Iran Red Crescent Med J. 2018 May; 20(5):e61693. doi: 10.5812/ircmj.61693.

Published online 2018 September 9. **Research Article**

The Effect of Training on Knowledge, Attitude, and Practice in Patients with Hypertension; The Application of the Expanded Chronic Care Model: A Clinical Trial Study

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Received 2017 September 13; **Revised** 2017 December 17; **Accepted** 2018 February 14.

Abstract

Background: Patients have a significant role in controlling and treating hypertension. Improving patients' Knowledge, Attitude, and Practice (KAP) is a crucial step in controlling hypertension.
Objectives: This study aimed to examine the effect of training based on the Expanded Chronic Care Model (ECCM) on KAP in patients with hypertension residing in Isfahan, Iran.
Methods: The clinical trial was conducted on 190 hypertensive patients aged 36 to 80 in 2015 - 2016. Patients were randomly assigned to an intervention and a control group. The intervention plan based on ECCM was four 2-hour education sessions for the intervention group and a family member. Then, follow-ups were done by a phone call for six months. Meanwhile; there was no intervention in the control group. The data collection was done using KAP (a valid researcher-made questionnaire), before and after intervention in both groups.
Results: In the intervention group, there was a statistically significant difference between the mean score of KAP before and six months after the ECCM training ($P < 0.05$). No significant differences were observed in the control group. The two groups were not significantly different in terms of the Mean $\pm$ SD of KAP scores before the intervention. Six months after implementing the care model, however, the Mean $\pm$ SD of KAP scores were significantly higher in the intervention group compared to in the controls ($P < 0.05$).
Conclusions: Based on the results, a training program based on the ECCM is effective in improving the knowledge, attitude, and practice of patients. The ECCM could therefore be used as a framework for designing educational interventions for patients with hypertension.

Keywords: Attitude, Blood Pressure, Education, Health, Hypertension, Knowledge, Practice

1. Background

Hypertension (HTN) is a health issue and chronic disease that affects one billion people around the world and 40% of adults in developed countries (1, 2). HTN is responsible for approximately 7.6 million deaths; that is, 13.5% of all deaths worldwide (3). The prevalence of HTN is reported as 23% in those aged 30 - 55 and 50% in those over 55 in Iran (4) and as 22.2% in Isfahan (5).

The failure to control and prevent HTN remains a medical and social problem in developed and developing countries (6). In Iran, the HTN control rate is approximately 16% as reported in one study (7) and 24.9% in another report (8). The causes of poor control of HTN may be the lack of knowledge regarding the risks of uncontrolled HTN and the failure to adhere to and follow up on treatments (9). HTN patients often lack adequate knowledge regarding blood pressure and require better primary healthcare training (10).

Effective health education interventions to improve the patients' knowledge and attitude and their adherence to the recommended medical regimens have a significant role in controlling this disease (11). According to one study, self-care educational programs are effective in enhancing the level of Knowledge, Attitude, and Practice (KAP) in patients with HTN (12).

Given the chronic and debilitative nature of HTN and its poor control and treatment, a suitable self-care model is required for this disease in order to assist the patients in adopting good health behaviors, sustaining recovery, and improving their health. The Chronic Care Model was designed by Wagner et al. in 1999, and over time, a new version was developed, namely the expanded chronic care model (ECCM). This model is a multifaceted framework to enhance healthcare delivery. The premise of the model is that quality of chronic disease care can be enhanced by community resources, self-management support, and organizational support working in tandem to enhance patient-provider interactions. By providing sufficient information and enhancing the patients' cooperation, this model enables the patients to manage their disease and prepares and motivates them. It also supports self-care and changes the patients' role from passive to active and aware. It turns the patients into determined and influential agents in their health and its promotion. It prepares them for participation in their care by offering supervised education and encourages them to improve their health by preventing and controlling their chronic disease (13-15). Interdisciplinary teams have a key role in implementing this care model, since the power of collaborative knowledge, information and skills is much more than individual potentials. In these teams, members assume certain responsibilities and roles based on their professional capabilities and potentials. The goal of teamwork is to provide patients with the best services from the best providers, at the best time and place and with minimum obstacles. Moreover, discussions among patients during group training sessions promote peer-learning (15, 16).

Examining KAP is a crucial step in controlling HTN. The present study was therefore conducted to examine the effect of training based on the ECCM on KAP in patients with HTN residing in Isfahan, Iran.

2. Methods

2.1. Study Design and Participants

The present randomized clinical trial with a pre-post design was conducted in two groups of patients diagnosed with HTN (the intervention and control groups) over a ten month period in 2015 - 2016 and was registered at the Iranian Registry of Clinical Trials under the ID IRCT201604107391N2. The required sample size in each group was estimated as 90, given a significance level of 0.05, a statistical power of 80%, and the normalized effect size of Δ = (0.3 - 0.9) pertaining to the pre-post intervention score difference reported in the reference article. To achieve a higher precision and considering the 20% chance of attrition, the sample size was increased to 108 per group. This sample size for each group was estimated by similar studies and also based on the Izadirad et al. and Sadeghi et al. studies (17, 18).

This paper is part of a Ph.D. dissertation. The Ph.D. dissertation subjects were selected through random multistage cluster sampling from a population of 2107 individuals aged over 18 in Isfahan. A total of 252 of these individuals (138 women and 114 men) were diagnosed with HTN. Due to reasons given in Figure 1; 36 subjects were excluded from the study. Then, 216 patients were selected and permuted-block stratified randomization (based on age, gender, and education) was used to assign the subjects to an intervention (n = 108) and a control (n = 108) group.

The research was approved by the local Research Ethics Committee (IR.MUI.REC1394.3.790). Informed written consent was obtained from the participants. Moreover, functioning calibrated instruments were used for the measurements. Plus, a booklet of the educational material covered in class was distributed among the controls at the end of the study.

The subjects would be included in the study if they declared their diagnosis with HTN by a physician and were receiving pharmacotherapy for HTN. The exclusion criteria consisted of having any limitations to do the interventions such as cognitive impairment, and unwillingness to continue participation in the study. In addition, if the subjects in the intervention group missed over two sessions of the class, they would be excluded from the study.

Prior to beginning the educational intervention, the questionnaires were filled out for the subjects in both groups and their measurements were taken. The intervention group with HTN received invitations and referrals for visiting their local health centers on pre-determined days with a family member involved in their care.

Using lectures, slides, discussion, question and answers, as well as an educational booklet, the members of the education team, which consisted of a GP, a research PhD student with an MSc in nursing, and a nutritionist, gave training to the intervention group in two-hour sessions held every week for four weeks (for a total of eight hours) in groups of 10 - 15 (consisting of patients accompanied by a family member). For a total of six months, the intervention group was followed-up with by monthly phone calls emphasizing self-care, the material covered in class, and also answering any questions of the patients or their family had.

The material covered in the group training sessions held in the patients' local health centers included training on definition of high blood pressure (HBP), complications and risk factors of HBP, HTN and the importance of its control, the side-effects of uncontrolled HTN, the importance

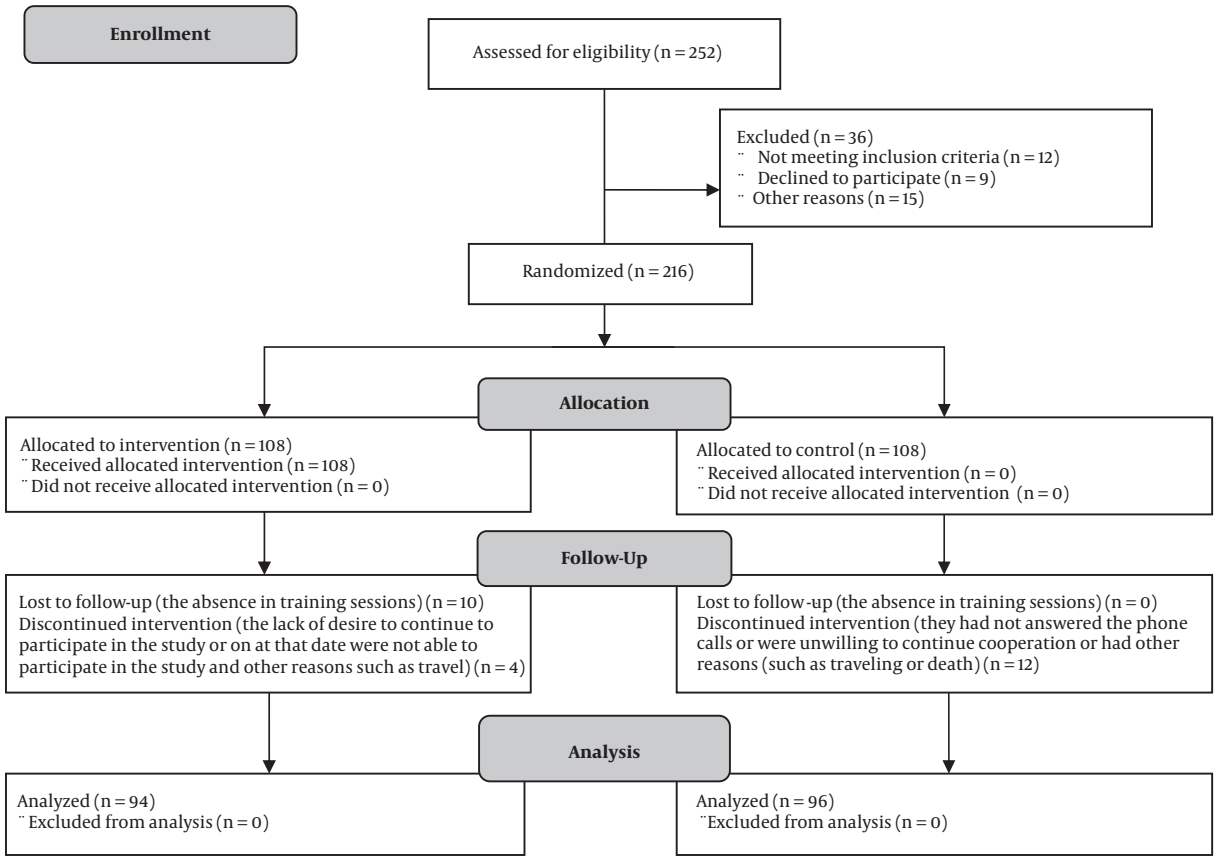

Figure 1. Consort flow diagram of the participants

of preventing and treating the short and long-term side-effects of the disease, non-pharmacological treatments available, and healthy lifestyle choices, such as proper physical activity, appropriate duration, repetition and type of exercise, stress management, restrictions on smoking, the importance of a healthy diet, especially the level of salt intake, the Dietary Approaches to Stop Hypertension (DASH), the importance of diet and its effect on controlling blood pressure (BP), foods that could increase BP, the risks of weight gain, the effect of an increase in waist, abdomen and hip size on BP, proper BP measurement training, pharmacotherapy, medication type and doses, drug interactions, proper storage of medications, recognizing the major side-effects of medications, the importance of regular drug treatment, the importance of continuing the medications after HTN is controlled, the necessity of the timely treatment of the disease, getting the required blood tests as the physician's recommendations, number of follow-ups and referring to the physician, and knowing when to seek immediate medical attention (when experiencing HBP).

Six months after the end of training, the patients in the intervention group were asked to visit their local health centers to fill out the questionnaire once again and have their blood pressure, height, and weight measured another time. Meanwhile, the routine treatment program was continued in the control group, and six months after completing the first questionnaire, they were invited over the phone to visit their local health centers to complete the questionnaire once again. At the end of the study, all of the control group individuals received the training manuals.

4.2. Study Instruments and Variable Assessment

The data collection tools used in this study included a valid researcher-made questionnaire, a digital arm sphygmomanometer, a measuring tape, and a digital weighing scale. A cross-sectional methodological study was conducted to develop an appropriate questionnaire on knowledge, attitude, and practice in hypertension, for this

study. According to the objectives, hypotheses, and research questions, by referring to valuable books, clinical guidelines, scientific resources, and other similar studies, a questionnaire was initially arranged. Then, the face validity of the questionnaire was determined in the expert panel. Content validity was evaluated using two criteria of content validity index and content validity ratio. The questionnaire was given to 21 individuals who were representativeness of the target population and internal consistency was calculated using Cronbach's alpha. Then, to determine the reliability, the questionnaire was given to the same people, for the second time, after 14 days. The Intraclass correlation coefficient (ICC) was calculated. The Cronbach's alpha obtained for the questionnaire was 0.715 for knowledge, 0.787 for attitude, and 0.782 for practice. Moreover, the ICC was 0.924 (0.808 - 0.970) for knowledge, 0.814 (0.531 - 0.926) for attitude, and 0.909 (0.771 - 0.964) for practice.

The questionnaires were completed by the interviewer with maximum precision using face to face interviews with the participants and consisted of several parts. The interviewer was blinded. The 1st part inquired about participants' demographic details, such as age, gender, marital status, years of education, occupation, and economic status. The 2nd part consisted of 20 items on knowledge (given one point in the case of a correct answer or zero in the case of a wrong answer or "I don't know"), 18 items on attitude (scored on a 5-point Likert scale from "completely agree" to "completely disagree"), and 17 items on practice (scored on a 5-point Likert scale from "always" to "never"). The scores ranged from 0 (the lowest score) to 20 (the highest score) on the knowledge section, 18 (the lowest score) to 90 (the highest score) on attitude section, and 17 (the lowest score) to 85 (the highest score) on the practice section. Higher scores in each section indicated a better KAP. Floor and ceiling effects were considered present if > 15% of patients achieved the worst score/floor effect or best/ceiling effect score. A total of 12.5%, 0%, and 0% of patients, achieved the best score in knowledge, attitude, and practice sections, respectively, and 0% achieved the worst score in all of these sections.

The knowledge section contained questions regarding the individuals' knowledge about the natural number of blood pressure, the risk factors of hypertension, and the symptoms and complications of the disease. The attitude section contained questions regarding drug and non-drug treatment of illness as well as referral to physician and lifestyle. The practice section included questions regarding measuring blood pressure, using a proper diet, and avoiding risk factors such as stress, smoking, being overweight, and obesity, inactivity.

The 3rd part consisted of a physical examination form including height (m), weight (kg), pulse rate (per minute), and systolic and diastolic blood pressures (mmHg) on both arms measured on three occasions; the mean of the last two blood pressures measured on the right arm was taken as the patient's blood pressure. Digital and mercury sphygmomanometers were compared and verified on 1 - 3 individuals on multiple occasions. The plastic measuring tapes used were calibrated using a metal measuring tape. The digital weighing scale was calibrated on a daily basis with a 50-kg control weight. Blood pressure was measured using the standard procedure (19). The body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters (20).

4.3. Statistical Analysis

The data were collected from 94 patients (43 women and 51 men) in the intervention group and 96 patients (48 women and 48 men) in the control group. The analysis was performed using the IBM SPSS Statistical Software, version 19.0 (IBMCorp., Armonk, N.Y., USA) and STATA Statistical Software, Release 9. (College Station, TX: StataCorp LP.). The significant level was $P < 0.05$.

The numerical variables are reported as mean $\pm$ standard deviation (SD), and categorical variables are presented as frequencies and percentages. For the within comparisons, the paired *t*-test was used for the normally-distributed numerical variables and Wilcoxon's test for the non-normally-distributed variables. For the between-group comparisons, the independent *t*-test was used for the normal numerical variables and Mann-Whitney's U-test for the non-normal variables. The non-numerical values were compared between the two groups using the Chi-square test. In addition, generalized estimating equations (GEE) analysis was conducted to compare the longitudinal effect of KAP scores for intervention vs. control group.

3. Results

The present study was conducted on 190 patients with HTN (91 women and 99 men) aged 36 to 80. Of the 108 subjects in the intervention group, ten were excluded for having missed more than two sessions of the class. Six months after the end of training, four subjects could not make it to the follow-up on the specified date (due to the fact that they were traveling, for instance). Of the 108 subjects in the control group, 12 were excluded from the study due to the fact that they had not answered the phone calls, were unwilling to continue cooperation, or had other reasons (such as traveling or death, which was the case for a 60-year-old woman who died due to heart attack) (Figure 1).

The results of the independent *t*-test (Table 1) showed that the two groups were not significantly different in

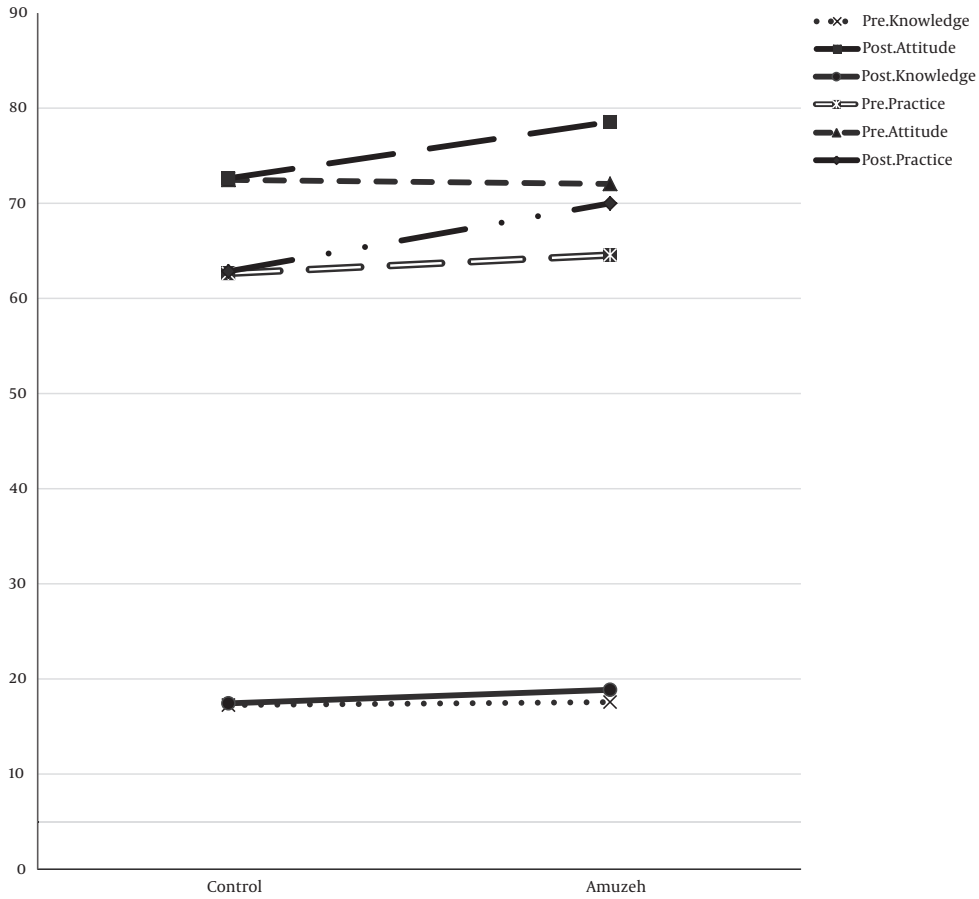

Figure 2. The mean of knowledge, attitude and practice scores within and between intervention and control groups before and after the intervention

terms of age, BMI, pulse rate, diastolic blood pressure (DBP), and systolic blood pressure (SBP) ($P > 0.05$). Moreover, based on Mann-Whitney's U-test, there were no significant differences between the two groups in terms of the duration of HTN and years of education. Based on the Chi-square test (Table 2), the two groups were not significantly different from each other in terms of gender, economic status, and occupation ($P > 0.05$), however, they were different in terms of marital status. Furthermore, 56.4% of the cases and 61.5% of the controls had their HTN under control, although no significant differences were observed between the two groups based on the Chi-Square test ($P \geq 0.05$).

The comparison of the mean and SD of knowledge scores (Table 3) in the intervention group using Wilcoxon's test before and six months after the ECCM training showed a statistically significant increase in the mean score ($P < 0.05$). In the control group, the mean and SD of knowledge scores had increased slightly by the end of the study compared to the beginning; however, this difference was not significant based on Wilcoxon's test ($P > 0.05$). The mean and SD of attitude scores increased in the intervention group six months after training compared to at the beginning; the paired *t*-test showed that this difference was significant ($P < 0.05$), suggesting an improved attitude among the patients. No significant differences were observed in the control group in terms of attitude scores based on the paired *t*-test ($P > 0.05$). In the intervention group, the mean scores of practice increased six months after the ECCM training and this difference was statistically significant based on the paired *t*-test ($P < 0.05$). In the control group, the mean and SD of practice scores increased slightly by the end of the study compared to at the beginning; however, the difference was not significant based on the paired *t*-test ($P > 0.05$).

Based on the results of Mann-Whitney's U-test (Table 3), the two groups were not significantly different in terms of mean and SD of knowledge scores before the interven-

Table 1. The Comparison Between Quantitative Demographic Variables in the Intervention and Control Groups[a]

	Total, N = 190	Intervention Group, N = 94	Control Group, N = 96	P Value
Age, y	59.27 ± 9.46	60.37 ± 9.20	58.19 ± 9.64	0.112*
BMI, kg/m²	29.58 ± 4.29	29.22 ± 4.49	29.93 ± 4.07	0.257*
Duration of having hypertension, mo	74.84 ± 75.21	84.89 ± 84.36	65.00 ± 63.94	0.093**
Pulse, per minute	72.83 ± 12.54	71.59 ± 12.55	74.05 ± 12.48	0.176*
SBP, mmHg	134. 83 ± 18.88	135.61 ± 19.32	134.07 ± 18.51	0.576*
DBP, mmHg	79.94 ± 11.12	80.77 ± 10.92	79.13 ± 11.30	0.309*
Years of education	8.36 ± 5.10	9.05 ± 4.97	7.69 ± 5.16	0.085**

[a]Values are expressed as Mean ± SD.

Table 2. The Comparison Between Qualitative Demographic Variables in the Intervention and Control Groups[a,b]

	Intervention Group, N = 94	Control Group, N = 96	P Value
Sex			0.557
Female	43 (45.7)	48 (50)	
Male	51 (54.3)	48 (50)	
Marital			0.020
Single and widows	16 (17)	6 (6.3)	
Married	78 (83)	90 (93.7)	
Economic income status			0.881
Little	49 (52.1)	49 (51)	
Moderate and good	45 (47.9)	47 (49)	
Occupation status			0.076
Employed	17 (18.1)	27 (28.1)	
Housewife	38 (40.4)	43 (44.8)	
Retired	39 (41.5)	26 (27.1)	
Hypertension			0.477
Controlled HTN	53 (56.4)	59 (61.5)	
Non controlled HTN	41 (43.6)	37 (38.5)	

[a]Values are expressed as No. (%).
[b]P value derived from the Chi-square test.

Table 3. The Comparison of the Mean ± SD Score of KAP Within and Between Intervention and Control Groups Before and After Implementation of Care Model

	Knowledge			Attitude			Practice		
	Before	After	P Value[a]	Before	After	P Value[b]	Before	After	P Value[b]
Intervention group	17.56 ± 1.99	18.86 ± 1.12	< 0.001	72.03 ± 7.21	78.55 ± 5.89	< 0.001	64.55 ± 8.85	69.98 ± 6.73	< 0.001
Control group	17.25 ± 2.33	17.43 ± 2.12	0.134	72.45 ± 7.87	72.62 ± 7.63	0.659	62.62 ± 9.25	62.84 ± 8.86	0.427
P value[c]	0.439	< 0.001		0.698	< 0.001		0.144	< 0.001	

[a]P value derived from Wilcoxon test.
[b]P value derived from paired t-test.
[c]P value derived from Mann-Whitney U test or Independent t-test.

tion (P > 0.05). Six months after implementing the care model, however, the mean and SD of knowledge scores were higher in the intervention group than in the controls, suggesting a significant difference based on Mann-

Whitney's U-test ($P < 0.05$).

Moreover, based on the results of the independent *t*-test, the two groups were not significantly different in terms of the mean and SD of attitude and practice scores before the intervention ($P > 0.05$). Six months after implementing the care model, however, the mean and SD of attitude and practice scores were significantly higher in the intervention group compared to the controls ($P < 0.05$).

The duration of having hypertension (month) and years of education in Table 1, plus knowledge score in Table 3 were non-normal variables. Median and percentiles of 25, 50, and 75 of the duration of having hypertension in the intervention group were 60.00, 24.00, 60.00, and 120.00, respectively, and in the control group, the median was 48.00, and Percentiles of 25, 50, and 75 were 24.00, 48.00, and 84.00. Median and percentiles of 25, 50, and 75 of years of education in the intervention group were 9.00, 5.00, 9.0 0, and 12.00, respectively, and in the control group, median was 6.00, and percentiles of 25, 50, and 75 were 5.00, 6.00, and 12.00. Before the intervention, median and percentiles of 25, 50, and 75 of knowledge score in the intervention group were 18.00, 17.00, 18.00, and 19.00, respectively, and in control group median was 17.50, and percentiles of 25, 50, and 75 were 16.00, 17.50, and 19.00, respectively. After intervention, median and percentiles of 25, 50, and 75 of knowledge score in the intervention group were 19.00, 18.00, 19.00, and 20.00 respectively, and in the control group median was 18.00, and percentiles of 25, 50, and 75 were 16.00, 18.00, and 19.00 respectively.

As shown in Table 4, knowledge, attitude, and practice mean changes were higher in the intervention group compared to in the controls and were 0.87 ± 0.26, 2.75 ± 0.97, and 4.54 ± 1.18, respectively. Based on GEE analysis and adjustments applied to age, gender, and education, the mean changes were still significant ($P < 0.05$). Figure 2 demonstrates the mean of knowledge, attitude, and practice scores within and between intervention and control groups before and after the intervention.

4. Discussion

Based on the results of the study, before the intervention, the two groups were not statistically different in terms of age, gender, BMI, pulse rate, DBP, SBP, years of education, duration of affliction with HTN, HTN control, economic status, and occupation ($P > 0.05$), showing the homogeneity of the groups as a result of the randomization.

The mean age was about 60 in both groups. The results obtained by Zaw and Zinat Motlagh showed a positive correlation between age and the prevalence of HTN and the risk of HTN are higher in older age (21, 22).

Obesity is one of the factors involved in HTN that also raises the risk of cardiovascular diseases (23). The mean BMI was about 30 in both groups in the present study, revealing obesity or overweight among the subjects.

There are various studies about HTN control in Iran. A study has reported that HTN control rate in Iran is about 41% (24) and about 20.9% in Isfahan citizens (25). Based on the results of the present study, 56.4% of the subjects in the intervention group and 61.5% of those in the control group had their HTN under control; that is, the mean SBP was < 140 mmHg and the mean DBP < 90 mmHg in the last two measurements in patients with HTN receiving pharmacotherapy (26). In other words, the rate of HTN control has improved in Isfahan.

The rate of HTN control and treatment appears to have improved over the past decade (27) due to the improvement of insurance coverage, the enhancement of healthcare, the better availability of medical services, the implementation of the family doctor program, the provision of services by health and medical centers, the television programs aired on the National Health Channel, the health messages transmitted through the national media, the wider use of the internet and the implementation of large-scale studies such as cohort studies and Isfahan Healthy Heart Program (IHHP) by Isfahan Cardiovascular Research Institute (27). In one study, Ke also reported that the increase in patients' awareness regarding their salt intake affected their rate of HTN control and treatment (28).

In the present study, the mean and SD of knowledge scores increased significantly in the intervention group six months after the ECCM training, which indicates the effectiveness of the program in enhancing the patients' knowledge. In another study, Pandit et al. showed that health training enhanced the knowledge of patients with HTN (29). Moreover, based on the results, the mean and SD of attitude and practice scores increased in the intervention group six months after training, which suggests an improvement in their attitude and practice. Although the mean KAP scores increased slightly in the control group by the end of the study, the difference was not statistically significant with the scores at baseline.

In a study by Jafari et al. a training program aiming to correct the lifestyle of patients with HTN undergoing angioplasty effectively enhanced the KAP scores in the intervention group, and the mean KAP scores differed significantly from before the intervention to the end of the intervention and one month later, while no significant increase was observed in the scores in the control group (30).

In the present study, the two groups were not significantly different in terms of their KAP scores before the intervention; however, the scores were acceptable in both groups. Sabouhi et al. also reported relatively high KAP

Table 4. Beta ± SE and 95%CI of Comparing Longitudinal Effect of KAP Scores for Intervention vs. Control Group[a]

	Beta ± SE	95% CI	P Value
Knowledge (intervention vs. control group)			
Crude	0.87 ±0.26	(0.36, 1.38)	0.001
Adjusted	0.86 ± 0.25	(0.37, 1.35)	0.001
Attitude (intervention vs. control group)			
Crude	2.75 ± 0.97	(0.85, 4.65)	0.005
Adjusted[b]	2.36 ± 0.97	(0.45, 4.27)	0.015
Practice (intervention vs. control group).			
Crude	4.54 ± 1.18	(2.23, 6.85)	< 0.001
Adjusted	3.95 ± 1.23	(1.54, 6.37)	0.001

[a] Results deduced from generalized estimating equations (GEE) analysis.
[b] Results were adjusted for age, sex, and education.

scores in the patients with HTN in Isfahan (31). A cohort study and an IHHP report revealed an increase in the public knowledge about HTN in Isfahan (27). In a study by Bollampally, the patients had sufficient knowledge regarding HTN side-effects, normal blood pressure, symptoms of HTN, name of HTN medications, and the risk factors of HTN. Reports from the National Health and Nutrition Examination Survey (NHANES 1, 2) showed an increase in the public knowledge about HTN from 51% to 73% between 1976 and 1991 along with a more positive attitude and improved practice in patients (1).

Based on the results of the present study, six months after implementing the care model, the mean and SD of the KAP scores were higher in the intervention group than in the controls, indicating the effectiveness of the training program in enhancing KAP in the former. Although the mean KAP scores increased in both groups, the changes were more significant in the intervention group. Sadeghi et al. implemented a Health Belief Model-based educational intervention for patients with HTN and reported a significant increase in knowledge and awareness in the intervention group, while no such significant increase was observed in the control group (18).

In a study by Baghaee et al. the implementation of a BASNEF model-based educational intervention remarkably enhanced dietary adherence among patients with HTN. Educational interventions based on this model were therefore recommended as a complementary and facilitating factor for enhancing dietary adherence among HTN patients (32). In Thailand, a national educational program on healthy lifestyle in chronic non-communicable diseases such as HTN is currently being implemented to improve the patients' knowledge and attitude in the 2010 - 2020 period (33).

Based on a number of studies, patients' beliefs regarding pharmacotherapy can be positively affected by enhancing their knowledge through educational interventions (34). Benue et al. also showed a reduced blood pressure and improved lifestyle in patients with HTN following an educational intervention (35). Education seems to affect the fundamental indicator of (behavioral) adherence, the prerequisites of adherence (i.e., knowledge and attitude), and some clinical outcomes of medication adherence, such as SBP and DBP (36).

In general, based on the results of this study, a training program based on the ECCM is effective in improving the knowledge, attitude, and practice of patients. The ECCM can, therefore, be used as a framework for designing educational interventions for patients with HTN.

4.1. Limitations and Strengths

One of the limitations of the present study pertains to the refusal or no-response bias, as the researchers visited the patients at their homes and invited them to participate in the study. It is possible that the more sensitive, aware, cultured, and educated individuals have agreed to participate in the research, who have received high KAP scores even at baseline. Due to these restrictions, using strategies such as longer follow-up time on missing values was not applicable in this study. Therefore, it is recommended that future qualitative and quantitative studies should be performed with more extended follow-up periods. Consequently, the results cannot be generalized to those who did not participate in the study for any reason; however, this limitation is not unique to the present study.

The strengths, novelty, and significance of this study lie in the fact that, based on this care model, members of the medical team used clinical guidelines for care and treatment and were prepared, active, coordinated, unified,

and cooperative with the patients and assisted them in accepting health behaviors, sustaining recovery, and improving their health by providing healthcare services in line with their needs and problems and through sensitizing them to the subject and within a continuous care process with follow-ups. Moreover, persistence, encouragement, and support on the part of family members and educators were effective in improving the patients' KAP. The patients' families were also educated along with their patients and learned about the importance and the chronic nature of the disease.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Acknowledgments

This paper is extracted from a Ph.D. thesis approved by Isfahan University of Medical Sciences under the ID 394790. This study has been funded by the Iranian National Science Foundation and registered under number 91004751. The National Network of Cardiovascular Research and the Isfahan University of Medical Sciences as well as Isfahan Cardiovascular Research Institute have funded the study too. Hereby, the authors would like to express their gratitude to all those who assisted us in conducting this study, especially all the patients and their families.

Footnotes

Authors' Contribution: Implementer, data collection, and author: Maryam Eghbali-Babadi; statistical advice and monitoring on article writing: Awat Feizi; monitoring on article writing and implementation of the project: Alireza Khosravi; monitoring on article writing and implementation of the project: Nizal Sarrafzadegan. All the authors approved the final version of the manuscript.

Conflict of Interests: Authors have no conflict of interests.

Funding/Support: This manuscript was supported by Iranian Network of Cardiovascular Research, Vice Chancellor for research, Isfahan University of Medical Sciences, and Isfahan Cardiovascular Research Institute, Iran.

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