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The effect of educational intervention on self-care behavior in hypertensive older people: Applying the health belief model

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Abstract:

BACKGROUND: Hypertension is a worldwide health issue. Increasing aging has given rise to the prevalence of this problem. Disease management using educational intervention based on theoretical frameworks is effective for influencing self-care behavior. The goal of this study is to investigate the effects of educational intervention on self-care behaviors that influence hypertension control among the elderly population during 2020 based on the health belief model.

MATERIALS AND METHODS: A quasi-experimental study was conducted on rural older people in Ardestan, Iran. Assessments were done before and after three educational intervention sessions with a control group. The random sampling has done on 99 hypertensive elderly people in two rural centers of Ardestan from 2019 to 2020. Awareness variables, components of the health belief model, and blood pressure were assessed before and three months after the intervention. Data analysis was done using descriptive and analytical statistics.

RESULTS: The study groups did not differ significantly in terms of the variables studied at the beginning of the study. After three months, the variables of awareness, self-care, and perceived sensitivity constructs, perceived severity, perceived benefits, and guide to action showed a significant rise in the experimental group compared to the control group. In addition, the effectiveness of educational intervention significantly increased self-care behavior in the experimental group.

CONCLUSIONS: Educational intervention based on the health belief model can be effective to reduce the barriers of self-care behaviors. In order to have a lasting change in behavior, the use of behavioral change patterns that ecologically take into account interpersonal, organizational, and social factors is suggested too.

Keywords:

Educational intervention, elderly, health belief model, hypertension, self-care behavior

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Introduction

Hypertension is a common health problem in many developed and developing countries.[1] In Iran, in a review and meta-analysis study in 2019, hypertension was observed to be the most common disease during 2004 to 2018 and was estimated to be 25% and 42% in the elderly.[2] It is considered to be one of the main priorities of the Ministry of Health in Iran.[3] An estimated model of cardiovascular diseases in our country shows that this disease will more than double from 2005 to 2025 due to the increasing rate of the elderly population.[4]

High blood pressure is now a health problem among the rural population, contrary to what was previously thought.[5]

The increase in the prevalence of hypertension is associated with population growth, aging,

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and behavioral risk factors such as unhealthy diet, alcohol consumption, lack of physical activity, overweight, exposure to persistent stress, and its poor management.[6] Since these modifiable lifestyle factors play a major role in the occurrence and control of this disease, it is classified as a manageable disease.[7,8]

Therefore, effective management and self-care behaviors to prevent complications and maintain the health of people suffering from high blood pressure is a vital issue.[9] During self-care behaviors, each person uses their knowledge, skills, and abilities to maintain their health independently. Numerous studies have shown a significant reduction in high blood pressure when self-care behaviors are used.[10–13]

One of the most effective educational programs is the theory-based programs based on patterns of behavior change[14] and one of these effective patterns is the health belief model (HBM) that has been used to describe the change and continuity of related behaviors or health.[15] This model considers behavior based on a person's knowledge and attitude, and according to its components, informs the person about their health risk or threat, which in turn leads their behavior to positive health. The HBM includes perceived susceptibility, perceived benefits, cues to action, perceived severity, perceived barriers, and self-efficiency (self-efficacy).[16]

According to this model, in order to adopt care for hypertension, the individual should first feel threatened by the problem (perceived sensitivity), then understand the depth of the risk and severity of its various complications (perceived severity), with positive symptoms affected by their environment (action guide); they should then believe in the usefulness and applicability of preventive behaviors (perceived benefits), find the factors that prevent the behaviors which pose more harm than good (perceived barriers), and consider themselves capable of performing preventive behaviors (self-efficacy) in order to finally obtain an effective care[17,18]

The prevalence of hypertension in Isfahan province was in an increasing trend, that is, 32% in the elderly aged ≥60 years in the rural population.[19] Since the health education programs have been effective in improving self-care behaviors,[20,21] the goal of this study was to evaluate the educational program on self-care behaviors in hypertensive people in 2020.

Materials and Methods

Study design and setting

A quasi-experimental study was conducted, and assessments were done before and after the three educational intervention sessions with a control group.

Study participants and sampling

The random sampling was done on 99 hypertensive elderly people in two rural centers of Ardestan from 2019 to 2020. The study was approved by Isfahan University of Medical Sciences. The criteria for choosing participants included age (≥60 years), place of residence (rural areas until the end of the study), willingness to participate in the study, and developing hypertension based on physician approval. The criteria for excluding participants included missing a session and not completing questionnaires. The sample size was calculated using the equation, $n = ([(Z_1 + Z_2)]^2 (2S^2))/d^2$, consisted of at least 44 in each group, which with the prediction of 10% loss in each group became 49 participants.

Due to the onset of the COVID-19 pandemic, it was not possible to hold training sessions and take active care. In May and June 2020, the condition of the pandemic was subsided. Therefore, it was possible to perform monthly blood pressure monitoring as well as conduct training sessions for up to 15 people. This study was selected conducted in two rural centers with similar socio-economic conditions, where one center was used as intervention according to the table of random numbers, and the other center was used as control to minimize the possibility of distortion of the results due to family relationships in the village. Random sampling was performed according to the table of random numbers from the electronic medical records of elderly patients with hypertension who referred to the health center for monthly care.

Data collection tool and technique

First, a briefing and training session was held to coordinate and complete the questionnaire. The examination tool included a mercury sphygmomanometer that was calibrated by the support company before starting the study. A questionnaire was completed by 99 people who were randomly divided into experimental group (49 participants) and control group (50 participants). Simultaneous assessment of blood pressure was performed. Systolic and diastolic blood pressures were measured in a sitting position after at least 15 minutes of rest.

Educational sessions

Blood pressure control was repeated three months after the treatment. For the experimental group, three 60-minute training sessions with a maximum capacity of 15 people were held during three weeks in June 2020, and each session was held in four groups. In order to codify the training program and increase its efficiency before the sessions, a lesson plan was designed for each session, including behavioral goals and educational strategy, as well as the time specified for them [Table 1]. The first ten minutes of each session was dedicated to warm-up and an introduction to the topic, as well as reviewing

Table 1: Structure and strategy of training sessions

Row	Health belief model constructs	Training strategy
1	Knowledge	Lecture, discussion
2	Perceived susceptibility	Brain storming, unfinished story, discussion, educational video of hospitalization due to complications of blood pressure
3	Perceived severity	Group discussion, question and answer, educational pictures and posters
4	Perceived Benefits	Group discussion, pictures
5	Perceived Barriers	Educational pictures, group discussion, brainstorming
6	Self-efficacy	Role play, substitution, experiences, group discussion
7	Cues to action	Role play, substitution, experiences, group discussion

the previous materials by the researcher and one of the interested seniors. Next, the topics were presented to our participants who were either illiterate or semiliterate based on the structures of the HBM as in Table 1.

The questionnaires were reviewed and validated in a study by Sadeghi *et al*.[16] Reliability analysis showed satisfactory result (Cronbach's alpha coefficient was 0.86, the perceived barriers were 0.82, and self-efficacy was 0.76). The questionnaires were anonymous and coded in three parts: the first part included demographic information with questions about age, education, occupation, marital status, systolic and diastolic blood pressure, and history of hypertension in first-degree relatives; the second part contained eight multiple choice questions about measuring awareness; the third part included the structures of the HBM and self-efficacy based on the five-point Likert scale. In this section, there were eight questions related to each part of HBM, which equaled to 56 questions in total.

Independent *t* test or analysis of covariance was used to compare the mean of the structural variables of the HBM in each of the two times, and paired *t* test was used to compare the mean of each of the variables before and after the intervention in each of the two groups. Independent *t* test, Chi-squared or Fisher's exact test and Mann–Whitney *U* test were used to compare demographic characteristics (age, sex, employment status and education level) between the two groups. SPSS software version 22 was used for statistical analysis. The significance level in the tests was considered to be 0.05.

Ethical consideration

The ethical approval of this study included the acquisition of a scientific code of 398868 and an ethical code of IR.MUI.RESEARCH.REC.1398.754. Informed consent, explanation of study objectives, and confidentiality of participants' information were also performed.

Results

In the present study, 99 participants (≥60 years of age) with hypertension in the rural region of Ardestan, Isfahan were included in the study. For this purpose, 50 participants for each group were selected and 1 person in the experimental group was excluded from the study due to not participating in training classes. Therefore, 49 people in the experimental group and 50 people in the control group were included in our research.[Table 2].

The Mann–Whitney *U* test showed that there was no significant difference between the two groups of elderly in terms of age ($P = 0.12$) and education level ($P = 0.28$). Chi-squared test showed that the frequency distribution in terms of gender was not significantly different between the two groups ($P = 0.56$). The Chi-squared test with likelihood ratio showed that the frequency distribution of marital status ($P = 0.10$) and occupation ($P = 0.10$) as well were not significantly different between the two groups.

Paired *t* test showed that in the experimental group, the mean scores of knowledge and components of the HBM in the control and experimental group were not significantly different before the intervention and three months after the intervention ($P > 0.05$). On the other hand, the mean scores of knowledge, perceived sensitivity, perceived intensity, perceived benefits, self-efficacy, and guidance for action three months after the intervention were significantly higher than before the intervention ($P < 0.001$) [Table 3].

Paired *t* test showed that in the experimental group, the mean scores of self-care three months after the intervention were significantly higher than before the intervention ($P < 0.001$). The mean scores of self-care were not significantly different before the intervention and three months after the intervention ($P > 0.05$). In addition, independent *t* test showed that the mean scores of self-care before the intervention were not significantly different between the two groups ($P > 0.05$) [Table 4].

Discussion

The aim of this study was to investigate the effects of educational intervention based on the HBM on self-care behaviors and related factors in 99 senior participants with hypertension in the rural area of Ardestan in 2020 In the present study, three months after three 60-minute training sessions based on self-care behaviors using participatory education method, the mean scores of awareness, self-care, and HBM constructs (perceived sensitivity, perceived severity, perceived barriers, self-efficacy, and guidance for action) in the experimental group were significantly different from the control

Table 2: Frequency distribution of age group, level of education, gender, marital status and occupation of the elderly in two groups

Variable	Experimental group		Control group		*P*
	Number	Percentage	Number	Percentage	
Age (years)					
60-69	14	28.5	11	22	0.12
70-79	26	53.1	24	48	
80 years and more	9	18.3	15	30	
Education level					
Illiterate	27	55.1	34	68	0.28
Reading and writing knowledge	22	44.9	15	30	
Post-secondary education	0	0	1	2	
Gender					
Woman	35	71.4	33	66	0.56
Man	14	28.6	17	34	
Marital status					
Single	0	0	3	6	0.10
Married	31	63.3	27	54	
Widow/Widower	18	36.7	20	40	
Occupation					
Housewife	33	67.3	32	64	0.10
Worker/Farmer	5	10.2	3	6	
Retired	7	14.2	6	12	
Disabled	4	8.2	9	18	

Table 3: Mean scores of some knowledge and components of the health belief model in the experimental and control groups

Variable	Group	Before the intervention	Three months after the intervention	*P*
Knowledge	Experimental	61.9 (15.5)	82.4 (7.2)	>0/001
	Control	61.2 (10.5)	62.2 (9.7)	0.64
Perceived susceptibility	Experimental	69.3 (8.5)	84.4 (6.2)	>0/001
	Control	68.4 (4.5)	68.1 (6.2)	0.88
Perceived severity	Experimental	76.03 (11.2)	90.6 (9.6)	>0/001
	Control	75.1 (0.5)	74.9 (5.9)	0.88
Benefits perceived	Experimental	76.3 (8.1)	86.03 (8.7)	>0/001
	Control	75.3 (1.3)	74.8 (6.3)	0.62
Barriers perceived	Experimental	63.01 (12.4)	24.9 (16.5)	>0/001
	Control	62.2 (12.2)	61.9 (10.9)	0.91
Perceived self-efficacy	Experimental	62.7 (7.5)	74.1 (9.4)	>0/001
	Control	62.9 (8.4)	62.2 (9.4)	0.66
Action cues to action	Experimental	76.4 (14.9)	84.8 (11.5)	>0/001
	Control	75.7 (8.9)	75.2 (9.3)	0.79

Table 4: Mean of self-care score in Intervention and control groups (out of 100)

Variable	Group	Before the intervention	Three months after the intervention	*P*
Self-care	Experimental	60.02 (12.2)	79.4 (7.2)	>0/001
	Control	59.1 (9.9)	59.7 (10)	0.73

group. The results of the present study were consistent with the findings of Sharif Darani *et al*.[22]

The results of the present study showed a significant increase in the mean score of patients' knowledge in the experimental group after the educational intervention. The results of other studies such as the one by Ozoemena *et al*.[23] showed that healthy diet education and drug adherence significantly improved the knowledge related to hypertension. Moreover, the study by Zangiabadi[24] showed that the level of awareness of individuals has an effective role in promoting drug obedience in patients with hypertension. Evaluation of factors related to self-care behaviors of patients with hypertension is not consistent. The reason for the difference seems to be related to the difference in age group of the participants.[25]

In the present study, the mean sensitivity and perceived severity before educational intervention were at the same level in both groups while, at the end of the study, the patients' understanding of the consequences of not taking care of hypertension for themselves and their families increased. Thus, they were more likely to behave more responsibly and develop sensitivity and motivation to follow proper self-care. The results of this study were consistent with the study of other studies.[16,26] In a study by Mirhoseini *et al*.[27] on 400 individuals over 30 years old in Yazd, perceived sensitivity of patients did not change. The results of this study in terms of perceived severity are in line with the results of Shameena *et al*.[28]

In the recent study, the mean score of perceived benefits in the experimental group increased after the educational intervention, but there was no significant change in the control group. This improvement was also significant compared to the control group. These findings support the fact that patients have an acceptable understanding of the benefits of adopting caring behaviors.

In a study by Nooriani *et al*. in 2019[29] that aimed at designing and evaluating a nutritional education program based on the HBM and its effect, the findings showed an improvement in the mean of perceived benefit construct in renal patients. Another study by Khani *et al*. in 2015[30] showed a significant increase in all components of the HBM in the experimental group compared to the control group. The results of the present study were not consistent with the cross-sectional study by Poormuhamad and Jalili in 2017.[21] In this study, the structure of self-efficacy was the highest predictor of self-care behaviors of hypertension among the elderly. In general, self-efficacy has a predictability power of self-care behavior in other chronic disease such as diabetic patients.[31]

Regarding the perceived barriers, along with a significant decrease in the score of this variable in the experimental group, there was a significant difference between the experimental group and the control group. In other words, patients in the training class mentioned lack of awareness, forgetting medications, not having a suitable place for the elderly to exercise in the village, unwillingness to consume healthy foods because of consumption of fried foods and animal oil as obstacles to self-care behavior. Education of the principles of proper nutrition in blood pressure, physical activity and walking in the yard, and medication adherence were justified. A 2016 study by Sadeghi *et al*.[16] showed that education with pictures of patients with complications of disease removed the perceived barriers in the intervention group. Perceived barriers have been suggested as the strongest predictor of self-care behaviors in the elderly with hypertension.[32,33] So, we were able to overcome this behavioral barrier by suitable educational methods. The results of a 2017 study by Long *et al*.[34] on 34 hypertensive African-American men in southeastern United States mentioned drug side effects and unhealthy eating patterns as the most common self-care barriers. The results of this study are not consistent with the 2017 study by Poormuhamad and Jalili.[21] It seems that the reason for this difference is easier access to healthy nutrition, more mobility in the rural than in the urban population, and trainings of healthcare providers appropriate to the geographical area due to local population.

The results of the present study also showed that the mean score of self-efficacy in the experimental group increased over time; but in the control group, no significant change was observed over time. One study showed that perceived self-efficacy was the most predictive of self-care behavior.[21] The results of a study by Long *et al*. in 2017, aimed at reviewing the effect of self-management intervention on 64 Korean elderly participants with hypertension, showed a significant improvement in self-efficacy, physical activity, and healthy nutrition.[34] In general, self-efficacy has an immediate effect on health behaviors, and a person with low self-efficacy is less likely to change health behaviors that they are used to.[35] The results of this study were aligned with a study by Park in South Korea[36]; however, they were not consistent with a study by Babaei *et al*. in 2020[37] that aimed at educational evaluation of healthy lifestyle–promoting behaviors in people prone to cardiovascular disease in Tehran.

The results of this study showed that the mean guide score for practice in the experimental group increased. As a practical guide, health staff played a crucial role in helping people to trust and make health decisions. Due to the prevalence of COVID-19 pandemic, monthly care of patients with hypertension was performed by telephone follow-up, and face-to-face care was performed seasonally. Due to the pandemic and reduction of in-patient health care, it can be concluded that in the education of the elderly, family and health care providers education is essential. The study by Poormuhamad and Jalili[21] showed that guidance for action had a significant relationship with self-care behavior. Other studies have also shown that poor self-care behaviors were associated with inadequate self-efficacy and guidance for action.[34,38] Therefore, it is suggested that health professionals in designing and implementation of health-promoting interventions consider strengthening the factors that motivate them to perform the health behaviors. The results of the present study are consistent with the findings of a 2019 study by Sharifi Darani *et al*.[22] that aimed to study the effect of education on self-care behaviors in the elderly with hypertension who were referred to comprehensive health service centers.

In the present study, the rate of hypertensive self-care behaviors before educational intervention in the

experimental and control groups were not statistically significant. But three months after the intervention, a significant difference was observed, which highlights the effectiveness of educational intervention. The results of Hacihasanoğlu and Gözüm's[39] 2011 study showed that healthy lifestyle behaviors increased via trainings in the experimental group and their blood pressure decreased significantly compared to the control group. Moreover, the results of Zafar *et al*.'s 2021[40] study in Western Ireland observed a significant increase in weekly training time in the intervention group, and showed that providing appropriate training to people with hypertension can have a positive effect on control, knowledge, and self-care in community-based settings. The results of another research done by Magadza *et al*. in 2009[41] showed that after the intervention, the consumption of medication significantly improved. Moreover, the findings of Goyer *et al*.'s research in 2013[42] showed that the educational programs based on the HBM led to reduced consumption of salt. In addition, Keshvari's study showed the efficacy of intervention on improvement of hypertension based on family-centered empowerment.[43]

Limitation and recommendation

The study coincided with the COVID-19 crisis, making it difficult to reach the elderly. However, direct education of the elderly in these situations increased the impact of education programs on hypertensive health behaviors. Considering the findings of this study, future studies are suggested to compare the environmental factors such as living in urban and rural areas on self-care behaviors in hypertensive elderly.

Conclusion

The results of this study showed that educational intervention led to improvement in the structures of the health belief model and self-care behaviors and could reduce the barriers of self-care behaviors. It also increased the performance and health beliefs of the elderly with hypertension and reduced the irreversible complications of hypertension. These results suggest that health strategies can increase the quality of educational interventions. In order to have a lasting change in behavior, the use of behavioral change patterns that ecologically take into account interpersonal, organizational, and social factors is suggested as well.

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Declaration of patient consent

Informed consent, explanation of study objectives, and confidentiality of participants'' information were performed. Written consent forms were obtained from the elderly.

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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