Original Article

The effect of education based on Leventhal's model on adherence to treatment and control of blood pressure in patients with hypertension

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ARTICLE INFO	ABSTRACT
	Background & Aim: Hypertension is a prevalent and significant health problem; moreover, lack of treatment adherence can cause precarious complications. The present study aims to determine the effect of education based on Leventhal's model on adherence to treatment and control of blood pressure in patients with hypertension. **Methods & Materials:** This quasi-experimental **study** was performed on 59 patients with hypertension in Gonabad in 2020. The participants were selected based on convenience sampling; they were randomly assigned to the intervention and control groups. In addition to the routine treatment for hypertension, the patients in the intervention group received a training program based on Leventhal's model in 45-minute sessions and three times a week. In contrast, the patients in the control group received only the routine treatment for hypertension. A demographic and Hill-Bone Adherence Questionnaires were completed for the participants. Moreover, their blood pressure was recorded using the blood pressure record form. The data were analyzed in SPSS v.22 software, at the significance level of $p<0.05$. **Results:** The two groups were homogeneous in adherence to treatment (P=0.63) before the intervention; yet, there was a substantial difference between the groups once the intervention was implemented (P<0.001). Besides, the average systolic and diastolic blood pressure was not significantly different between the two groups before the intervention. After the intervention, though, the difference was reported significant ($p<0.05$). **Conclusion:** Education based on Leventhal's model caused an improvement in adherence to treatment and reduced blood pressure among patients with hypertension.

Introduction

According to the World Health Organization (WHO) reports, chronic and non-communicable diseases are increasing worldwide, especially in developing countries. Hypertension is one of the most prevalent chronic diseases (1). It refers to a complication in which blood pressure is chronically higher than 140/90 mm/Hg (2). Hypertension is the leading cause of death around the globe (3). It is also recognized as a fundamental cause of preventable death (4). High blood pressure is a crucial risk factor for cardiovascular disease that accounts for most cardiovascular-related incidents in the United States compared to other modifiable risk factors (5). The most crucial risk factors for hypertension include inadequate diet, inactivity, smoking, and inappropriate lifestyle (6). Besides, various psychological factors, emotional factors, stress, and anger can also affect hypertension (7).

Hypertension is observed in more than one billion adults worldwide (8), and it is estimated to increase to 1.5 billion people by 2025 (9). According to WHO, it is projected to witness a 33% prevalence rate for hypertension in different parts of the world among the adult population. It is expected to rise to 60% by 2025 (10). According to

existing studies, the prevalence of hypertension is estimated at 17 to 25% among adults in Iran (11). It is noteworthy that hypertension is recognized as a major health problem worldwide due to its excessive prevalence and its severe and precarious complications on the body organs (12).

This disease is very significant because of its high prevalence rate. Given that many patients with hypertension do not tend to control their high blood pressure, it is even more imperative to highlight the significance of this disease. If hypertension is controlled, there will be a substantial reduction in the occurrence of cardiovascular diseases. For example, in the United Kingdom, brain stroke and heart diseases are estimated to reduce by 28-46 percent and 20-37 percent, respectively (13, 14). However, many patients disregard or degrade the recommended treatment procedure. Recent studies have shown that low adherence to treatment in patients with hypertension is reported around 30 to 50 percent, leading to a 15 to 20 percent increase in the treatment costs and more frequent hospitalizations (15).

It is also believed that failure in medical treatment in patients is primarily attributed to the lack of understanding of the disease and the lack of treatment adherence. Therefore, adherence to treatment and raising the patients' perception of hypertension are considered prominent measures to control hypertension (16). As a result, these two factors and making changes in the patients' lifestyle can play a significant role in controlling and preventing this disease. For this purpose, such patients should be trained using appropriate educational approaches to develop a proper understanding of the disease and adherence to the necessary treatment procedures (15).

Educating the patient with hypertension is regarded as a critical part of treatment, so that it might be impossible to achieve the therapeutic objectives without proper education for the patients (17). It is also noteworthy that patient education will have economic benefits because each dollar spent on education can help reduce medical costs by 3 to 4 percent (15). According to statistics in the United States, 69-100 million dollars are spent annually on the problems caused by the lack of patient education (18). Nevertheless, selecting appropriate and effective teaching methods has always been one of the central challenges in this regard. Leventhal's self-regulatory model is considered one of the proposed and investigated educational models accordingly (19). Leventhal's model is the common-sense model that works on modifying the cognitive process by organizing the content. According to some studies, including a seminal study by Sadeh Tabarian et al. on the effectiveness of education based on Leventhal's model on the patients' perception and adherence to treatment among the patients with diabetes, it is suggested that Leventhal's approach is likely to affect the patient's perception and adherence to treatment (19).

According to Leventhal's model, each patient would begin to form a mental pattern or a system of beliefs about his/her disease. After observing the stimulus, he/she would interpret the observed symptoms based on that mental pattern. This model asserts that a people's reaction toward a threat is determined based on their beliefs and perceptions about the six variables of nature, causes, consequences, manageability, duration of the illness, and disease severity. This model also emphasizes evaluating the symptoms of the disease and believes that the individuals' mental manifestations of the disease are shaped based on their awareness and perception, including the perception of a threat; this can, in turn, affect their disease behavior. Leventhal believes that every component of the disease's perception can affect the patients' behavior in response to the symptoms. The patients' decisions at the stage of assessing the symptoms are influenced by the perception of the symptoms and their emotional characteristics. Therefore, the individuals' reactions may vary according to their perception of the identity of the threat and the cause of the symptoms, their perception

of the severity of the disease, their beliefs about the possible outcomes, as well as their expectations regarding the manageability and treatment of the symptoms (20, 21).

It is noteworthy that different educational methods have been implemented for this group of patients. Nonetheless, each educational method investigates different dimensions, such as mental norms, self-efficacy, attitude, etc., in adherence to treatment. Leventhal's model considers the perception of the disease as an essential factor in directing and managing the disease. In addition, this model affects the patients' perception. It only requires a little time to be implemented; moreover, no research has been conducted on the adherence to treatment and its effect on hypertension in patients with hypertension based on the premises of this model. Therefore, due to the significance of the problem and the lack of a similar study in the literature, the present study was designed and conducted to determine the effect of education based on Leventhal's model on the adherence to treatment and control of blood pressure in patients with hypertension.

Methods

Study design

This quasi-experimental study was conducted in Gonabad health centers in 2020. The present study was performed based on a pre-test and post-test design and investigated the comparison between an intervention and a control group.

Sample size

Mirkarimi et al. (16) applied the same methodology and studied the effect of lifestyle modification on adherence to treatment and blood pressure among the patients experiencing hypertension. Therefore, using the average comparison formula for adherence to treatment and considering the 95% confidence interval and 80% test power, a minimum of 29 participants were calculated for each group.

Given the 10% probability of drop rate, 32 individuals were selected for each group.

Statistical population and sampling

The statistical population of this study included the entire patients with hypertension referring to the healthcare centers in Gonabad (3 urban centers with seven sub-centers). The following inclusion criteria were implemented for the present study: the confirmation of hypertension by a specialist physician, between 20 and 60 years of age, no history of mental disorder that interferes with the intervention (based on the patients' profile), no history of participation in similar training programs, the ability to understand simple conversations in Persian language, lack of communication disorders (such as hearing and vision impairment), as well as the lack of diagnosis with severe underlying diseases such as malignancies, severe heart disease, and respiratory failure. Besides, the exclusion criteria included: absenteeism in each training session and reluctance to continue the study.

Initially, a list of all the patients in the health centers was prepared. Using random numbers generated in Excel software, 64 patients were selected according to the inclusion criteria. Afterward, they were divided into two equal groups (32 patients in each group) so that the first patient was assigned to the intervention group and the next one to the control group. The same procedure was applied for the assignment of all the participants into the two groups. Moreover, blinding was performed in this study. Then, an experienced nurse who was not informed of the group assignments was asked to measure the patients' blood pressure and complete the questionnaire for treatment adherence.

Data collection

The data were collected using a demographic information questionnaire, Hill-Bone treatment adherence questionnaire, and a blood pressure record form. The demographic information questionnaire included questions about age, sex, weight,

height, marital status, level of education, employment status, physical activity, place of residence, smoking, history of hypertension, underlying diseases, and previously prescribed medications. The blood pressure record form included a table to record systolic and diastolic blood pressures for each participant before and after the intervention.

The Hill-Bone's Adherence to Treatment Questionnaire was first established by Kim et al. in 2000 (22). This questionnaire contains fourteen items and is prepared regarding the three areas of taking medication, consuming salt, and referring to the physician. Each question would be responded to against four options: never (4), sometimes (3), often (2), and always (1). The higher scores obtained from the questionnaire indicate greater adherence to treatment. In this questionnaire, the lowest score is considered 17 indicating non-adherence to treatment, and the highest score is considered 53 indicating the maximum or full adherence. The other respective values are relative and show the level of treatment adherence. The reliability of the instrument was proved according to a seminal study by Ashktorab et al. In addition, the Cronbach's alpha coefficient for the Hill-Ben questionnaire was estimated at 0.71 (23). In this regard, the obtained Cronbach's alpha coefficient of 0.89 indicated the acceptable reliability of the instrument in the present study.

Furthermore, ALPK2 hand-held Japanese sphygmomanometer, whose validity was evaluated based on the manufacturer's report and blood pressure calibrator by the hospital medical engineer. Blood pressure was measured and recorded from the patients' right hand in both groups, 15 minutes after resting in a sitting position; this measurement was performed by an experienced nurse who was unaware of the assignments of research participants.

Intervention

The participants in both groups received routine treatment for hypertension. Then, the patients in the intervention group, which consisted of four groups, were provided with face-to-face training based on the different areas of Leventhal's model in three 45 to 60-minute sessions per week. It is noteworthy that the research's geographical limitations made it possible for the participants to attend the sessions following the required coordination. In the first session, the researcher would explain the nature and symptoms of the disease to the research participants; then, the aggravating factors such as improper diet, smoking, medication complications, intensive activities, and physical and psychological stress from the patient's perspective were discussed. During the first session, the focus was on the modification of the patients' misunderstanding. After reviewing the main issues of the previous session, the researcher discussed the patient's beliefs about the consequences of the disease, the duration of the disease, and how to control and treat hypertension according to their understanding in the second session. In the third session and after reviewing the main issues of the previous sessions, a booklet consisting of brief explanations related to hypertension was provided to the participants in the intervention group to review the topics presented in the class. The participants in this group would also receive telephone follow-up calls by the researcher for eight weeks after the intervention. The phone calls were made every other week for 10 minutes (based on the patients' needs) to provide verbal encouragement, answer their questions, reinforce their knowledge, and evaluate the possible changes.

Procedure

Before the intervention, the patients in the intervention group were provided with a brief explanation of the research; then, the demographic information and treatment adherence questionnaires were completed in groups. Moreover, the participants' blood pressure in both groups was measured and recorded earlier than the provision of the intervention. Finally, the questionnaire regarding treatment adherence was completed; then, blood pressure measurement was conducted for both groups again, eight

weeks after the first stage of the intervention.

Ethical considerations

This study has been approved by Gonabad University of Medical Sciences (Ethics ID: IR.GMU.REC.1398.179). Having explained the purpose and procedure of the present study to the patients, they were invited to participate in the research, and the written consent form was obtained accordingly. While complying with all the ethical codes, the patients were also assured that their reluctance to participate in the study would not prevent them from receiving the routine services in the center. Also, they could leave the research without any problems at any time. In addition, the participants in the intervention and control groups were assured of the confidentiality of the information and the accuracy and scientific reliability in recording and analyzing the collected data. After data collection, educational materials were also provided to the patients in the control group to observe ethical issues.

Data analysis

Data analysis was performed using SPSS software version 22. The data were described using indexes of central tendency and dispersion (frequency, percentage, mean, & standard deviation). Kolmogorov-Smirnov (K.S) test was used to examine the compliance of the data with normal distribution premises.

Moreover, an independent samples t-test was applied to appraise the mean scores for treatment adherence and systolic blood pressure before and following the intervention based on the normal distribution of the data. Nonetheless, the Mann-Whitney test was utilized to compare the average scores of diastolic blood pressure before and after the instruction, provided that the data did not follow the normality of distribution. Furthermore, an independent t-test was used to compare the demographic information such as age, BMI, weight, height, and the duration of physical activity; Chi-square test was performed to compare the variables of gender, marital status, educational level, occupation, smoking, physical activity, and underlying diseases; and Mann-Whitney test was run to compare the duration of the disease. To determine the effect size of the intervention on blood pressure, the blood pressures (systole and diastole) were compared before and after the intervention. Finally, the level of significance was considered $p<0.05$ for the present study.
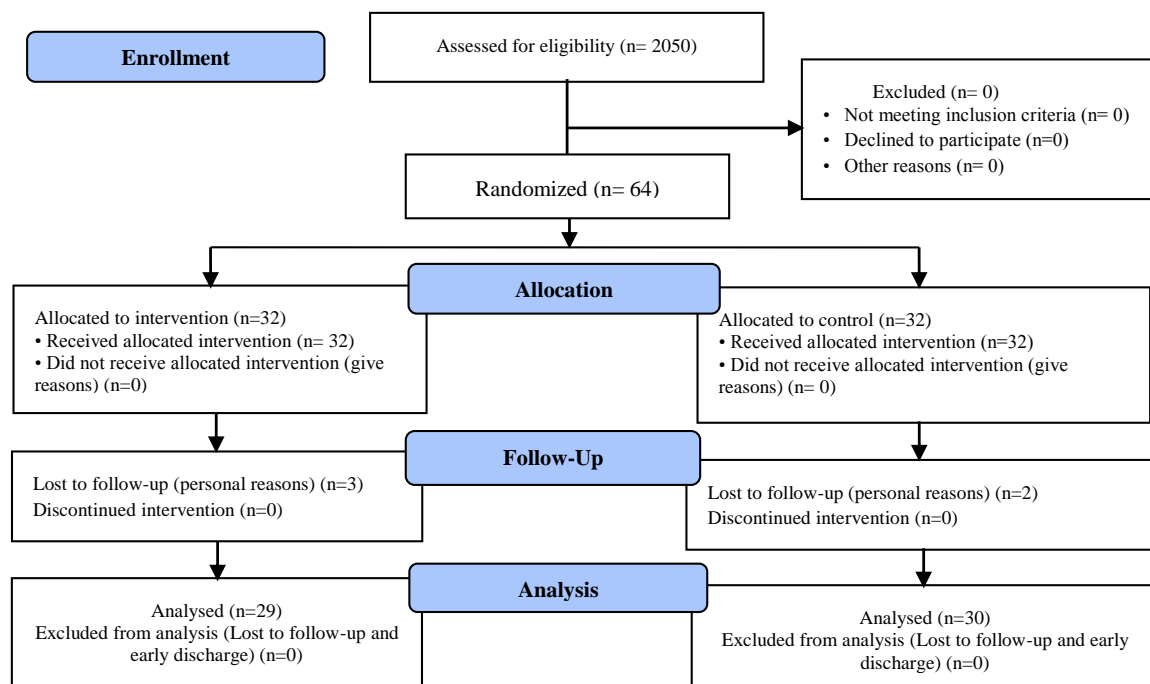

Figure 1. The flow diagram of the study, based on the Consort statement 2012

Results

The data on 59 patients with hypertension were analyzed in this study (Figure. 1). According to the research findings, 21 (35.6%) participants were male, and 38 (64.4%) were female. The average age of the research participants was 51.95±6.01 within the range of 32-60 years. Moreover, the average weight of the patients was 74.94±13.22 within the range of 51-113 kilograms. Besides, 5.1% of the research participants were single, 89.8% were married, and 5.1% were widowed. The majority of the participants (62.7%) had undergraduate education, 22% held a diploma, and only 15.3% held a university degree. Nevertheless, the patients in the intervention and control groups were homogeneous in terms of demographic characteristics (Table 1).

Table 1. Comparison of the demographic characteristics of the patients with hypertension in the two intervention and control groups

Demographic characteristics		Intervention group N=29	Control group N=30	P-value
Sex	Female	21 (72.4%)	17 (56.7%)	P=0.20
	Male	8 (27.6%)	13 (43.3%)	
Marital status	Single	4 (13.8%)	2 (6.7%)	P=0.36
	Married	25 (86.2%)	28 (93.3%)	
Education	High-school degree	16 (55.2%)	21 (70%)	P=0.48
	Diploma	8 (27.6%)	5 (16.7%)	
	University degree	5 (17.2%)	4 (1.3%)	
Occupation	Employee	8 (27.6%)	5 (16.7%)	P=0.46
	Household	17 (58.6%)	18 (60%)	
	Retired	4 (13.8%)	7 (23.3%)	
Drug use	Yes	1 (3.4%)	3 (10%)	P=0.61
	No	28 (96.6%)	27 (90%)	
Place of residence	City	24 (8.28%)	29 (96.7%)	P=0.10
	Village	5 (17.2%)	1 (3.3%)	
Physical activity	Yes	14 (48.3%)	16 (53.3%)	P=0.69
	No	15 (51.7%)	14 (46.7%)	
Underlying disease	Yes	17 (58.6%)	21 (70%)	P=0.36
	No	12 (41.4%)	9 (30%)	
Age (year)		50.79±7.5	53.07±3.62	P=0.14
BMI		28.33±4.49	29.23±5.67	P=0.50
Weight		75.62±13.00	75.26±13.66	P=0.85
Height		162.44±10.16	161.00±10.39	P=0.59
Duration of physical activity		21.197±17.59	22.30±18.17	P=0.91
Duration of the disease		6.34±6.04	5.13±4.17	P=0.58

There was no meaningful variation between the patients' adherence to treatment in the intervention and the control groups at the beginning of the study (p=0.63); nevertheless, a noticeable difference was observed following the intervention. Moreover, the paired t-test indicated no significant difference in the adherence to treatment between the pre-test and post-test results in the control group. On the other hand, there was a statistically substantial difference between the groups after the intervention concerning treatment adherence. Moreover, there was also a significant difference between the pre-test and post-test results among the patients in the intervention group. (Table 2).

Furthermore, the present study's findings suggested that there was no statistically significant difference between the mean scores of the sub-scales of consuming salt, taking medicine, and referring to a physician before the intervention in the participants of both groups. Meanwhile, the difference was statistically significant between the two groups after the intervention (Table 3).

Based on the results of the independent t-test, table (4) suggests that there was no significant difference between the two groups in terms of systolic blood pressure before the

intervention (P=0.40); however, the difference was significant after the intervention (P=0.02). Moreover, the results of the paired t-test also confirmed the statistically significant difference between the two groups in terms of systolic blood pressure after the intervention (P<0.05). There was no significant difference between the two groups before the intervention (P=0.68). Nonetheless, this difference was reported significant after the intervention (P=0.002). Besides, the results of the Wilcoxon test indicated no significant difference between the scores of diastolic blood pressure in the pre-test and post-test among the patients in the control group (P=0.29). On the other hand, there was a statistically significant difference between the pre-test and post-test results in the

intervention group regarding diastolic blood pressure (P<0.001).

The results of the independent t-test showed that there was a significant difference between the pre-test and post-test in the two groups regarding systolic blood pressure. In other words, systolic blood pressure has decreased in the intervention group but increased in the control group. Moreover, the Mann-Whitney test results also indicated a significant difference between the two groups in terms of diastolic blood pressure. To investigate the effect size of the intervention on blood pressure, the difference between systolic and diastolic blood pressure scores, as a new research variable, was calculated to compare the two stages (Table 5).

Table 2. Comparison of the average scores of adherence to treatment among the patients in the two intervention and control groups, prior and after the intervention

Groups / Adherence to treatment	Before the intervention	After the intervention	Paired T-test results
Control	45.80±5.61	45.70±5.55	t=0.53 df=29 p=0.59
Intervention	45.10±5.45	52.17±4.90	t=-11.51 df=28 p<0.001
Independent t-test results	t=-0.483 df=57 p=0.63	t=4.73 df=57 p<0.001	

Table 3. Comparison of the average scores of the sub-scales of adherence to treatment (consuming salt, taking medicine, & referring to the physician) among the patients in intervention and control groups, before and after the intervention

Sub-scale	Before the intervention			After the intervention		
	Intervention	Control	Mann-Whitney test	Intervention	Control	Mann-Whitney test
Consuming salt	9.51±4.93	9.40±5.16	Z= -0.319 P= 0.75	11.41±0.73	9.23±1.65	Z= -5.59 P<0.001
Taking medicine	30.65±4.21	31.23±4.86	Z= -1.23 P= 0.21	34.24±4.38	31.06±4.85	Z= -4.57 P<0.001
Referring to the physician	4.93±1.25	5.16±1.26	Z= -1..03 P= 0.30	6.51±1.45	5.40±1.32	Z= -2.81 P= 0.005

Table 4. Comparison of the average scores of the systolic and diastolic blood pressure among the patients in the two intervention and control groups, before and after the intervention

Groups		Systolic blood pressure			Diastolic blood pressure		
		Intervention	Control	Independent t-test	Intervention	Control	Mann-Whitney test
Before	SD±Mean (mmHg)	134.03±12.26	131.33±12.57	t= 0.835 df= 57 P= 0.40	82.89±5.79	81.46±10.49	Z= 0.41 P= -0.68
After	SD±Mean (mmHg)	127.00±11.68	134.53±13.01	t= -2.33 df= 57 P= 0.02	78.13±5.99	82.43±9.86	Z= -3.03 P= 0.002
Paired t-test		t= 6.26 df= 28 P< 0.001	t= -3.25 df= 29 P= 0.003	Wilcoxon test	Z= -3.91 P< 0.001	Z= -1.04 P= 0. 29	

Table 5. Comparison of the differences between the average scores of the systolic and diastolic blood pressure in both groups, before and after the intervention

Group / Variable	Intervention SD±Mean	Control SD±Mean	Results
Systolic blood pressure	7.03±6.05	-3.20±5.38	t= 6.87 df= 57 P<0.001
Diastolic blood pressure	4.76±5.09	-0.97±3.37	Mann-Whitney U= 150.5 Z= 4.33 P<0.001

Discussion

The present study aimed to determine the effect of education based on Leventhal's model on adherence to treatment and control of blood pressure in patients with hypertension. The results indicated that all the participating patients obtained low adherence scores in the pre-test stage. However, the patients in the intervention group could obtain significantly higher scores regarding adherence to the treatment compared to the pre-test and compared to the patients in the control group after participating in educational sessions based on Leventhal's model. In other words, the intervention sessions had a significantly positive effect on adherence to treatment.

Leventhal et al. conducted a study by implementing the features of the common-sense model on patients. They concluded that the best adherence pattern to treatment could be observed among the patients who are aware of the severity of the disease and its complications and use self-regulatory strategies to control the aggravating factors

(24). It is also noteworthy that such results are in line with the findings of the present study.

In a seminal study, Taheri et al. asserted a significant relationship between the perception of disease and adherence to treatment in patients with hypertension. They also concluded that it is necessary to raise the patients' awareness of the disease as an effective strategy to increase their adherence to treatment (20). Moreover, the results of another study by Seyyedrasooli et al. highlighted that the implementation of interventions that promote the perception of disease could be effective on adherence to the treatment among the patients undergoing hemodialysis (25), which is consistent with the findings of the present study. In this regard, some researchers claimed that education could play an essential role in forming treatment adherence (26,27).

Furthermore, the results of another study by Beune et al. highlighted the direct effect of education on treatment adherence among patients with hypertension (28). Mirshafiee et al. also believed that education has a positive effect on adherence to medication treatment.

However, they reported that treatment adherence decreased among the patients in the control group (12). In a comprehensive study, Tang et al. found that when the patients become aware of the importance of medications and their therapeutic effect, the probable side effects, and other medicine-related issues, they will be more likely to adhere to treatment. Therefore, they concluded that in addition to raising awareness and improving the patients' attitudes, educational sessions could help the patients become more sensitive to self-care and control of disease complications (29). Accordingly, such findings are consistent with the results of the present study.

According to the findings of Beune et al. 's study, raising the patients' awareness of cognitive factors, including highlighting the disease, the duration, the causes, and the complications of the disease, as well as receiving social support (especially from the relatives) can lead to increased self-control and adherence to treatment (28). This is in line with the findings of the present study. Moreover, Khosravi et al. found that the interventions at the workplace were effective in controlling blood pressure in employees, and there was a significant decrease in the average scores of systolic and diastolic blood pressure (30). The results of Saarti et al.'s study indicated that the average score of perception of the disease was higher in patients with better adherence to treatment compared to those with poor treatment adherence (31). This is also consistent with the findings of the present study.

Furthermore, the present study results showed that educational interventions in the intervention group had a significant effect on systolic and diastolic blood pressure in the patients; in other words, the educational intervention based on Leventhal's model confirmed effectiveness on the patients'

control of blood pressure. Chen et al. reported that the rates of treatment and control of blood pressure in patients with hypertension were 98.1% and 72% in the interventions group, respectively; while, these two values were 51.8% and 37.5% among the patients in the control group (32). The results of Ali Mohammadi et al.'s study indicated that the average post-test scores of systolic (39.5 mm Hg vs.) and diastolic (26.6 mm Hg) blood pressure were 24 mm/Hg and 20.7 mm/Hg in the intervention and control group, respectively. It showed a decrease in blood pressure scores among the patients in both groups (33).

The findings of another research by Mirkarimi et al. indicated that employing the health belief model has led to an increase in their knowledge and scores of different constructs of the model in patients with hypertension; consequently, it helped reduce the systolic and diastolic blood pressure among the patients in the intervention group compared to the control group (16). Besides, Babaei-Sis et al. reported a meaningful decrease in systolic and diastolic blood pressure scores following the instructive intervention regarding lifestyle modification in the intervention group (34). Izadirad et al.'s study showed that educational intervention based on the BASNEF model could contribute to the decline and management of hypertension. The average score of awareness of control in the intervention group increased significantly after the educational intervention, which is consistent with the results of the present study highlighting the effectiveness of the educational intervention on raising the patients' awareness (14). Similarly, Sadeh Tabarian et al. concluded that Leventhal's model's instructions are influential in controlling blood sugar among patients with diabetes (19). Nevertheless, their findings are inconsistent with the results

of Haji Jafar Namazi et al.'s study. This might be attributed to the difference in the type of research community, given that Haji Jafar Namazi et al. investigated the patients with hypertension (35).

The obtained results can be interpreted so that education based on Leventhal's model can lead to greater adherence to treatment. Therefore, such training programs can affect the beliefs that direct the patients' behavior regarding hypertension. In other words, identifying these beliefs can lead to the development of more effective programs and a healthier lifestyle in the target group. Health care providers who take care of patients with hypertensive can help improve their behavior by measuring their beliefs about adherence to proper treatment. Consequently, they can provide follow-up interventions and more effective measures to prevent or delay the effects of high blood pressure.

Despite all the contributions of the present study, the study samples were only selected from the city of Gonabad. With respect to the relative reliance of the contextual variables on dependent variables, especially treatment adherence, it is suggested to employ cautionary measures before generalizing the study findings to patients in other cities with different cultures. Therefore, it is recommended that, as complementary studies, future research be conducted in other institutions and clinics related to patients with hypertension. It is also suggested to consider long-term follow-up sessions in subsequent similar studies because long-term evaluation can help patients understand the enduring effects of such educational methods.

Conclusion

The present study results revealed that education based on Leventhal's model has a positive effect on the patients' perception;

hence, it can also have a significant effect on adherence to treatment and control of blood pressure. Such an educational program can lead to the identification of factors affecting the acceptance of the disease process.

Therefore, it may help increase the patients' adherence to treatment, which, in turn, leads to greater control of blood pressure in these patients. It is also noteworthy that it is relatively easy to implement this model in patient education. It is regarded appropriate, the patients welcome it, it is accessible to understand the instructions based on this model, and it can be very effective in patients' patients' adherence to treatment. As a result, it is highly recommended to implement this educational method based on Leventhal's model, as a non-pharmacological method, to increase treatment adherence, reduce the effects of hypertension, control blood pressure, and prevent the probable complications.

Acknowledgments

Conflict of interest

This study did not lead to any conflicts of interest for the authors.

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