Effect of Self-Care Training Based On VARK Learning Style Preference on Blood Pressure of Patients with Hypertension

Zeinab Ghorbani [ID][1], Elham Imani [ID]*[2], Saeed Hoseini Teshnizi [ID][3]

1. Student Research Committee, Hormozgan University of Medical Sciences, Bandar Abbas, Iran.
2. Department of Nursing, Faculty of Nursing and Midwifery, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
3. Department of Biostatistics, Faculty of Nursing and Midwifery, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
Correspondence: Elham Imani, Department of Nursing, Faculty of Nursing and Midwifery, Hormozgan University of Medical Sciences, Bandar Abbas, Iran. Tel: +987631285022 E-mail: eimani@hums.ac.ir

Abstract

Background: Hypertension has been a global public health crisis. Complications of hypertension can be reduced by educating patients. Consideration of the learning styles of patients is important for effective education. The aim of this study was to determine effects of self-care training based on visual, aural, reading/writing, and kinesthetic (VARK) learning style preference on blood pressure of hypertensive patients.

Methods: This semi-experimental study was conducted in Bandar Abbas, South of Iran in 2019. Forty-four eligible patients who were referred to six comprehensive health centers in Bandar Abbas were selected by convenience sampling and then allocated into four visual, aural, reading/writing, and kinesthetic groups based on the results of the VARK learning style questionnaire. Educational interventions were performed according to patients' learning style preference in four sessions. To evaluate effectiveness of the training, patients' blood pressure was measured before the intervention and two months after the intervention. Data were analyzed with SPSS 16 software using paired t-test, Wilcoxon test, and one-way analysis.

Results: After the educational intervention, a statistically significant difference was observed in the mean systolic and diastolic blood pressures of all patients (P<0.001). After the intervention, the mean systolic blood pressure did not change significantly in the kinesthetic group (P>0.05) but decreased significantly in other groups (P<0.05). In addition, the mean diastolic blood pressure decreased significantly after the intervention in all study groups (P<0.05).

Conclusion: Providing education based on the preferred learning style can be an effective way to educate patients with hypertension in comprehensive health care centers across the country.

Highlights:
What is current knowledge?
Considering the importance of high blood pressure as a cause of ischemic heart disease, heart failure, stroke and kidney dysfunction, it is necessary to implement a self-care program to reduce blood pressure in patients with hypertension.
What is new here?
Self-care training based on VARK learning style preference is effective in lowering blood pressure of patients with high blood pressure.

Introduction

With the rapid social and economic development, lifestyle changes, and aging, high blood pressure has become one of the most important public health issues in the world (1). In 2000, about 972 million people worldwide (around 16%) were living with hypertension, which is anticipated to increase to 4.9 billion people (around 60%) by 2025 (2). Today, the prevalence of this disease has been estimated to be 29.5% in the Eastern Mediterranean region and 22% in Iran (3). The World Health Organization reports that high blood pressure is responsible for 62% of cerebrovascular events and 49% of ischemic heart disease, and causes approximately 7.5 million deaths per year (12.8% of all deaths) worldwide (3,4). Despite the high risk of complications, no much attention has been paid to treatment of hypertension, especially in patients (5). High blood pressure is often asymptomatic, and almost half of the patients are unaware of their disease. The absence of symptoms in the early stages of the disease and the slow onset of complications hiders timely engagement of the patient in the treatment process (either pharmacological or non-pharmacological) (5, 6).

Lack of awareness about high blood pressure is an important challenge in controlling the disease (7). Risk factors for high blood pressure include smoking, excessive alcohol consumption, overweight, sedentary lifestyle, lipid disorders, and high stress. Motivating and educating patients about their illness are the key factors that can be beneficial for them to cope with these risk factors (8). Patient education is a useful tool to improve this knowledge, as it helps patients to improve their lifestyle and promote adherence to medication. Therefore,

educational interventions play an important role in the management of hypertension (9). The World Health Organization has recommended patient education as an important strategy to improve patients' active participation in the disease management process (10).

In recent decades, it has been suggested that educators should adapt their teaching style to the specific learner's preference to increase effectiveness of teaching (11). Learning styles refer to the preferred methods of a learner for understanding, absorbing, and interpreting information (12). In fact, learning style is a sensory method by which people prefer to acquire new information (13). People learn to use different strategies to turn an educational message into long-term memory (14). When information is provided using learners' preferred learning styles, educators are better able to communicate with learners, which in turn improves learning (15). Nurses' awareness of learning styles can help them adjust the way of providing educational content in order to strengthen patients' understanding (16). Among the various tools used for determining learners' learning style, the visual, aural, read/write, and kinesthetic (VARK) learning style's questionnaire developed by Neil de Fleming (1987) has good validity and reliability. The results of this questionnaire can help the instructor to choose the most effective method of providing information (14).

Since a limited number of studies have investigated the effect of individual preferred learning style in the field of patient education, this study was conducted to determine effects of self-care training based on the VARK learning style preference on blood pressure of hypertensive patients.

Methods

A semi-experimental study with pretest-posttest design was carried out on 44 patients with hypertension who were referred to six comprehensive health centers in Bandar Abbas (South of Iran) from January to December 2019. Sample size was determined as 40 using the sample size formula to estimate the average of a community taking into account α=0.05, power of 80% (ß=0.20), S=32.5, and d=25 in MedCalc software. Considering the possibility of drop outs, 10% was added to the sample size. After receiving approval from the ethics committee of Hormozgan University of Medical Sciences (ethical code:

IR.HUMS.REC.1397.261), six health centers in Bandar Abbas (South of Iran) were selected using simple random sampling method. Then, 44 patients with hypertension were selected through convenience sampling method. Informed consent was taken from the participants after explaining the research objectives. Then, based on their learning style preference, the subjects were allocated into four intervention groups including; visual (n=12), aural (n=17), reading/writing (n=8), and kinesthetic (n=7) groups (Figure 1). Inclusion criteria were literacy, no vision or hearing problems, being diagnosed with essential hypertension (stages 1 and 2 hypertension) for at least six months, age of over 18 years, and no learning disability due to mental problems or psychiatric disorders. Data were gathered using a demographic characteristics form (age, sex, level of education, marital status, income level, employment status, smoking, underlying diseases, and drugs/substances) and the VARK learning style questionnaire. A blood pressure monitor and a stethoscope were used to measure blood pressure.

The VARK questionnaire, as a learning preference assessment tool, consists of 16 four-choice questions that can be answered in a short period. All choices correspond to the four sensory modalities including visual, aural, reading/writing, and kinesthetic modes. For each question, the respondents must choose the option that best describes their preferred learning style. If more than one choice matches their preference, they can select more than one option. Depending on the responses, their preferred learning style will be determined (17). In this study, the seventh version of this questionnaire was used, and its reliability was confirmed by obtaining a correlation coefficient of 0.81.

A Richter mercury sphygmomanometer (Diplomat, Germany) and a Richter stethoscope (Germany) were used for measuring blood pressure. Their reliability was confirmed by retest method with a correlation coefficient of 0.93. Blood pressure was measured by a researcher (observing all JNC7 criteria in how to measure blood pressure) from the right hand of patients in sitting position. The subjects were advised to be inactive and not consume heavy food, coffee, and medicine for half an hour before measuring blood pressure. Blood pressure was measured on empty balder after five minutes of rest in a quiet room. To reduce error in measuring blood pressure, calibration was performed by a medical engineer, and blood pressure of all patients in all stages was measured by one person. The trainings were designed and implemented in four, sixty-minute sessions based on the learning style preference of each group (Table 1) (18). The teaching content and methods of education were used according to the learning style of each group (Table 2). To evaluate the effect of educational intervention, the systolic and diastolic blood pressures were measured twice, before the intervention and two months after the intervention. Thus, before the first training session, each person's blood pressure was measured and the average of three recent measurements was considered as the baseline (pre-intervention) blood pressure. Two months after the end of the educational interventions, patients' blood pressure was measured four times with an interval of one week between measurements, and the average number of these measurements was recorded as the post-intervention blood pressure

SPSS Statistics for Windows, version 16 (SPSS Inc., Chicago, Ill., USA). Descriptive statistics were used to describe the frequency of data. One-way analysis of variance was used for intragroup comparison of quantitative variables, and paired t-test and Wilcoxon test were used for comparison of quantitative values (systolic and diastolic blood pressures) before and after the intervention. A P-value of less than 0.05 was considered statistically significant.

Results

Learning style preference of patients is shown in figure 2. The mean age of subjects in the visual, aural, reading/writing, and kinesthetic groups was 60.08±8.71, 58.17±8.59, 52.37±12.59, and 55.57±9.03 years, respectively. The results of one-way analysis of variance showed no significant difference in the mean age of the subjects between the study groups (P=0.329).

Patients in all four groups were homogeneous in terms of other sociodemographic characteristics (Table 3). Most of the patients were married (75%), homemaker (36.4%), with high school education (36.4%) and sufficient income (53%), and no history of opium use (54.5%). The majority of subjects had an underlying disease (86.4%).

According to the results, after the educational intervention, the mean systolic and diastolic blood pressures of all patients reduced significantly (Table 4).

The mean systolic blood pressure after the intervention change notably in all groups (P<0.05) except in the kinesthetic group (P>0.05). In addition, a significant difference was observed in the mean diastolic blood pressure of all patients after the intervention compared with baseline (P<0.05) (Table 5).

Discussion

The results of the study showed that the VARK learning style training program significantly reduced the mean systolic and diastolic blood pressures of patients with hypertension. To our knowledge, this study is the first to employ an educational method based on the VARK learning style in order to reduce blood pressure in patients with hypertension. Similar to our study, Grebner et al. (2015) conducted a pretest-posttest study to investigate the impact of teaching through learning styles on adult health literacy in central Illinois, USA. The results of their study showed the favorable effect of using this educational method in promoting adult health literacy (19). Anbarasi et al.

(2014) conducted a pretest-posttest study to investigate the effect of teaching respiratory physiology based on learning style on students' learning in India. The results of their study showed that people who were trained based on their own learning style scored better than those who were trained only via lectures (20). In a study by Saleh Moghadam et al., training-based learning style method promoted self-care behaviors in patients with type 2 diabetes (21). The results of these studies are consistent with the results of our study. In fact, educating patients based on their learning style preference is considered an effective way to enhance learning and maximize its retention. Learning style can help people understand their needs and find appropriate learning strategies. Paying attention to learning style also helps educators find the best teaching methods for learners to learn better. Therefore, it seems that a simple intervention such as using the VARK learning style questionnaire before teaching the learner can be effective in promoting their learning. In our study, the use of this educational method led us to the desired learning of the educational content presented. Adherence of patients to what they have learned using this method and its application in daily life led to an acceptable reduction in their blood pressure. Koonce et al. (2011) did not report learning-based education as effective in improving the hypertensive knowledge of patients referred to the emergency department. So that two weeks after their discharge from the emergency center, there was no significant difference in the acquisition of knowledge about hypertension between the experimental and control groups. However, more satisfaction with the training provided was observed among those who were trained based on learning style than the control group whose teaching method was based on printed version (22). Perhaps the reasons for the difference between the results of the mentioned study and the results of the present study are difference in characteristics of the subjects and the type of educational tools used. In addition, the mentioned study was performed on patients admitted to an emergency department, and it seems that the instability of these patients as well as lack of focus on attention may have contributed to the reduced rate of learning during training. In our study, training was conducted on outpatients who are generally stable and better prepared to learn educational materials.

In our study, the mean diastolic blood pressure decreased significantly in all groups after the educational intervention. The mean systolic blood pressure decreased significant in the visual, aural, and reading/writing but not in the kinesthetic group. Similar to this finding, in a previous study, a training based on the VARK learning style did not significantly change fasting blood sugar of diabetic patients in the kinesthetic group (23). The results of the above study are consistent with the results of our study, so that in our study, education based on learning style was not effective in significantly reducing systolic blood pressure in the kinetic group. Perhaps one of the reasons is the better impact of the teaching method through role-playing and learning on learning practical and manual skills, but the concepts that needed to be understood and taught to patients in the present study did not have such a feature. This inconsistency could be a reason to reduce the effect of the educational method used on the learning rate of patients in this group and consequently the lack of a satisfactory reduction in their systolic blood pressure.

Conclusion

The results showed that training according to learning styles can reduce the systolic and diastolic blood pressures in patients with hypertension. It is recommended to conduct further studies on a larger sample size to confirm the positive effect of this educational method on improving patients' learning. In addition, this study was performed only on patients who had a single-model learning style, while some individuals may have a several learning styles (As in our study, 11 of these individuals were identified and excluded from the study at the time of sampling). Thus, it is recommended to consider this factor when designing future studies.

Ethical statement

Consent was taken from the patients after ensuring confidentiality of personal information. The study has been approved by the ethics committee of Hormozgan University of Medical Sciences (ethical code: IR.HUMS.REC.1397.261).

Conflict of interest

The authors declare that there is no conflict of interest regarding publication of this article.

Author contributions

Study concept and design: ZGh and EI; Analysis and interpretation of data: ZGh, EI and SHT; Manuscript drafting: ZGh; Critical revision of the manuscript for important intellectual content: ZGh znd EI; Statistical analysis: ZGh and SHT.

References

1. Zhao B, Li J, Liu J, Hao Y, Zhen Y, Feng D, et al. Hypertension prevalence alteration in 92 815 nurses based on the new standard by 2017 ACC/AHA hypertension guideline: observational cross-sectional study from China. BMJ open. 2019; 9(8):e027201. [View at publisher] [DOI] [PMID] [Google Scholar]
2. Essayagh T, Essayagh M, El Rhaffouli A, Khouchoua M, Bukassa Kazadi G, Khattabi A, et al. Prevalence of uncontrolled blood pressure in Meknes, Morocco, and its associated risk factors in 2017. PloS one. 2019; 14(8):e0220710. [View at publisher] [DOI] [PMID] [Google Scholar]
3. Mirzaei M, Mirzaei M, Bagheri B, Dehghani A. Awareness, treatment, and control of hypertension and related factors in adult Iranian population. BMC Public Health. 2020; 20:667. [View at publisher] [DOI] [PMID] [Google Scholar]
4. Buda ES, Hanfore LK, Fite RO, Buda AS. Lifestyle modification practice and associated factors among diagnosed hypertensive patients in selected hospitals, South Ethiopia. Clin Hypertens. 2017; 23(1):26. [View at publisher] [DOI] [PMID] [Google Scholar]
5. Jankowska-Polańska B, Blicharska K, Uchmanowicz I, Morisky DE. The influence of illness acceptance on the adherence to pharmacological and non-pharmacological therapy in patients with hypertension. Eur J Cardiovasc Nurs. 2016; 15(7):559-68. [View at publisher] [DOI] [PMID] [Google Scholar]
6. Akbarpour S, Khalili D, Zeraati H, Mansournia MA, Ramezankhani A, Fotouhi A. Healthy lifestyle behaviors and control of hypertension among adult hypertensive patients. Sci Rep. 2018; 8(1):8508. [View at publisher] [DOI] [PMID] [Google Scholar]
7. Worku Kassahun C, Asasahegn A, Hagos D, Ashenafi E, Tamene F, Addis G, Endalkachew K. Knowledge on hypertension and self-care practice among adult hypertensive patients at university of Gondar comprehensive specialized hospital, Ethiopia, 2019. Int J Hypertens. 2020; 2020: 5649165. [View at publisher] [DOI] [PMID] [Google Scholar]
8. Drevenhorn E, Bengtson A, Kjellgren KI. Evaluation of consultation training in hypertension care. Eur J Cardiovasc Nurs. 2009; 8(5):349-54. [View at publisher] [DOI] [PMID] [Google Scholar]
9. Delavar F, Pashaeypoor S, Negarandeh R. The effects of self-management education tailored to health literacy on medication adherence and blood pressure control among elderly people with primary hypertension: A randomized controlled trial. Patient Educ Couns. 2020; 103(2):336-42. [View at publisher] [DOI] [PMID] [Google Scholar]
10. Javadzade H, Larki A, Tahmasebi R, Reisi M. A theory-based self-care intervention with the application of health literacy strategies in patients with high blood pressure and limited health literacy: A protocol study. Int J Hypertens. 2018; 2018: 4068538. [View at publisher] [DOI] [PMID] [Google Scholar]
11. Fallace T. The ethnocentric origins of the learning style idea. Educ Res. 2019; 48(6):349-55. [View at publisher] [DOI] [Google Scholar]
12. Hsieh SW, Jang YR, Hwang GJ, Chen NS. Effects of teaching and learning styles on students' reflection levels for ubiquitous learning. Comput Educ. 2011; 57(1):1194-201. [View at publisher] [DOI] [Google Scholar]
13. Slater JA, Lujan HL, DiCarlo SE. Does gender influence learning style preferences of first-year medical students? Adv Physiol Educ. 2007; 31(4):336-42. [View at publisher] [DOI] [PMID] [Google Scholar]
14. Prithishkumar IJ, Michael SA. Understanding your student: using the VARK model. J Postgrad Med. 2014; 60(2):183-6. [View at publisher] [DOI] [PMID] [Google Scholar]
15. Dobson JL. Learning style preferences and course performance in an undergraduate physiology class. Adv Physiol Educ. 2009; 33(4):308-14. [View at publisher] [DOI] [PMID] [Google Scholar]
16. Hamilton S. How do we assess the learning style of our patients?. Rehabil Nurs. 2005; 30(4):129-31. [View at publisher] [DOI] [PMID] [Google Scholar]
17. James S, D'Amore A, Thomas T. Learning preferences of first year nursing and midwifery students: utilising VARK. Nurse Educ Today. 2011; 1(4):417-23. [View at publisher] [DOI] [PMID] [Google Scholar]
18. Zhu HR, Zeng H, Zhang H, Zhang HY, Wan FJ, Guo HH, Zhang CH. The preferred learning styles utilizing VARK among nursing students with bachelor degrees and associate degrees in China. Acta Paul Enferm. 2018; 31(2):162-9. [View at publisher] [DOI] [Google Scholar]
19. Grebner LA. Addressing learning style needs to improve effectiveness of adult health literacy education. Int J Health Sci. 2015; 3(1):93-106. [View at publisher] [DOI] [Google Scholar]
20. Anbarasi M, Rajkumar G, Krishnakumar S, Rajendran P, Venkatesan R, Dinesh T, et all. Learning style-based teaching harvests a superior comprehension of respiratory physiology. Adv Physiol Educ. 2015; 39(3):214-7. [View at publisher] [DOI] [PMID] [Google Scholar]
21. Saleh Moghadam AR, Hozhabr Araghi F, Bazzi A, Behnam Voshani H, Karimi Moonaghi H. Examining the effects of training according to learning styles on self-care among patients with type 2 diabetes. Evidence Based Care. 2017; 6(4):47-56. [View at publisher] [Google Scholar]
22. Koonce TY, Giuse NB, Storrow AB. A pilot study to evaluate learning style–tailored information prescriptions for hypertensive emergency department patients. J Med Libr Assoc. 2011; 99(4):280-9. [View at publisher] [DOI] [PMID] [Google Scholar]
23. Saleh Moghadam A R , Hozhabr-Araghi F , Behnam Vashani H , Karimi Moonaghi H , Bazzi A . Evaluation of the effect of self-care education based on VARK learning style on HbA1c and FBS levels in patients with type II diabetes. Med Surg Nurs J. 2016; 5(2):e68016. [View at publisher] [Google Scholar]

Enrollment

Assessed for eligibility (n=44)

Excluded (n= 0)
♦ Not meeting inclusion criteria (n=0)
♦ Declined to participate (n=0)

Randomized (n=44)

Allocated

Allocated to visual group (n=12) □ Received allocated intervention (n=12)	Allocated to aural group (n=17) □ Received allocated intervention (n=17)	Allocated to reading/writing group (n=8) □ Received allocated intervention (n=8)	Allocated to kinesthetic group (n=7) □ Received allocated intervention (n=7)

Follow-Up

Lost to follow-up (n=0) Discontinued intervention (n=0)	Lost to follow-up (n=0) Discontinued intervention (n=0)	Lost to follow-up (n=0) Discontinued intervention (n=0)	Lost to follow-up (n=0) Discontinued intervention (n=0)

Analysis

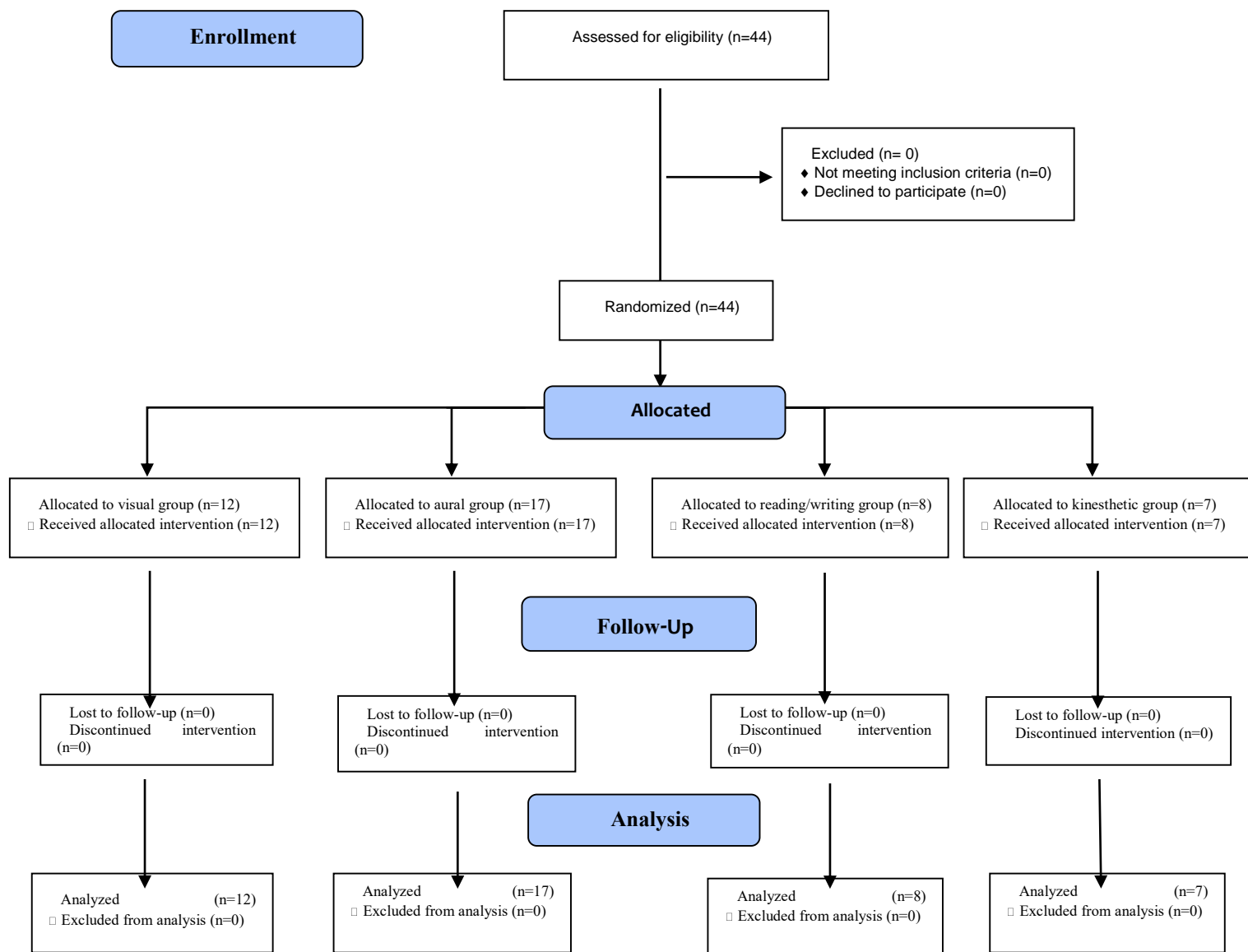| Analyzed (n=12) □ Excluded from analysis (n=0)	Analyzed (n=17) □ Excluded from analysis (n=0)	Analyzed (n=8) □ Excluded from analysis (n=0)	Analyzed (n=7) □ Excluded from analysis (n=0)

Figure 1. The flowchart of the study's inclusion, allocation and follow-up
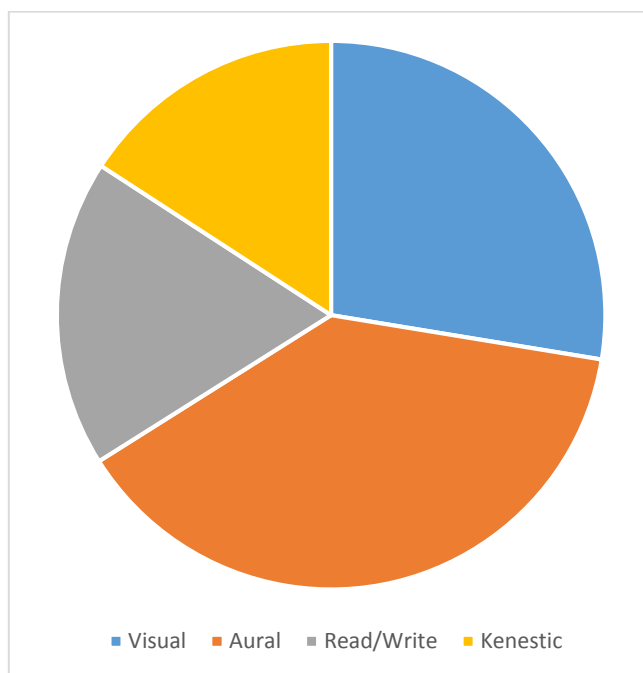
Figure 2. Learning style preference among patients

Table 1. Description of the VARK learning style categories and the educational method used in the study

VARK learning style		Description	Training method
Unimodal learning preference	Visual	Visual (V) learners prefer to observe the practice of others and use visual resources to perceive information. Pictures, videos, flow charts, and diagrams are their favorites and of great value to them	Images, PowerPoint, charts, and videos
	Aural	Aural (A) learners enjoy attending tutorials and sessions, listening to tape recorders, hearing stories from others, talking about problems and exchanging ideas with classmates to acquire information	Audio file containing educational content and group discussion
	Read/Write	The read (R) learners like to acquire and integrate information by reading textbooks and writing down the key details. They review their notes regularly.	Educational booklet. Asking them to rewrite the textbook in their own language
	Kinesthetic	kinesthetic (K) learners prefer to learn information through practice and self-experience	Role playing
Multimodal learning preference		The "multimodal learners" have a balanced set of learning preferences, including the bimodal, trimoda, and quadmodal	Mixed

Table 2. Content of educational materials presented in each training session

Sessions	Educational content
First	Familiarity with the purpose of education, definition of blood pressure, symptoms, complications of hypertension, the importance of continuing self-care behaviors in maintaining health and controlling complications, and evaluating the material presented in this session
Second	A review of the topics presented in the first session, the importance of a healthy lifestyle in a person's health and prevention of chronic diseases such as hypertension, training on how to use drugs and their side effects, how to measure blood pressure, the importance of diet, mobility and activity in controlling hypertension, and evaluating the material presented in this session
Third	A review of the material presented in the second session, teaching social health indicators and explaining the effects of smoking and alcohol consumption on blood pressure, and finally evaluating the material presented in this session
Fourth	A review of the material presented in the third session, improving mental health by presenting information about the causes of stress and the role of stress on the onset, exacerbation, and persistence of hypertension, ways to control stress with methods such as relaxation training and diaphragmatic breathing, improving spiritual health by presenting materials about the impact of religious duties on people's health, and finally evaluating the materials presented in this meeting

Table 3. Sociodemographic characteristics of subjects in the study groups based on the learning style

Variable		Visual	Aural	Read/Write	Kinesthetic	P-value
		Number (%)	Number (%)	Number (%)	Number (%)	
Gender	Male	5 (41.7)	10 (58.8)	2 (25.0)	5 (71.4)	0.246
	Female	7 (58.3)	7 (41.2)	6 (75.0)	2 (28.6)	
Marital status	Married	8 (66.7)	14 (8.4)	5 (62.5)	6 (85.7)	0.658
	Single	1 (8.3)	1 (5.9)	1 (12.5)	0 (0.0)	
	Widow	3 (25.0)	2 (11.8)	1 (12.5)	1 (14.3)	
	Divorced	0 (0.0)	0 (0.0)	1 (12.5)	0 (0.0)	
Educational status	Elementary	4 (33.3)	1 (5.9)	0 (0.0)	1 (14.3)	0.085
	Middle school	4 (33.3)	4 (23.5)	0 (0.0)	1 (14.3)	
	High school	4 (33.3)	7 (41.2)	3 (3.5)	2 (28.6)	
	College	0 (0.0)	5 (29.4)	5 (62.5)	3 (42.9)	
Income	Inadequate	6 (50.0)	9 (52.9)	4 (50.0)	4 (57.1)	0.990
	Adequate	6 (50.0)	8 (47.1)	4 (50.0)	3 (42.9)	
Employment status	Homemaker	7 (58.3)	5 (29.4)	1 (12.5)	1 (14.3)	0.074
	Self-employed	4 (33.3)	8 (47.1)	2 (25.0)	2 (28.6)	
	Employed	1 (8.3)	4 (23.5)	5 (62.5)	4 (57.1)	
History of opium use	Yes	7 (58.3)	7 (41.2)	3 (37.5)	3 (42.9)	0.765
	No	5 (41.7)	10 (58.8)	5 (62.5)	4 (57.1)	
History of comorbidity	Yes	10 (83.3)	16 (94.1)	6 (75.0)	6 (85.7)	0.606
	No	2 (16.7)	1 (5.9)	2 (25.0)	1 (14.3)	
Receiving medication for hypertension	Yes	10 (83.3)	14 (82.4)	5 (62.5)	6 (85.7)	0.619
	No	2 (16.7)	3 (17.6)	3 (37.5)	1 (14.3)	

Table 4. Comparison of mean score of systolic and diastolic blood pressures of patients before and after the intervention

Blood pressure	Before intervention	After intervention	P value
Systolic	142.15±15.60	133.86±15.65	*<0.001
Diastolic	85.90±13.90	78.97±9.43	**<0.001

Table 5. The mean score of systolic and diastolic blood pressures in the study groups before and after the intervention

Group		Blood pressure	
		Systolic	Diastolic
		Mean ± SD	Mean ± SD
Visual	Before	145.00±16.09	87.91±12.69
	After	133.75±11.50	80.83±7.92
	P-value	*<0.001	*0.001
Aural	Before	146.47±16.27	85.88±14.60
	After	140.88±17.34	80.00±10.00
	P-value	*0.001	*0.002
Read/ Write	Before	131.25±11.57	78.75±11.25
	After	120.62±8.21	72.50±5.97
	P-value	*0.001	**0.041
Kinesthetic	Before	139.28±13.04	90.71±16.43
	After	132.14±16.03	80.71±12.05
	P-value	*0.094	*0.013