



The Effect of Educational Programs on Hypertension Management

Mohammad Ali Babaee Beigi¹, Mohammad Javad Zibaenezhad^{1,*}, Kamran Aghasadeghi¹,
 Abutaleb Jokar¹, Shahnaz Shekarfroush², Hajar Khazraei¹

¹Cardiovascular Research Center, Shiraz University of Medical Sciences, Shiraz, IR Iran

²Department of Physiology, Islamic Azad University, Arsanjan Branch, Arsanjan, Fars, IR Iran

ARTICLE INFO

Article Type:
 Research Article

Article History:
 Received: 06 Mar 2014
 Accepted: 06 Apr 2014

Keywords:
 Education
 Hypertension
 Knowledge
 Life Style

ABSTRACT

Background: Hypertension is the main risk factor for cardiovascular diseases and stroke. Blood pressure control is a challenge for healthcare providers and the rate of blood pressure control is not more than 50% worldwide.

Objectives: The present study aimed to determine the effectiveness of a short-term educational program on the level of knowledge, lifestyle changes, and blood pressure control among hypertensive patients.

Patients and Methods: This quasi-experimental study was conducted on the hypertensive patients attending Shiraz Healthy Heart House. In this study, 112 patients were selected via systematic random sampling. The study data were collected using a data gathering form which consisted of baseline characteristics and measurements of blood pressure. Multivariate analyses were used to assess the relationship between education and hypertension.

Results: At baseline, the scores of aware, treated, and controlled hypertensive patients were 21%, 20%, and 12%, respectively. However, these measures were increased to 92%, 95%, and 51%, respectively at the end of the study. The mean knowledge scores improved from 2.77 ± 2.7 to 7.99 ± 1.78 after 3 months ($P < 0.001$). Also, the mean lifestyle scores changed from 3.15 ± 1.52 to 4.53 ± 1.23 ($P < 0.001$).

Conclusions: The results of the current study indicated that the educational programs were effective in increasing knowledge, improving self-management, and controlling detrimental lifestyle habits of the patients with hypertension.

► Implication for health policy/practice/research/medical education:

This article can improve the individuals' health and control their blood pressure. We investigated whether meals affected the subjects' blood pressure. We also showed a relationship between education and blood pressure. These can decrease the prevalence of blood pressure in both developed and developing countries.

1. Background

Hypertension (HTN) is the main risk factor for cardiovascular diseases and stroke. However, it is not taken seriously and is often deficiently controlled (1). Lowering the Blood Pressure (BP) reduces the associated risks. Therefore, an effective strategy for reducing HTN complications is increasing the number of patients who control BP (2, 3).

A survey of the risk factors of non-communicable diseases in Iran revealed that 25.2% and 45.5% of the adults

between 25 and 64 years old had HTN and prehypertension, respectively. However, 66% of the hypertensive patients were unaware of their disorder, 75% were untreated, and 94% were not controlled. These proportions are relatively high compared to those reported in other countries (4).

Patients' knowledge about HTN and benefits of lifestyle modifications seems to be the key to successful control of HTN (5). However, lifestyle changes are not easily achieved. Adherence to treatment increases when the patients are active (6). Therefore, well-designed educational interventions with active participation of the patients are necessary for increasing HTN knowledge, self-monitoring, and control.

*Corresponding author: Mohammad Javad Zibaenezhad, Cardiovascular Research Center, Shahid Faghihi Hospital, Zand Ave., Shiraz, IR Iran, Postal Code: 7134844119, Tel: +98-7112342248, E-mail: icrjournal@yahoo.com

2. Objectives

The present study aims to determine the effectiveness of a short-term educational program in BP control and adherence to healthy lifestyle.

3. Patients and Methods

The data were collected using a validated researcher-made questionnaire through face-to-face interviews. The participants' demographic characteristics, including age, sex, education level, and occupation, were recorded, as well. The interview included questions about HTN knowledge (9 questions) and detrimental lifestyle behaviors (6 questions). Accordingly, one point was allocated to correct answers or behaviors and no points were considered for incorrect answers or behaviors. The total score was computed by summing up the correct answers or behaviors for each patient, ranging from 0 to 15.

Resting BP, height, weight, and BMI (kg/m²) were measured and cardiovascular examinations were performed for all the patients. Besides, eye examination, including visual acuity, was carried out using Snellen chart and ophthalmoscopy. In addition, ECGs were taken and interpreted by a trained resident to diagnose left ventricular hypertrophy according to Romhilt-Estes criteria. Blood samples were collected after a 12-h fasting for assessment of FBS, TG, total cholesterol, HDL, BUN, Cr, Na, and K. It should be noted that written informed consents were signed by all the participants before beginning the study.

HTN was defined according to the seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7). The patients were labeled as hypertensive if on the average of three measurements, Systolic Blood Pressure (SBP) was ≥ 140 mm Hg, Diastolic Blood Pressure (DBP) was ≥ 90 mm Hg, or if s/he reported current use of antihypertensive medication. The patients were considered "aware" if they gave a positive response to the question, "Have you ever been told by a doctor or another health professional that you have hypertension, also called high blood pressure?" Moreover, a patient with HTN was classified as "treated" if s/he reported taking antihypertensive medication at the time of the survey. Furthermore, a treated patient was considered "controlled" if his/her SBP was < 140 mm Hg and his/her DBP was < 90 mm Hg^a (7). Overall, BP was classified as stage 1, stage 2, and severe according to the JNC 7.

3.1. Educational Program

At first, each patient was trained individually and face to face by a trained cardiology resident about the definitions of high BP and controlled HTN, symptoms and complications of HTN, follow up intervals, and medication adherence. Additionally, nutritional and exercise counseling was conducted by the experts at the center. A diet habit

questionnaire was designed to assess the patients' dietary patterns. The dietary recommendations included a low fat, low sodium diet with adequate consumption of fruits, vegetables, and fish. Exercise was also recommended to be done for at least 30 min/day. Then, the patients were divided into 10 groups and followed up for 3 months. Each group took part in two one-hour training sessions once a month. Class topics included definition of HTN, course of illness, symptoms, BP monitoring at home, healthy lifestyle, healthy self-management behaviors, and emphasis on the previous trainings. The patients were interviewed again after 3 months to complete the post-test questionnaire, which was exactly the same as the pre-test. Resting BP was measured again, as well.

3.2. Data Analysis

The SPSS statistical software, version 16 (SPSS, Inc. Chicago, IL) was used to compute the frequencies and means of the patients' demographic characteristics and their responses to the knowledge and lifestyle behaviors test. McNemar's test was used to analyze the categorical data. In addition, paired sample t-test was employed to analyze any changes in the mean scores of knowledge and behaviors at the end of the study. P value < 0.05 was considered as statistically significant.

4. Results

The present study was conducted on 100 hypertensive patients. A total of 12 patients, who failed to return for follow up, were excluded from the study. Among the study participants, 65% were male. In addition, approximately two third of the patients had below high school degrees. At baseline, 21% of the hypertensive patients were aware of their high BP, 20% of the aware patients were treated, and only 12% of the treated ones were controlled. All these variables significantly improved at the end of the study (Table 1). Moreover, the percentage of the patients taking medication during the 3-month period increased from 20 to 95.

According to Table 2, almost 99% of the hypertensive patients had other concomitant risk factors, the most common of which being overweight or obesity.

At baseline, 11 - 90% of the responses to the questionnaires were correct (Table 3). Accordingly, the majority of the participants (90%) knew about the range of a blood pressure reading. However, a low percentage of the hypertensive patients were knowledgeable about the meaning of high BP and controlled HTN. Besides, 32% of the patients knew that HTN increases the risk of stroke, heart attack, heart failure, and kidney disease and only 24% believed that people can help lower their high BP. However, the patients had less information about more specific questions on BP. The patients' mean scores of knowledge improved from 2.77 ± 2.7 before the intervention to 7.99 ± 1.78 after 3

Table 1. Percentage of Aware, Treated, and Controlled Hypertensive Patients before and after the Intervention

Variable	Before (n = 100)	After (n = 100)	P value
Aware, n (%)	21 (21.00)	92 (92.00)	< 0.001
Aware, taking medication, n (%)	20 (20.00)	95 (95.00)	< 0.001
Aware, taking medication, controlled ^a , n (%)	12 (12.00)	51 (51.00)	< 0.001

^aMeasured SBP lower than 140 mm Hg and measured DBP lower than 90 mm Hg

Table 2. Frequency of the Concomitant Risk Factors of Coronary Artery Disease

Variable	Number	Percent
BMI \geq 25	60	60.00
Abnormal GTT	22	22.00
Overt diabetes	32	32.00
Dyslipidemia (LDL > 130)	22	22.00
Renal dysfunction (GFR < 60)	19	19.00
Left ventricular hypertrophy	12	12.00
Retinopathy	41	41.00
Smoking	27	27.00
Family history of early heart disease	26	26.00

Table 3. Percentage of Correct Responses to Hypertension Knowledge Questions before and after the Intervention

Variable (habits)	Before, n (%)	After, n (%)	P value
Smoking	27 (27.00)	25 (25.00)	0.500
Physical inactivity	84 (84.00)	26 (26.00)	< 0.001
Excessive salt intake ^a	40 (40.00)	5 (5.00)	0.030
Inadequate use of vegetables and fruit	61 (60.00)	35 (35.00)	< 0.001
Inadequate use of fish	63 (63.00)	56 (56.00)	0.016
Use of saturated fat	4 (4.00)	1 (1.00)	0.250

^aExcessive salt use was considered to be \geq 5 g/day (7)

months ($P < 0.001$).

Table 4 displays self-reported detrimental lifestyle behaviors at baseline and 3 months after the educational program. As the table depicts, the number of participants with physical inactivity, excessive salt use, and inadequate use of vegetables, fruits, and fish was significantly decreased after the intervention. The patients' mean scores of lifestyle changed from 3.15 ± 1.52 at baseline to 4.53 ± 1.23 after three months.

5. Discussion

It has been reported that a fall of 10 - 20 mmHg in systolic pressure maintained for 5 years could reduce the risks of myocardial infarction by 25% and that of stroke by 40% (8). However, BP control is a challenge for healthcare providers and the rate of BP control worldwide is on average not more than 50% and may even be as low as 8.1%. Wu Y et al. conducted a study on a group of hypertensive patients in Singapore and showed that although HTN treatment was high, its awareness and control were low (9). Similarly, in spite of the high prevalence of HTN in China, the percentage of hypertensive patients who were aware, treated, and controlled was very low (11).

The present study was a well-organized educational model which involved the patients in their own health

care. This study was conducted in order to determine the status of HTN awareness, treatment, and control in the Iranian population and to evaluate the effect of a short-term educational program on the above-mentioned parameters. According to the study findings, the rate of HTN awareness (21% of those having HTN), treatment (20% of those aware of HTN), and control (12% of the hypertensive patients on treatment) was low in our population. HTN control was even less than that reported in other studies (12). However, this measure was significantly increased from 12% to 51% after the educational intervention, demonstrating the beneficial effects of education on the triad of patient's awareness, lifestyle changes, and adherence to medications. Patient's education, self monitoring of BP, and regular follow up were also revealed to be effective healthcare measures for controlling HTN.

Patient's involvement in self-monitoring and management, together with continuous follow up has also been recommended by others (13, 14). Similarly, Wang YR et al. emphasized that the most important points for BP control were lifestyle modifications, home BP monitoring, reinforcement of healthy behaviors, and continuous follow up (15).

In spite of the increasing emphasis on drug therapy, lifestyle modification is an important part of BP control (16, 17). It has been found that the patients who adhered

Table 4. Percentage of Hypertensive Patients with Detrimental Lifestyle Behaviors before and after the Intervention

Variable	Before, n (%)	After, n (%)	P value
What is the meaning of high blood pressure?	31 (31.00)	97 (97.00)	< 0.001
What is the meaning of controlled hypertension?	21 (21.00)	92 (92.00)	< 0.001
Is hypertension a chronic condition?	39 (39.00)	85 (85.00)	< 0.001
Do you know the two numbers reported for blood pressure?	90 (90.00)	96 (96.00)	0.030
What are the complications of high blood pressure?	32 (32.00)	88 (88.00)	< 0.001
What are the symptoms of high blood pressure?	15 (15.00)	89 (89.00)	< 0.001
Can you do things to lower blood pressure?	24 (24.00)	89 (89.00)	< 0.001
What are the follow up intervals?	11 (11.00)	81 (81.00)	< 0.001
What is the blood pressure measurement technique?	13 (13.00)	97 (97.00)	< 0.001

to medication and lifestyle regimens had better health outcomes (18).

Because few hypertensive patients receive guidance on changing their lifestyles, healthcare professionals should further encourage the hypertensive patients regarding lifestyle habits (1).

Moreover, Wai Chiu et al. demonstrated that follow-up calls after nursing clinic consultation were effective in improvement of the patients' adherence to a healthy lifestyle and their BP control (9). In the present study, the proportion of physically inactive individuals, excessive salt users, and those with inadequate intake of vegetables, fruits, and fish was significantly decreased after 3 months as indicated by improvement in the patients' life style scores. This strongly suggests the effectiveness of our approach in transferring information regarding life style changes for BP control.

One of the strong points of this study was a matched-pair analysis before and after the measurements on the same patient, because it helps match the unmeasured variables.

The present study had some limitations, with small sample size and short follow-up period being the most important ones. Further studies with larger sample sizes and longer follow-ups are therefore recommended to be conducted on the issue. Another limitation was lack of a special emphasis on smoking cessation in the educational program offered to our patients. The importance of smoking avoidance, as one of the strongest predictors of cardiovascular health and survival, has been shown in several studies (19, 20). Recently, it has been expressed that "smokers who adopted other healthy behaviors still had lower survival rates than sedentary and obese nonsmokers" (22). Unfortunately, this habit does not change easily (21) and only 2% of smokers quit smoking at the end of counseling. Thus, healthcare providers should insist more on smoking avoidance.

In conclusion, educational interventions have significantly desirable effects on lifestyle modification and BP control. Therefore, they should become an integral part of management of the patients with HTN. On the other hand, HTN control in our hypertensive population was found to be less than that reported in many other countries. Thus, a public educational program for promoting HTN awareness and lifestyle modification is an urgent need.

Acknowledgements

The present article was extracted from the thesis written by Dr. Jokar and was financially supported by Shiraz University of Medical Sciences (Grant No. 3273).

The authors would like to thank the Research vice-chancellery of Shiraz University of Medical Science for financially supporting this research.

Authors' Contribution

Study concept and design: Mohamad Javad Zibaenezhad; Analysis and interpretation of the data: Abutaleb Jokar, Shahnaz Shekarfroush, Hajar Khazraee; Study supervision: Mohamad Ali Babae Beigi, Kamran Aghasadeghi

Financial disclosure

The authors have no financial interests related to the material in the manuscript.

Funding/Support

The funding organizations are public institutions and had no role in design and conduct of the study, collection, management, and analysis of the data, or preparation, review, and approval of the manuscript.

References

1. Neutel CI, Campbell N, Canadian Hypertension S. Changes in lifestyle after hypertension diagnosis in Canada. *The Canadian journal of cardiology*. [Clinical Trial]. 2008;**24**(3):199-204.
2. Dolor RJ, Yancy WS, Jr., Owen WF, Matchar DB, Samsa GP, Pollak KI, et al. Hypertension Improvement Project (HIP): study protocol and implementation challenges. *Trials*. [Randomized Controlled Trial Research Support, N.I.H., Extramural]. 2009;**10**:13.
3. Ayatollahi S, Vakili M, Behboodiani J, Zare N. Reference Values for Blood Pressure of Healthy Schoolchildren in Shiraz (Southern Iran) using Quantile Regression. *IRANIAN CARDIOVASCULAR RESEARCH JOURNAL*. 2010.
4. Esteghamati A, Abbasi M, Alikhani S, Gouya MM, Delavari A, Shishehbor MH, et al. Prevalence, awareness, treatment, and risk factors associated with hypertension in the Iranian population: the national survey of risk factors for noncommunicable diseases of Iran. *American journal of hypertension*. 2008;**21**(6):620-6.
5. Alexander M, Gordon NP, Davis CC, Chen RS. Patient knowledge and awareness of hypertension is suboptimal: results from a large health maintenance organization. *Journal of clinical hypertension*. [Research Support, Non-U.S. Gov't Research Support, U.S. Gov't, P.H.S.]. 2003;**5**(4):254-60.
6. Drevenhorn E, Kjellgren KI, Bengtson A. Outcomes following a programme for lifestyle changes with people with hypertension. *Journal of clinical nursing*. [Clinical Trial Research Support, Non-U.S. Gov't]. 2007;**16**(7B):144-51.
7. McDonald M, Hertz RP, Unger AN, Lustik MB. Prevalence, awareness, and management of hypertension, dyslipidemia, and diabetes among United States adults aged 65 and older. *The journals of gerontology Series A, Biological sciences and medical sciences*. 2009;**64**(2):256-63.
8. Freis ED. Salt, volume and the prevention of hypertension. *Circulation*. [Review]. 1976;**53**(4):589-95.
9. Wyatt SB, Akylbekova EL, Wofford MR, Coady SA, Walker ER, Andrew ME, et al. Prevalence, awareness, treatment, and control of hypertension in the Jackson Heart Study. *Hypertension*. [Comparative Study Research Support, N.I.H., Extramural Research Support, U.S. Gov't, P.H.S.]. 2008;**51**(3):650-6.
10. Wu Y, Tai ES, Heng D, Tan CE, Low LP, Lee J. Risk factors associated with hypertension awareness, treatment, and control in a multi-ethnic Asian population. *Journal of hypertension*. [Research Support, Non-U.S. Gov't]. 2009;**27**(1):190-7.
11. Gu D, Reynolds K, Wu X, Chen J, Duan X, Muntner P, et al. Prevalence, awareness, treatment, and control of hypertension in china. *Hypertension*. [Research Support, Non-U.S. Gov't]. 2002;**40**(6):920-7.
12. Falaschetti E, Chaudhury M, Mindell J, Poulter N. Continued improvement in hypertension management in England: results from the Health Survey for England 2006. *Hypertension*. [Research Support, Non-U.S. Gov't]. 2009;**53**(3):480-6.
13. Chiu CW, Wong FK. Effects of 8 weeks sustained follow-up after a nurse consultation on hypertension: a randomised trial. *International journal of nursing studies*. [Randomized Controlled Trial Research Support, Non-U.S. Gov't]. 2010;**47**(11):1374-82.
14. Ostovan MA, Zibaenezhad MJ, Keshmiri H, Shekarfroush S. The impact of education on weight loss in overweight and obese adults. *International cardiovascular research journal*. 2013;**7**(3):79-82.
15. Wang YR, Alexander GC, Stafford RS. Outpatient hypertension treatment, treatment intensification, and control in Western Europe and the United States. *Archives of internal medicine*. [Comparative Study Research Support, N.I.H., Extramural Research Support, Non-U.S. Gov't Research Support, U.S. Gov't, P.H.S.]. 2007;**167**(2):141-7.
16. Appel LJ, Champagne CM, Harsha DW, Cooper LS, Obarzanek E, Elmer PJ, et al. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. *JAMA*. [Clinical Trial Multicenter Study Randomized Controlled Trial Research Support, U.S. Gov't, P.H.S.]. 2003;**289**(16):2083-93.
17. Khoshdel A, Jafari SMS, Heydari ST, Abtahi F, Ardekani A.

- Lak FJ. The Prevalence of Cardiovascular Disease Risk Factors, and Metabolic Syndrome among Iranian Military Parachutists. *International cardiovascular research journal*. 2012;**6**(2).
18. 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. *Archives of internal medicine*. 2000;**160**(4):481-90.
 19. Boggs DA, Rosenberg L, Cozier YC, Wise LA, Coogan PF, Ruiz-Narvaez EA, et al. General and abdominal obesity and risk of death among black women. *N Engl J Med*. [Research Support, N.I.H., Extramural]. 2011;**365**(10):901-8.
 20. Pischon T, Boeing H, Hoffmann K, Bergmann M, Schulze MB, Overvad K, et al. General and abdominal adiposity and risk of death in Europe. *N Engl J Med*. [Research Support, Non-U.S. Gov't]. 2008;**359**(20):2105-20.
 21. Ahmed HM, Blaha MJ, Nasir K, Jones SR, Rivera JJ, Agatston A, et al. Low-risk lifestyle, coronary calcium, cardiovascular events, and mortality: results from MESA. *American journal of epidemiology*. [Research Support, N.I.H., Extramural]. 2013;**178**(1):12-21.
 22. Tappin DM, Lumsden MA, Gilmour WH, Crawford F, McIntyre D, Stone DH, et al. Randomised controlled trial of home based motivational interviewing by midwives to help pregnant smokers quit or cut down. *BMJ*. [Clinical TrialMulticenter StudyRandomized Controlled TrialResearch Support, Non-U.S. Gov't]. 2005;**331**(7513):373-7.

Archive of SID