adult population in Ahvaz, Iran. *Saudi Med J.* 2014;**35**(9):967–74. [PubMed: 25228178].
26. Park JE, Jung H, Lee JE. Dietary pattern and hypertension in Korean adults. *Public Health Nutr.* 2014;**17**(3):597–606. doi: 10.1017/S1368980013000219. [PubMed: 23442232].

27. Ghassemi H, Harrison G, Mohammad K. An accelerated nutrition transition in Iran. *Public Health Nutr.* 2002;**5**(1A):149–55. doi: 10.1079/PHN2001287. [PubMed: 12027278].

28. Safari M, Saadatmand N, Azarman M. Food intake pattern and related factors in women referred to medical and health centers of Yasouj-2006. *Dena.* 2007;**2**(2):27–37.