Effectiveness of a self-management education program on hypertension control and contributing factors in older adults: an interventional trial

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Abstract

Background: One of the common disorders that may negatively affect the health status in elderly is hypertension. Self-management education offers an effective method to control various disorders. This study was designed to assess the effectiveness of self-management educational program on blood pressure, and other cardiometabolic risk factors control among elderly patients from Tabriz, Iran.

Material and methods: 227 eligible hypertensive elderly patients from three primary health care centers of Tabriz participated in 12 sessions of self-management education intervention conducted in 6 months from April to October 2019. Systolic (SBP) and diastolic blood pressure (DBP), serum levels of fasting blood sugar (FBS), total cholesterol (TC), and triglyceride, as well as anthropometric indices were assessed both before and at the end of the intervention.

Results: The participants were 64.5 ± 5.8 years of age (mean ± SD). After 6-month attendance in educational sessions, the SBP ($p = 0.04$), body weight ($p = 0.01$), body mass index (BMI) ($p = 0.02$), FBS ($p = 0.01$), and TC ($p < 0.0001$) were lower as referred to baseline.

Conclusion: Study suggests self-management education programs in elderly may be beneficial for cardiovascular risk factors control.

Key words: self-management; education; hypertension; metabolic syndrome; elderly; Iran

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Introduction

Elderly has been defined as a chronological age of 65 years old or older in most developed countries and the age of 60 years or above in many developing nations [1]. Elderly is naturally associated with social, economic, and health burdens. Aging presents challenges and concerns in the fields of public health, nutrition, nursing, and economic development [2]. Worldwide, the elderly population is living longer than the past years. The United Nations reported that worldwide the elderly population grew at an average rate of 2.5% from 1990-2010, and it is expected that 2 billion elderly will live in the world by

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2050 [3]. Elderly forces the health care systems of every nations to planning more effective measures to provide suitable care and education for themselves to handle their health related complications and consequently have healthier lives [4].

One of the common disorders that can negatively affect the health status of elder adults is hypertension (HTN), the condition tightly related to advanced age [5, 6]. HTN is a major preventable risk factor for heart disease and stroke, which at the same time the leading causes of deaths in elder people [7, 8]. Evidently, the control of hypertension, blood glycaemia and lipids are inadequate around the globe [9, 10].

There are multiple treatment options for hypertension, with adopting a healthy lifestyle as complementary to every therapies [11]. Self-management education is an effective method to control various disorders and consists of various components including providing the way of interaction among patients and health care providers, recommendations to adhering to treatment, improving psychological health, and monitoring health status [12]. Adopting a healthy diet along with increased physical activity are two main non-pharmacological recommendations in hypertension, which the patients usually poorly adhere to [13].

Therefore the aim of the study was to evaluate the effectiveness of a novel self-management educational programme aimed at the improvement in blood pressure control, and other metabolic and cardiovascular risk factors in elder patients.

Material and methods

Participants

The study participants were recruited from the elder patients who attended three different public health centers affiliated to the Tabriz University of Medical Sciences, Tabriz, Iran. The inclusion criteria were as follows: age > 60 years, hypertension diagnosed at least 12 months prior to study initiation (SBP ≥ 140 and DBP ≥ 80 mm Hg) [14], and ongoing anti-hypertensive therapy. Exclusion criteria were as follows: the diagnosis of severe disorders such as cancer, dementia or Parkinson disease, residency in nursing home or receiving home health care, hospitalization. Patients with the history of smoking and alcohol consumption were also excluded from the study. All the participants signed an informed consent. The study was approved by the ethical committee of Tabriz University of Medical Sciences, Tabriz, Iran (reference number: IR.TBZMED.REC.1397.1018). Recruitment and follow-up took place from February through March 2019. The study was conducted in line with the principles of the Declaration of Helsinki.

Study design and intervention

All eligible patients participated in 6-months self-management education sessions (Tab. 1). The general components of the intervention were as follows: assessment of the hypertension signs and symptoms, disease control, social support, patients' relationships with their health care providers, mental status, and home BP monitoring. The complementary components were focused on improving adherence to the Dietary Approaches to Stop Hypertension (DASH) dietary pattern [15], reduced sodium intake and increased potassium intake [16], weight reduction [17], and increased physical activity [18, 19].

The intervention was delivered by a nutritionist during face to face group sessions. All information was presented in an easily understood format in Turkish language which is the common language in Tabriz. The sessions were held twice per month duration 6 months that finally 12 educational sessions were done successfully. The average duration of each session was 45 minutes with a number of 15 participants in each class. The classes were held separately in 3 public health care centers from April to October 2019.

Demographic and anthropometric measurements

Medical history, socio-demographic variables such as age, sex, marriage and occupation status, and medications were asked by the nutritionist at baseline of the study. Body weight of every participant was measured before and after the intervention using a balance-beam scale, with no shoes. Height was measured using a secured stadiometer. Body mass index (BMI) was calculated by dividing weight (in kilograms [kg]) to height (in meters squared [m^2]).

Biochemical and blood pressure measurements

A trained and certified nurse collected peripheral venous blood samples after 12–14 hours fasting from each subject and centrifuged 10 min at 300 × g to separate the serums. Serum fasting blood sugar (FBS), total cholesterol (TC), and triglyceride (TG) were measured before and after the intervention.

Blood pressure was also measured twice (before and after the intervention) in the resting state using an Omron digital blood pressure monitor (Omron Healthcare, Inc, Lake Forest, Illinois).

Table 1. Class format for self-management education intervention

Activity	Description
Session 1	
Introducing the intervention and main goals, data collection	Collection of anthropometric indices and metabolic factors, gathered 24-h recalls, and create individualized activity goals
Session 2	
Raising motivation	Targeting attitude and self-efficacy of the participants, introducing the participants to each other and highlighting their common ground
Session 3	
Training general components	Hypertension signs and symptoms, common anti-hypertensive drugs and their mechanisms
Session 4	
Training general components	Patients' relationships with health care providers
Session 5	
Training general components	Role of the friends and family on disease control, social support, mental improvement
Session 6	
Training general components	Mental improvement and review on BP monitoring
Session 7	
Behavioral modification	Behavioral modification techniques, interactive activities to reinforce educational content
Session 8	
Nutrition education	Introducing DASH diet, food pyramid, and healthy portion sizes
Session 9	
Physical activity	Introducing the positive effects of participation in moderate aerobic activity sessions, emphasizing on weight reduction
Session 10	
Nutrition education	Training the healthful snack and new healthy foods
Session 11	
Listening	Participants share their struggles and victories in making behavior changes
Session 12	
Goal setting	Participants set goals for activity, diet, and blood pressure monitoring for each session and discuss them with the group

Statistical analysis

Normally distributed variables were represented as means± standard deviation (SD) and categorical variables were shown as frequency (percentages). Chi-square test was used where appropriate. The differences in measured variables between baseline and after 6 months were assessed with paired *t* test. Data were analyzed using the SPSS (version 18.0; SPSS Inc., Chicago, IL, USA). P-value of less than 0.05 was considered valid for all calculations.

Results

1022 hypertensive elderly were identified using the individual health files archived in three studied health care centers. Then, based on the telephone-based questionnaires 249 patients were recruited and included in the self-management educational sessions. Twenty one subjects were lost to follow-up, and one patient died before study termination. A total of 227 participants completed the study.

Baseline characteristics of the patients are shown in Table 2. Mean ± SD age of the patients was 64.5 ± 5.8 and 71% of them were female. Most of the participants were married (95.2%) and housekeeper (70.8%). All the patients were taken anti-hypertensive drugs.

Changes of blood pressure, anthropometric measures, and metabolic factors during treatment have been shown in Table 3. The participants of the study experienced significant reductions of SBP (–2.6 ± 19.1; p =0.04) and DBP (–0.77 ± 12.3; p = NS) following self-management education program. Body weight was 0.9 kg ± 5.3 lower as compared to baseline (p < 0.012). FBS concentrations also decreased by 3.1 ± 18.3 mg/dL at the end of the study (p = 0.01). Six months educational intervention resulted in BMI reduction (p = 0.02), and TC (p < 0.0001). The serum levels of TG were not significantly changed after the intervention.

In Table 4 differences of study variables between with relation to controlled/uncontrolled BP are presented.

Of the all participants, at the baseline, 121 elderly (53.3%) had abnormal FBS level (> 100 mg/dl) that was reduced to 97 subjects (42.7%) after the education. Efficiency of the education program on management of serum TC and TG levels, FBS and BMI of the subjects were 3.5%, 0.4%, 10.57%, and 1.1%, respectively. 10 participants with uncontrolled blood pressure levels had their BP controlled at the study end.

Discussion

This study was aimed to identify the effectiveness of a self-management education program on blood pressure control, anthropometric measures, and other metabolic factors in the hypertensive elderly patients

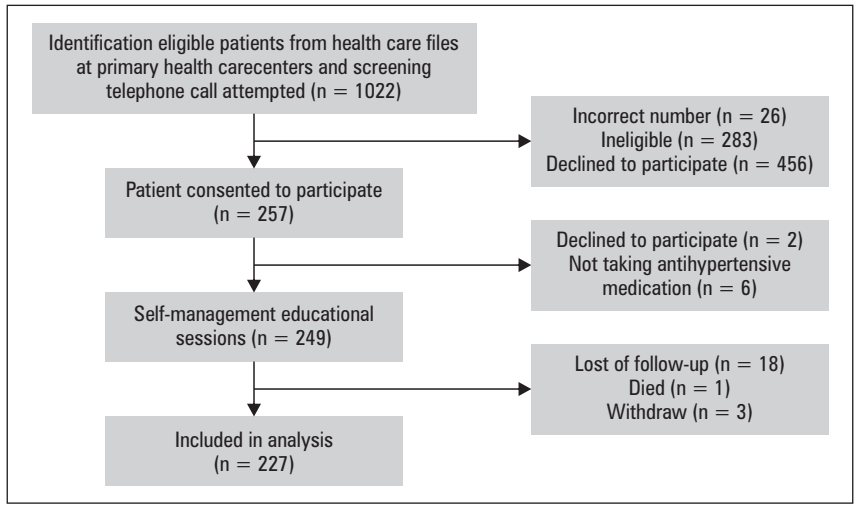

Figure 1. Flowchart of the study

Table 2. Baseline characteristics of patients (n = 227)

Age [year]	**64.52 ± 5.76**
Age [year]	64.52 ± 5.76
Height [cm]	157.83 ± 8.20
Sex, n (%)	
Female	161 (71)
Male	66 (29)
Marriage, n (%)	
Single	11 (4.8)
Married	216 (95.2)
Occupation	
Housekeeper, n (%)	160 (70.8)
Employee, n (%)	12 (5.3)
Self-employment, n (%)	18 (8)
Retired, n (%)	4 (1.8)
Drugs, n (%)	
Methoral	79 (34.8)
Losartan	148 (65.2)

in primary health care setting. The major findings of the study are that the six-month self-management education intervention (1) significantly reduced the body weight and BMI, (2) significantly reduced serum FBS and TC levels, and (3) significantly reduced SBP among elderly subjects.

The self-management education program can effectively reduce anthropometric factors including body weight and BMI among hypertensive elderly. Similar finding were reported in Turkish adults study where reduced body weight after six-month fo education, monitoring and counseling sessions was noted [20]. A meta-analysis by Neter et al. demonstrated that the hypertensive patients are much likely to reduce body weight after educational interventions [21]. Of more, the Internet-based educational program among adult patients with diabetes is capable of promoting weight loss of 4.4 kg after one year intervention (behavioral counseling and self-management training) [22]. Level of education translates to BMI group as reported in a study where higher levels of education were inversely associated with BMI [23]. In all, body weight clearly translates to hypertension burden and cardiovascular diseases [24].

Table 3. Changes in anthropometric measures, blood pressure and metabolic factors

Variable	**Before (n = 227)**	**After (n = 227)**	**Mean changes**	**p-value[1]**
Weight [kg]	73.7 ± 12.5	72.8 ± 12.3	–0.9 ± 5.3	0.01
BMI [kg/m2]	29.6 ± 4.6	29.3 ± 4.7	–0.3 ± 2.2	0.02
SBP [mm Hg]	129.1 ± 18.0	126.4 ± 19.3	–2.6 ± 19.1	0.04
DBP [mm Hg]	79.4 ± 12.4	78.7 ± 10.4	–0.8 ± 12.7	0.35
FBS [mg/dL]	109.7 ± 43.1	106.6 ± 46.9	–3.1 ± 18.3	0.01
TG [mg/dL]	132.5 ± 77.5	130.9 ± 73.8	–1.6 ± 28.8	0.41
TC [mg/dL]	245.8 ± 78.6	226.7 ± 63.6	–19.1 ± 44.0	< 0.0001

SBP — systolic blood pressure; DBP — diastolic blood pressure; FBS — fasting blood sugar; TG — triglyceride; TC — total cholesterol; all data reported as mean ± SD; p-value1 are for comparison within group by paired t-test

Table 4. Differences between study variables among subjects with controlled blood pressure (BP) and uncontrolled BP

Variables	Before					After				
	Controlled BP subjects (n = 144)		Uncontrolled BP subjects (n = 83)		p-value*	Controlled BP subjects (n = 154)		Uncontrolled BP subjects (n = 73)		p-value*
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
FBS	109.5	44.8	110.0	40.3	0.18	108.1	51.7	103.4	34.8	0.30
TC	248.5	77.2	241.3	81.4	0.63	225.3	64.03	229.6	63.1	0.75
TG	126.8	67.9	142.4	91.5	0.09	123.5	65.9	146.6	86.6	0.01
Weight	73.4	12.2	74.3	13.0	0.55	72.5	12.3	73.5	12.3	0.50
BMI	29.7	4.3	29.4	5.1	0.29	29.0	4.5	29.7	5.1	0.21
SBP	119.01	9.30	146.53	16.07	< 0.001	118.54	13.01	143.1	19.8	0.16
DBP	74.27	7.35	88.34	14.26	0.03	74.60	7.53	87.19	10.52	0.04

FBS — fasting blood sugar; TC — total cholesterol; TG — triglyceride; BMI — body mass index; SBP — systolic blood pressure; DBP — diastolic blood pressure; *based on Independent sample T-test

A self-management education offers an effective measure to reduce weight in patients with hypertension.

Our study also showed that self-management educational program may exert positive effects on serum levels of TC and FBS. Although, the patients of current study did not reach the optimal blood levels of TC (of less than 200 mg/dL [17]) but their serum levels decreased significantly. A study in Italy also had shown lower LDL and TC levels after 3-months educational intervention compared to baseline [25]. Another study showed that a 4-month educational program in adult patients with diabetes exerted advantageous effects on lipid profile [26]. We now report, that the efficiency of the education on FBS and TC are estimated at ~10% and ~4%, respectively.

In current study, patients at the intervention completion were characterized by reduced SBP, but not DBP. Such phenomenon was previously reported [27–29]. Of more, most of the randomized controlled trials reported significant reduction of SBP and DBP in patients who had received self-management educational programs [30–33], summarized in one meta-analysis [11]. In study by Lee, self-care educational intervention was not successful in terms of BP control improvement among community-dwelling elderly subjects [34]. This is consistent with a previous study that was conducted in health care centers [35]. These two studies had similar design (quasi-experimental) as opposed to current study. A systematic-review showed that non-pharmacological treatment among hypertensive patients was not associated with considerable net reduction in BP [36]. Altogether, available studies incl. our report suggest that apart from the duration of an educational program, the content, utilized tools, and components of the intervention might play a significant role in the outcomes.

The educational intervention may partly reduce cardiometabolic risk factors, but the magnitude of sole education is limited. There is a need for supplementary strategies including physical activity monitoring and dietary programs.

Conclusion

It is concluded that the lifestyle modifications in elederly patients with hypertension by self-management education may improve adherence to antihypertensive treatment a reduction of several cardiometabolic risk factors.

Conflicts of interests

The authors reported no conflict of interest.

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