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The Effect of Education Based on BASNEF Model on Lifestyle in Patients with Hypertension

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Abstract

Background: Hypertension is a major health problem in all communities that is closely associated with lifestyle. Different educational models have been used to improve the lifestyle in these patients. However, inconsistent results have been reported.
Objectives: This study aimed to investigate the effect of education based on the BASNEF model on lifestyle in patients with essential hypertension.
Methods: This single-blind randomized controlled clinical trial was conducted in 2015 on 80 patients with essential hypertension. The intervention group received five sessions of training based on the BASNEF model, while the control group received routine care. A two-part instrument was used in this study. The first part included a demographic questionnaire and the second part comprised the life style questionnaire (LSQ). The LSQ was responded in two times, i.e. before and one month after the intervention. Descriptive statistics, independent sample t-test, and analysis of covariance were used to analyze the data.
Results: The mean score of lifestyle in the intervention group was 121.80 at the start of the study that changed to 149.60 (with an increase of 27.8) after the intervention ($P < 0/001$). However, the mean score of lifestyle did not significantly change in the control group (126.55 vs. 122.78). The greatest improvements were observed in the areas of nutrition and weight management, sports and fitness, physical health, disease prevention, and mental health, in sequence.
Conclusions: Using a training program based on the BASNEF model was effective in improving the lifestyle in patients with hypertension. Thus, this model of behavior modification can be used as an inexpensive and applicable method in modification of lifestyle and behavior change in patients with hypertension.

Keywords: Hypertension, Life Style, Patient Education

1. Background

High blood pressure is a major health problem in all communities, especially in developing countries (1-4). The prevalence of hypertension in different populations varies from 5.2% to 55.3% (5). According to the world health organization (WHO), almost 40% of adults over the age 25 suffer from high blood pressure worldwide (6). The prevalence of hypertension has also been reported to be 17.3% in Iranian adults (7). It is the third leading cause of death (8) by 9.4 million deaths worldwide (9). In many cases, it can also lead to heart failure, stroke, renal failure, and liver insufficiency (10-12).

The aim of treatment of hypertension is to prevent and reduce the morbidities and mortality. These objectives can be achieved through lifestyle modification, either alone or in combination with drug therapy (13). Lifestyle has been defined as the patterns of behavior that are affected by the individual's personality traits, as well as his/her social, environmental, and economic interactions (14) and includes behaviors such as eating habits, sleep and rest, physical activity and exercise, weight control, immunization against the diseases, coping with stress and the ability to use of family and social supports (15, 16).

According to the first global ministerial conference on healthy lifestyles and noncommunicable disease control (2011), unhealthy lifestyle is responsible for 60% of the global mortality and 80% of mortality in developing countries, and this rate is projected to reach 75% in 2030 (17). Unhealthy lifestyle is also the most important cause of mortality and life-threatening diseases such as hypertension both globally and in Iran (18-21).

Several studies revealed a direct relationship between high blood pressure and lifestyle factors, such as high salt consumption, low physical activity, overweight, and maladaptive coping strategies (22-24).

It has been shown that a decrease in sodium consumption can decrease the blood pressure by 2.1 - 4.6 mmHg, and regular physical activity reduces blood pressure by 4.3 mm Hg. Moreover, the systolic blood pressure usually de-

creases about 5-20 mmHg for every 10 kg weight loss (4). Hence, the need to modify the lifestyle-related factors is felt.

Education can significantly modify unhealthy behaviors and improves the lifestyle in patients with hypertension (25). A number of behavior change models such as health belief model, BASNEF model, theory of reasoned action, social support, and innovation diffusion theory have been used in behavior change and lifestyle modification (26). Among the models presented, BASNEF model is one of the most comprehensive models that can be used to modify behavior and create new ones (27). This model combines the PRECEDE model with the behavioral intention model, and is composed of four components, including behaviors, attitudes, subjective norms, and enabling factors (28).

In behavior change, this model focuses on factors such as behavior (a visible performance), attitude (a relatively permanent organization of the person's beliefs about an object or situation that predispose him/her to respond in a certain way), subjective norms (the perceived social pressure that forces the individual to follow the wishes of those who are more important to him/her than others) and enabling factors (factors such as facilities, money, and skills that provide the necessary conditions for the realization of a behavior) (29).

Limited studies have used this model to improve lifestyle of hypertensive patients. However, the model has been used in a variety of interventions to improve lifestyle of taxi drivers (30), self-monitoring (31) and to decrease the blood pressure (32) and the rate of cesarean section among pregnant women (33). A number of studies have also reported that improving the variables such as family and social support (34), attitude and subjective norms (35) that are the components of the BASNEF model can significantly predict the patients' health behaviors and their long-term compliance with antihypertensive treatments. Furthermore, two studies have shown that health education and exercise program (36) and a comprehensive lifestyle modification (37) could significantly improve the hypertension, diet, weight, and physical fitness in hypertensive patients. In contrast, a number of studies have reported that health education (38) and life style education (39) could increase the knowledge of hypertensive patients, although they could not significantly reduce their blood pressure (38, 39). Moreover, a study has shown that nurse-led counseling (trying to affect the patients' subjective norms) had no effect on ambulatory blood pressure and antihypertensive drug prescription in patients at increased risk of cardiovascular disease (40).

Given the high prevalence of hypertension and its related mortality and morbidities, and considering the importance and crucial role of lifestyle modification in the treatment of hypertension and prevention of its complication, and also due to the inconsistencies among the earlier studies that investigated the BASNEF model, we conducted a study with the below mentioned objective.

2. Objectives

This study aimed to investigate the effect of education based on BASNEF model on lifestyle of patients with hypertension.

3. Methods

This single-blind randomized controlled clinical trial was conducted in 2015 on patients with essential hypertension (stage 1 or stage 2 hypertension) who referred to the Shahid Beheshti hospital in Kashan, Iran, to start or continue treatment duration. Specialized Shahid Beheshti hospital is a 615-bed governmental and referral hospital with 21 wards.

The sample size was calculated according to a study by Amiri (32). Then, given a type-one error of 5%, a power of 0.80, and confidence level of 95%, using the Formula 1 of (α =% 5 β = 0/2), 40 patients were recruited for each group.

$$n = \frac{2\sigma^2\left(Z_{1-\frac{\alpha}{2}+} + Z_{1-\beta}\right)^2}{\mu_1 - \mu_2} \quad (1)$$

Among a total of 150 patients with hypertension who referred to the Shahid Beheshti hospital, 55 did not meet the inclusion criteria and 15 did not consent to participate in the study. Therefore, a total of 80 patients were randomly assigned into two groups (Figure 1 shows the flow chart of the study).

After the approval of the study was obtained, the first researcher referred to the Shahid Beheshti hospital in the morning and evening shifts of all working days to find patients with inclusion criteria. The sampling continued until the sample size was completed. The patients were randomly assigned into the study groups by using the permuted-block randomization technique with a block of size 4.

Inclusion criteria included a medical diagnosis of essential hypertension (stage 1 or stage 2 hypertension), passing at least 6 months of the diagnosis, age range between 18 and 65 years, being able to understand and to speak in Persian, not having a known physically or mentally debilitating diseases, having Iranian nationality, possessing a lifestyle score less than 170 based on the life style questionnaire (41), and willingness to participate in the study. Exclusion criteria included subject's decision to withdraw from the study, the absence in more than one training session,

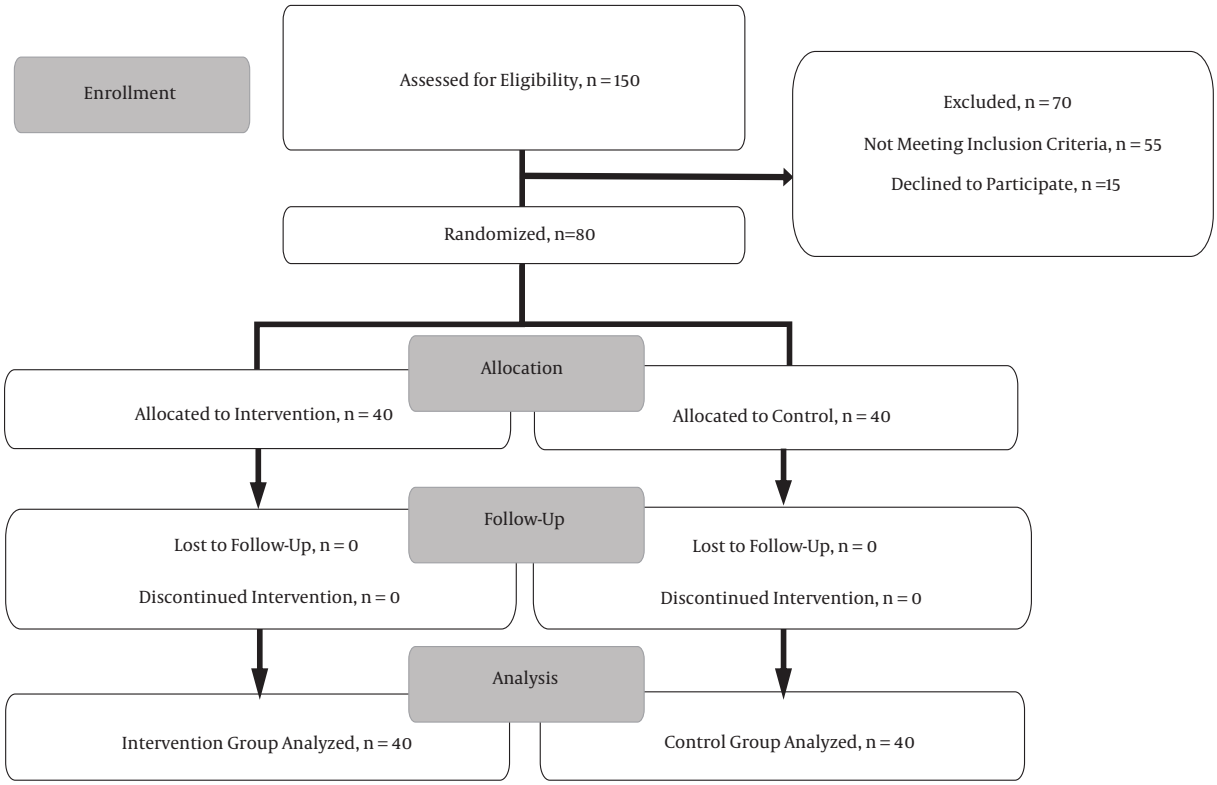

Figure 1. The Sampling Framework of the Study

attending similar training courses, and need for hospitalization during the study.

3.1. Instrument

A two-part instrument was used in this study. The first part included a demographic questionnaire including questions on the patient's demographic data (such as age, sex, height, weight, body mass index, education level, job, and the type of hypertension treatment). The life style questionnaire (LSQ) was used as the second part of the instrument.

The LSQ was constructed by Lali et al. (41) in Iran and its validity was confirmed through factor analysis. Its reliability was also assessed through internal consistency method and the Cronbach's alpha ranged between 0.79 and 0.89 for different subscales. In addition, this questionnaire has been used in Ahmadi Ardakani et al. study (42).

The LSQ is composed of 70 items in 10 subscales including physical health (8 items), sports and fitness (7 items), weight management and nutrition (7 items), disease prevention (7 items), mental health (7 items), spiritual health (6 items), social health (7 items), avoidance of drugs, alcohol and opiates (6 items), accident prevention (8 items) and environmental health (7 items). All items are responded on a four-point Likert scale scoring in range from 0 (= never) to 3 (= always). The higher the score, the better the lifestyle (41).

At the beginning of the study, all the patients responded to the demographic and lifestyle questionnaire before the intervention. If a patient was unable to complete the questionnaire, the researcher read the questionnaire to him/her and recorded his/her responses in the questionnaire. Moreover, the subjects' weight was measured using calibrated scale with a precision of $\pm$ 500g. Also, the patients' height was measured using a flexible tape measure vertically fixed on the wall. Then, the BMI was measured using the relevant Formula 2 of (43).

$$BMI = \frac{Weigh\,(Kg)}{Height^2\,(M)} \quad (2)$$

The content of the training sessions was prepared using valid literature based on the constructs of the BASNEF model. The validity of the educational materials was confirmed by 10 nursing professors and cardiologists in Kashan University of Medical Sciences. The outline of training sessions is presented in Table 1.

In addition to the routine treatments, the patients in the intervention group participated in a few training sessions on lifestyle modification in hypertension that were adjusted according to the BASNEF model. To this end, the intervention group was divided into seven small subgroups of 4 - 6 and each subgroup participated in five training sessions. The training sessions were held twice a week, in three consecutive weeks, and each session lasted for about 60 minutes. All training sessions were hosted by an expert nurse who was previously trained and tested to conduct the training sessions. The control group only received the routine treatments.

In this single-blind trial, patients in both groups were blind about the type of education provided by the nurse.

A month after the last educational session, all subjects in the two groups were again invited to attend a session in the hall of the hospital and responded to the study instrument.

3.2. Ethical Considerations

This study was approved by the ethics committee of Kashan University of Medical Sciences (Ethics code: IR.KAUMS.REC.1394.134). Permission was also obtained from the authorities at the university and the healthcare centers. All patients were briefed on the study aims and the voluntary nature of participation. They all signed a written informed consent, were assured of the anonymity and confidentiality of the data, and informed that they can withdraw from the study at any time. The researchers were sensitive to preserve the participants' rights according to the Helsinki Ethical Declaration. This study was registered in the Iranian registry for clinical trials (IRCT) with the registration code 201409094655N7 (Date 2016, January 25).

3.3. Statistical Analysis

Data analysis was performed using SPSS software version 16. Descriptive and inferential statistics such as independent sample t-test and analysis of covariance (ANCOVA) were used to analyze the data. To compare the demographic variables of the control and intervention groups, chi-square and t-tests were used. In all calculations, $P < 0.05$ were considered to be statistically significant. Normality of the results was tested by skewness of ± 2, indicating that all results were normally distributed.

4. Results

The mean age of patients in the control and intervention groups were 54.78 ± 8.43 and 53.35 ± 7.34 years, respectively ($P = 0.423$). Both groups were homogenous regarding the demographic characteristics such as gender, height, weight, body mass index, education level, occupation, and the type of hypertension treatment ($P > 0.05$) (Table 2). Moreover, no significant statistical difference was observed in the mean scores of lifestyle between the two groups before the intervention ($P > 0.05$) (Table 3).

The analysis of covariance was used to compare the scores of lifestyles subscales in the two groups after the intervention. The patients' pretest scores and all quantitative variables were entered to the model as covariate and all qualitative confounding variables were considered as independent variables. The differences in the overall lifestyle and its subscales were significant between the two groups in the presence of all the variables ($P < 0.05$) (Table 4).

5. Discussion

In the present study, a training intervention based on the BASNEF model could improve all aspects of the lifestyle behaviors in patients with essential hypertension. However, the greatest improvements were observed in the areas of nutrition and weight management, sports and fitness, physical health, disease prevention, and mental health.

No earlier studies used the BASNEF model in lifestyle modification in patients with hypertension. However, our findings are consistent with those of studies that used this model in providing psychological health to hypertensive patients (39) or in stabilizing the heart rate in adolescent females with anxiety disorders and major depressive disorder (44). Some of the researchers also investigated the effect of mindfulness-based stress reduction training and yoga or other training programs in improving the lifestyle of hypertensive patients (8) or middle-aged women (45). Balcazar et al. (2010) and Goyer et al. (2013) (46, 47) also examined the effect of training on reducing the risk of cardiovascular disease in patients at risk of cardiovascular diseases.

The current study showed that a training program based on the BASNEF model could improve all aspects of the patients' lifestyle, not only by raising awareness and changing the patients' beliefs and attitudes, but also by changing the subjective norms through participation of the patient's family members. However, a number of studies have reported that educational interventions could not modify the lifestyle (i.e. the rate of smoking, substance abuse, and social health) in patients with unstable angina (48) and in adults at risk of cardiovascular disease (49, 50). Khavoshi et al. (51) have also reported that educational intervention using health belief model could not affect the lifestyle and social and psychological health in elderly people. Perhaps, some behaviors, such as smoking cessation,

have a complex nature and are influenced by several social and personality factors. Hence, increasing the people's knowledge and awareness cannot solely affect these behaviors. However, the BASNEF model considers a vast range of factors, including knowledge and awareness, attitudes, subjective norms, and social and environmental factors (33) and therefore can lead to behavior modification in the areas of smoking and substance abuse. Perception of social and psychological health is also influenced by a vast range of people such as family, friends and other significant people. Therefore, BASNEF model would not only affect the individuals' lifestyle and behaviors, but also would affect their social and psychological health by involving the family members and other significant people.

The present study showed that the formulation and implementation of theory-directed educational programs that respect the environmental factors are more effective than the current educational programs that consider the patients' knowledge, attitude and behaviors without regarding the factors influencing their behavior. Our results emphasize the multifaceted nature of health promotion programs. This study showed that hypertension control programs that are in need of constant adherence to medication regimens, nutrition and individual's behavior control must not only involve the patients themselves, but also must involve other influential partners such as health care providers, families or individuals who affect the patient's conduct.

5.1. Conclusions

A training program based on the BASNEF model was effective in improving the lifestyle in patients with hypertension. The greatest improvements were observed in the areas of nutrition and weight management, sports and fitness, physical health, disease prevention, and mental health, in sequence.

To our knowledge, the present study is probably the first report, which shows the effect of BASNEF model on lifestyle in patients with hypertension. Thus, nurses and health care professionals can use this model of behavior modification as an inexpensive and applicable method to modify lifestyle and change behavior in patients with hypertension.

Despite the limitations of the present study (mentioned below), the use of BASNEF model (as a theoretical framework and the most comprehensive model for behavior modification in patient with hypertension) is the strong point of this study that can improve the results of the educational intervention.

5.2. Limitations

The results of the present study should be interpreted by considering some limitations: First of all, no similar studies were found in literature on BASNEF model application for lifestyle change among patients with hypertension. Secondly, it was so hard to follow up the patients. However, we tried to solve the problem with telephone follow-up, which resulted in a minimum dropout. Thirdly, a number of our patients were semi-literate and unable to respond the self-directed questionnaire. Therefore, we conducted structured interviews with these patients to gather their data in both pretest and posttest phases.

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Footnotes

Authors' Contribution: All of the authors approved the content of the manuscript and contributed significantly to research and involved in the writing of the manuscript.

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Table 1. The Outline of the Educational Sessions According the BASNEF Model

Phase	Session Number	Content of the Session
Phase 0: Initial assessment, familiarity with the groups, briefing the study to the groups	Starting session	Greeting, introducing the session facilitator and patients to each other, and explaining the numbers and the structure of the training sessions.
		Signing the informed consent form.
		Completing the study instruments and performing the initial measurements.
Phase 1: Increasing the knowledge and changing the patients behaviors, beliefs and attitudes according to the BASNEF model	1 and 2	Giving a short lecture on hypertension and lifestyle modification to change the patients beliefs and attitude and to motivate them to receive more information on hypertension:
		- Definition of hypertension, its causes and contributing factors,
		- Explaining the progressive and silent effects of hypertension on the body,
		- Explaining the effect of smoking, alcohol, caffeine and stress on blood pressure,
		- Explaining the effect of sodium consumption on the body and its relationship with high blood pressure,
		- Presenting a list of high-sodium foods,
		- Explaining about the antihypertensive drugs and their side-effects,
		- Explaining the importance of regular and timely use of the prescribed medications,
		- A comparison between lifestyle modification and medical therapy.
		- Dividing the hypertension control behavior into smaller components.
		- Teaching the patients what behavior is exactly expected of them and how to do it.
		- Teaching them how and in what condition measure their blood pressure and how to use the sphygmomanometer correctly.
Phase 2: Behavioral		- Teaching the patients

Table 2. Demographic Composition of the Two Randomly Assigned Groups

Demographics	Control, n = 40	Intervention, n = 40	P Value
Sex[a]			0.793
Female	30 (75)	31 (77.5)	
Male	10 (25)	9 (22.5)	
Age[b], **y**	54.78 ± 8.43	53.35 ± 7.34	0.423
Height[b], **cm**	159.65 ± 8.65	158.90 ± 10.52	0.729
Weight[b], **kg**	75.71 ± 15.22	79.11 ± 14.26	0.305
BMI[b,c], **kg/m²**	29.88 ± 5.91	31.35 ± 5.89	0.266
Job[a]			0.753
Free	5 (12.5)	3 (7.5)	
Employee / worker	4 (10)	4 (10)	
Retired	6 (15)	5 (12.5)	
Housewife	25 (62.5)	28 (70)	
Education Level[a]			0.906
Illiterate	10 (25)	9 (22.5)	
< Diploma	21 (52.5)	20 (50)	
> Diploma	9 (22.5)	11 (27.5)	
Type of hypertension treatment[a]			0.526
Diet	3 (7.5)	2 (5)	
One drug	17 (42.5)	22 (55)	
Two drugs or	20 (50)	16 (40)	

[a] Data presented as No. (%).
[b] Data presented as mean ± SD.
[c] Body mass index.

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Table 4. Lifestyle Subscales Before and After Intervention in Groups

Lifestyle Subscales[a]	Control, n = 40	Intervention, n = 40	P Value[b]
1-Physical health			< 0.001
Before intervention	12.02 ± 4.47	11.48 ± 3.57	
After intervention	11.68 ± 4.46	15 ± 3.46	
2-Sports and fitness			< 0.001
Before intervention	6.22 ± 4.28	6.10 ± 3.71	
After intervention	5.60 ± 3.91	13.25 ± 3.50	
3-Weight management and nutrition			< 0.001
Before intervention	11.30 ± 4.23	10.35 ± 3.05	
After intervention	10.92 ± 3.72	18.02 ± 2.24	
4-Disease prevention			< 0.001
Before intervention	14.25 ± 2.72	13.15 ± 2.72	
After intervention	13.70 ± 2.91	15.38 ± 2.45	
5-Mental health			< 0.001
Before intervention	10.78 ± 4.53	9.85 ± 4.24	
After intervention	10.62 ± 4.46	11.82 ± 3.59	
6-Spiritual health			0.001
Before intervention	11.62 ± 3.91	10.88 ± 4.56	
After intervention	11.10 ± 3.81	12.35 ± 4.03	
7-Social health			0.002
Before intervention	13.75 ± 3.77	12.82 ± 5.54	
After intervention	13.38 ± 3.72	14.28 ± 5.14	
8-Avoidance of drugs, alcohol and opiates			0.001
Before intervention	17.05 ± 2.62	17.25 ± 1.19	
After intervention	17 ± 2.72	17.85 ± 0.43	
9-Prevention of accidents			< 0.001
Before intervention	14.10 ± 5.45	15.10 ± 3.96	
After intervention	13.5 ± 4.72	16 ± 3.62	
10-Environmental health			0.03
Before intervention	15.45 ± 3.79	14.82 ± 3.56	
After intervention	15.28 ± 3.51	15.6 ± 3.05	
Total			< 0.001
Before intervention	126.55 ± 22.99	121.80 ± 23.22	

Table 3. Lifestyle subscales at the Start of the Study

Lifestyle Subscales[a]	Control, n = 40	Intervention, n = 40	P Value[b]
1-Physical health	12.02 ± 4.47	11.48 ± 3.57	0.545
2-Sports and fitness	6.22 ± 4.28	6.10 ± 3.71	0.889
3-Weight management and nutrition	11.30 ± 4.23	10.35 ± 3.05	0.253
4-Disease prevention	14.25 ± 2.72	13.15 ± 2.72	0.075
5-Mental health	10.78 ± 4.53	9.85 ± 4.24	0.349
6-Spiritual health	11.62 ± 3.91	10.88 ± 4.56	0.433
7-Social health	13.75 ± 3.77	12.82 ± 5.54	0.385
8-Avoidance of drugs, alcohol, and opiates	17.05 ± 2.62	17.25 ± 1.19	0.682
9-Prevention of accidents	14.10 ± 5.45	15.10 ± 3.96	0.351
10-Environmental health	15.45 ± 3.79	14.82 ± 3.56	0.450
Total	126.55 ± 22.99	121.80 ± 23.22	0.361

[a]Data presented as mean ± SD.
[b]Independent sample T-Test.

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