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Education based on VARK learning style versus lecture method on blood pressure level of patients with primary hypertension

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Original Article

Abstract

BACKGROUND: Hypertension (HTN) has become the costliest public health problem. After performing educational interventions, blood pressure (BP) of patients with this disease can be significantly reduced. The adaptation of the educational method to the individual learning style can be more effective on the patients' learning and thus better control of their BP with better educational effectiveness. The aim of this study was to compare educating based on visual, aural, reading/writing, and kinesthetic (VARK) learning style versus lecture method on BP level of patients with primary HTN.

METHODS: This study was a semi-experimental and pretest-posttest study conducted on patients with primary HTN referred to the comprehensive health service centers in Bandar Abbas, Iran, from January 2019 to December 2019. 88 patients were selected by convenience sampling method and divided into two groups of education based on VARK learning style and lecture. The training sessions were presented for the members of education based on VARK learning style group based on their learning style and as a presentation for lecture group. Patients' BP was measured before and after the intervention as a measure of the effectiveness of training on patients' learning. Data analysis was done by SPSS statistical software and using descriptive indices, chi-square test, t-test, Mann-Whitney, paired t, and Wilcoxon test.

RESULTS: Before the intervention, there was no significant difference between the average systolic BP (SBP) and diastolic BP (DBP) of the two groups ($P > 0.05$). After the intervention, the difference between the average SBP and DBP before and after the intervention between the two groups was not significant ($P > 0.05$).

CONCLUSION: Education based on VARK learning style does not have more effect in reducing SBP and DBP of patients than lecture method.

KEYWORDS: High Blood Pressure; Learning; Lectures; Teaching Methods

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Introduction

More than 1.2 million people worldwide have high blood pressure (BP), and it is one of the most critical and expensive public health problems.[1,2] The prevalence of hypertension (HTN) in Iranian 20-69-year-old adults is 48.2%.[3] This disease is diagnosed when systolic BP (SBP) of the person is higher than 140 mmHg and diastolic BP (DBP) is equal to or above 90 mmHg in at least two different visits to health therapists over a four-month period.[4] HTN is divided into two types:

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primary HTN and secondary HTN.[5] Primary HTN is diagnosed when there is a persistent increase in BP of more than 140/90 mmHg and there is no known cause for high BP.[6] While secondary HTN is caused by potential and reversible underlying factors.[7] Risk factors for high BP include immutable factors such as family history of HTN or cardiovascular disease (CVD), male gender, socioeconomic status (SES), and race as well as modifiable risk factors including alcohol use, smoking, physical inactivity, unhealthy eating habits, the presence of comorbidities (such as diabetes and high blood cholesterol), and poor sleep quality or short sleep duration.[8] Complications of this disease include atherosclerosis, stroke, heart attack, heart failure, chronic kidney disease, and dementia.[9] Complications and premature mortality due to HTN cause significant stress for individuals with HTN, family, and community.[10] Therefore, in order to reduce mortality and complications due to the disease and better control patients' BP, it is necessary to perform interventions that are based on BP control.[11] Numerous studies have shown that training interventions as part of antihypertensive treatment increase follow-up of the treatment diet, promote healthy lifestyle behaviors, and significantly reduce BP levels.[12]

It seems that traditional training has not been effective without using training models and rational procedures for changing individuals' behavior.[13] The main goal of education is to facilitate the learning process, and understanding the learning style of learners is a part of this process. Today, the concept of learning styles has become a popular topic.[14] Learning preferences are a way in which learners effectively and efficiently understand, process, store, and recall what they are trying to learn.[15] It is believed that knowledge of learning styles is beneficial for both educators and learners which means that educators are able to adjust training methods and tools used for learning in accordance with the learning style of learners, and the learners' awareness of the learning style causes them to find suitable ways to better learn training materials.[16] Different models have been designed to explain different learning styles of individuals. Among various models proposed, visual, auditory, reading/writing, and kinesthetic (VARK) learning style model is one of the most common methods provided by Neil Fleming which divides individuals' learning preferences into four groups (visual, auditory, reading/writing, and kinesthetic).[17] In the study of Moghadam et al., the use of the educational method based on the VARK learning style had a positive effect on improving the self-care behaviors of patients with diabetes.[18] The study of Grebner showed the effect of training based on VARK learning style on promoting adult health literacy.[19]

Considering the effective role of education on controlling patients' BP and since in Iran, so far, no study has been done on the effect of education based on learning style on patients' BP, the present study was conducted to compare education based on VARK learning style versus lecture method on BP level of patients with primary HTN.

Methods

This study was a semi-experimental and pretest-posttest study conducted on 88 patients with HTN referred to the comprehensive health service centers in Bandar Abbas, Iran, from January 2019 to December 2019. The sample size was calculated as 44 persons for each group (with 10% drop out) to detect 21 mmHg difference in the mean BP with standard deviation (SD) of 33.5 mmHg for trained group and 32.8 mmHg for control group (considering $\alpha = 0.05$, $\beta = 0.20$, power = 80%).[20] The sampling method in this study has two stages. After obtaining the permission from the Ethics Committee of Hormozgan University of Medical Sciences, Bandar Abbas, work permission from the

Research Department of the university, and the consent of the study area officials by submitting a letter of introduction and explaining the study purpose and procedure using cluster sampling method, among all comprehensive health service centers in Bandar Abbas, 6 centers were randomly selected. Then, the researcher referred to the mentioned centers and selected the patients who had the study inclusion criteria and at the same time as selecting each sample, based on the random allocation table, the patient was assigned to each of the education based on learning style or lecture groups. The researcher continued sampling until the number of samples reached the required number (n = 88, 44 in education based on learning style group and 44 in lecture group). Enrollment process and the allocation of participants into the study groups are shown in figure 1.

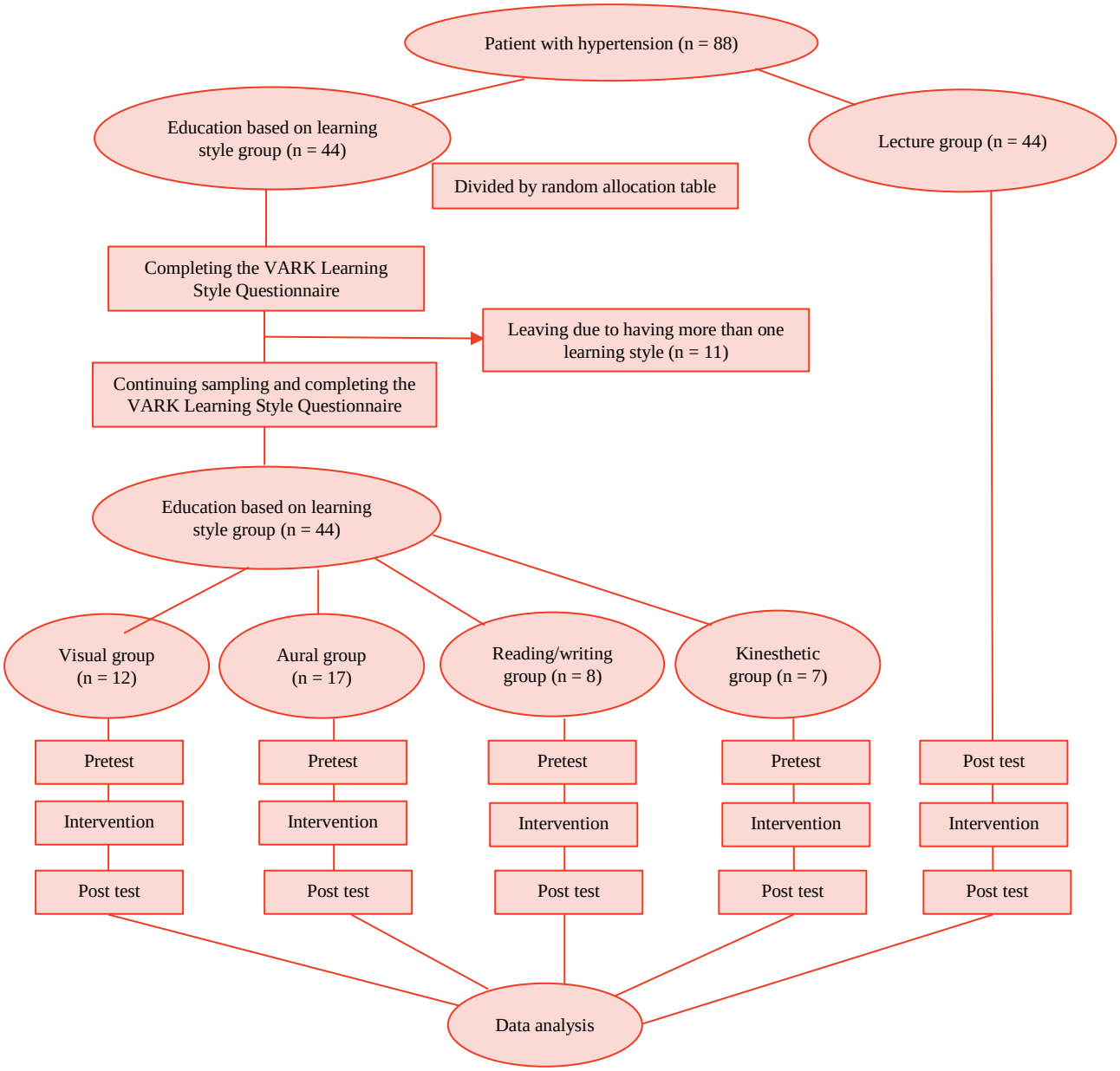

Figure 1. Flow diagram of the study participants

The inclusion criteria were literacy (reading and writing), no visual or auditory problem, consent to participate in the study, medical diagnosis of essential HTN (stages 1 and 2 of HTN) for at least 6 months (according to the patient's file), age above 18 years, and no learning disorder due to mental or psychological disorders. The exclusion criteria were absence for more than 1 session, no willingness to continue the participation in training classes, and participation in a similar training course. Data collection tools included a demographic information form, VARK Learning Style Questionnaire, BP data registration form, BP monitor, and stethoscope. VARK Learning Style Questionnaire is a questionnaire with 16 four-option questions. Each of the options in each question represents one of four learning styles, with options A representing visual style, options B representing auditory style, options C representing reading/writing style, and options D representing kinetic style. Each person is allowed to choose between four options for each question (0-4). After completing the questionnaire by the subjects, learning style of each subject can be calculated by sum of all the answers A, all the answers B, all the answers C, and all the answers D separately, so that the option that has received the highest answer is considered as the dominant learning style of each person. The validity of this questionnaire has been confirmed by Leite et al.; they also reported its reliability for learning style subscales between 0.77 and 0.85.[21] In the present study, the translation of the seventh version of this questionnaire was used. Its reliability was confirmed through the test-retest method with a two-week interval between tests by distributing a questionnaire among fifteen patients with HTN who referred to comprehensive health service centers in Bandar Abbas with a correlation coefficient of 0.81. In this study, at the same time as selecting the samples, the questionnaire was used for the education based on learning style group members (selected based on the pre-determined random allocation table at sampling time) and completed by the members of this group after providing the necessary explanations for how to answer the questions.

BP data form was a researcher-made form designed to record SBP and DBP levels of individuals both before and after the intervention.

In order to take BP of individuals before and after the training intervention, Richter mercury BP monitor (diplomat model, made in Germany with serial number 090762422) and Richter stethoscope (made in Germany) were used. BP was measured on the right arm by ensuring that the patient did not consume caffeinated substances such as tea and coffee, tobacco, and alcohol for 30 minutes before taking BP and giving him five minutes of absolute rest when sitting. In order to reduce the error in measuring BP, calibration was performed by medical engineering and BP of all patients at all stages was measured by one person.

The reliability of BP monitor was also investigated by re-test method, so that BP of 15 patients with HTN was measured, their BP was again measured ten minutes after the initial measurement, and finally its reliability was confirmed using calculation of the correlation coefficient of 0.93.

One week before the training intervention, each participant was contacted by telephone to be informed about the hours of training sessions, and they were asked to attend half an hour before the first training session to measure BP before training at the training class. The patients in both groups received self-care training in four 60-minute sessions over two consecutive weeks. The items that were presented during the training sessions included BP and its symptoms and complications, the importance of self-care behaviors and healthy lifestyle in a person's

health, how to consume medicines, how to measure BP, the importance of diet and mobility in controlling BP, social health indices, and the effects of smoking and alcohol on individuals' BP and mental health. In order to train the education based on learning style group, training methods and tools appropriate to learning style of the patients were used (Table 1) and lecture group members were trained self-care by the common method of presentation.

Before holding the first training session, each person's BP was measured and the mean BP measured by the researcher and the three recent BP levels recorded in the patient's file were considered as the person's BP before performing the intervention and recorded in BP registration form. Two months after holding training sessions, patients' BP was measured at four stages (at an interval of one week between each measurement) and the mean of the four BP levels was recorded as post-intervention BP. This study obtained ethical approval from the Ethics Committee of Hormozgan University of Medical Sciences (code: IR.HUMS.REC.1397.261). Moreover, explaining the procedure to patients, expression of voluntary participation in the study, gaining their trust on the confidentiality of information and observing the principle of confidentiality, and obtaining informed oral and written consent to participate in the research were among the ethical considerations during the sampling. After collecting the information, the data were controlled and coded, and then were analyzed using descriptive statistics (mean and SD) and inferential tests (chi-square test, t-test, Mann-Whitney, paired t, Wilcoxon test) by SPSS statistical software (version 21, IBM Corporation, Armonk, NY, USA).

Results

According to the results of this study, 44 patients were in the education based on learning style group, of whom 12 patients had visual style, 17 patients had auditory style, 8 patients had reading/writing style, and 7 patients had kinesthetic style. The average age of patients in education based on the learning style group was equal to 57.22 ± 9.56 years and 55.77 ± 9.77 years in the lecture group. According to the independent t-test results, there was no significant statistical difference between the average age of the two groups (P = 0.482). Other demographic data of the two education based on learning style and lecture groups are shown in table 2. Based on the table, there was no significant statistical difference in any of the demographic data between the two groups (P >0.05).

According to the results of this study, before the intervention, no significant statistical difference was observed in the average SBP and DBP between the two education based on learning style and lecture groups (P = 0.847 and P = 0.431, respectively); after the intervention, Mann-Whitney test did not show a significant statistical difference before and after the intervention in SBP and DBP between the two groups (P = 0.053 and P = 0.121, respectively) (Tables 3 and 4).

Table 1. Training method appropriate to the learning style of patients with hypertension (HTN) in the training group based on learning style

Learning style	Training method
Visual	The training was done through images, PowerPoint, diagrams, charts, and videos.
Aural	The training was given through recorded voice and listening to them and exchange of ideas with their peers.
Reading/writing	The training was done through presenting written version of training to the participants, giving 30 minutes to them for reading the pamphlet, listing the key points, and rewriting them in their own language. At the end, it was reviewed through asking a number of patients to read their points for other patients.
Kinesthetic	Training was given through role play, drama, and practicing educational materials practically.

Table 2. Frequency distribution and percentage of demographic characteristics of two groups based on learning style and lecture

Variable		Group		P
		Education based on learning style [n (%)]	Lecture [n (%)]	
Sex	Men	22 (50.0)	23 (52.3)	0.831
	Women	22 (50.0)	21 (47.7)	
Marital status	Married	33 (75.0)	30 (68.2)	0.427
	Single	3 (6.8)	5 (11.4)	
	Widow	7 (15.9)	5 (11.4)	
	Divorced	1 (2.3)	4 (9.1)	
Educational status	Elementary	6 (13.6)	8 (18.2)	0.492
	Middle school	9 (20.5)	13 (29.5)	
	High school	16 (36.4)	14 (31.8)	
	College	13 (52.3)	9 (20.5)	
Income	Less than adequate	23 (47.7)	18 (40.9)	0.520
	Enough	21 (53.8)	26 (59.1)	
Employment status	Housewife	16 (36.4)	18 (40.9)	0.632
	Freelance job	14 (31.8)	16 (36.4)	
	Employee	14 (31.8)	10 (22.7)	
Opium use	Yes	20 (45.5)	25 (56.8)	0.286
	No	24 (54.5)	19 (43.2)	
Underlying disease	Yes	38 (86.4)	37 (84.1)	0.764
	No	6 (13.6)	7 (15.9)	
Drug use	Yes	35 (79.5)	34 (77.3)	0.796
	No	9 (20.5)	10 (22.7)	

In the education based on learning style group, a significant statistical difference was found in the average SBP and also DBP after training compared to before ($P < 0.001$); similarly, in the presentation group, the difference between the average SBP and also DBP levels after training compared to before was statistically significant ($P < 0.05$) (Table 5).

Discussion

Based on the results of this study, self-care training based on VARK learning style was effective in reducing the patients' SBP and DBP. In studies of Elmer et al.[22] and Bavikati et al.,[23] the effect of educational interventions on lowering BP in patients was reported useful. Although in these studies, training was not based on learning style of patients, their results are consistent with the results of this study.

This study showed that self-care training through the presentation method caused a significant decrease in patient's SBP and DBP. In a study aimed to evaluate community-based health training strategies for managing patients with HTN with low SES in Dongguan, China, Lu et al. compared the effects of three training methods of lecture, interactive lecture with visual training aids, and training through pamphlets on HTN management by patients.

Table 3. Comparison of mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) before intervention in two groups based on learning style and lecture

Variable	Group		P
	Education based on learning style (mean ± SD)	Lecture (mean ± SD)	
SBP	142.15 ± 15.60	141.47 ± 17.47	0.847*
DBP	85.90 ± 13.90	87.61 ± 12.59	0.431**

*T-test; **Mann-Whitney

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; SD: Standard deviation

Table 4. Comparison of mean difference before and after intervention in systolic blood pressure (SBP) and diastolic blood pressure (DBP) in two groups based on learning style and lecture

Variable	Group		P
	Education based on learning style (mean ± SD)	Lecture (mean ± SD)	
SBP	3.63 ± 4.49	1.93 ± 3.61	0.053
DBP	2.84 ± 3.79	1.59 ± 3.69	0.121

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; SD: Standard deviation

The results of their study showed a remarkable reduction in patients' SBP and DBP after performing training intervention in two training groups of lecture and lecture with training aids.[24] In a study by Ma et al., the effect of training on SBP and DBP of individuals was reported to be significant.[25] The results of recent studies are consistent with the results of this research.

According to the results of this research, although there was no statistically significant difference in average difference before and after intervention between the two groups (education based on VARK learning style and lecture), the results showed that the education based on VARK learning style was more effective than the lecture method on reducing the average SBP and DBP of patients. Grebner conducted a study aimed to determine the effect of education based on learning style on adult health literacy in Central Illinois, USA. The results of this study showed a better promotion of health literacy in the education based on learning style group than in the lecture group.[19] In the study of Saleh Moghadam et al., training based on learning style method compared to the lecture method led to a further reduction of fasting blood sugar (FBS) and hemoglobin A1C (HbA1C) in patients with diabetes.[20] According to search by the authors of the present paper, no study has been conducted to use VARK learning style-based training method for training individuals with HTN. Therefore, it is practically impossible to compare the results of this research with the two recent studies mentioned. However, what can be deduced from this study suggests an interesting potential for VARK learning style-based training on lowering BP in individuals with HTN. Hence, this educational method can be considered as a complementary method for self-care training, especially in individuals prone to HTN. In fact, in order to provide appropriate education, it is necessary to use learners' preferred methods for learning, based on which appropriate methods and media are used in providing education, and stimulate the learners' various senses, so that the learner gains a good understanding of various topics. In fact, recognizing the learning style of learners and adapting the education to it reduces the despair and frustration of learners and increases their motivation to learn, and thus improves people's learning.

Table 5. Comparison of mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) before and after intervention in each of groups based on learning style and lecture

Variable	Group					
	Education based on learning style			Lecture		
	Before intervention (mean ± SD)	After intervention (mean ± SD)	P	Before intervention (mean ± SD)	After intervention (mean ± SD)	P
SBP	142.15 ± 15.60	138.52 ± 16.76	< 0.001*	141.47 ± 17.47	139.54 ± 16.87	0.001*
DBP	85.90 ± 13.90	83.06 ± 13.43	< 0.001**	87.61 ± 12.59	86.02 ± 11.59	0.007**

*Paired t-test; **Wilcoxon

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; SD: Standard deviation

The limitations of the study, which were beyond the control of researchers, included individual differences between patients for education and learning, the occurrence of any unpleasant and unexpected events in the period between the start of the study and follow-up, differences in patients' baseline information about HTN and ways to control it, and receiving information from other information sources by patients in the period between sampling and follow-up results. The use of more studies can further explain the effectiveness of this educational method. Therefore, conducting similar studies in other occupational groups and individuals exposed to HTN using other training methods and comparing them with each other can pave the way for better understanding of effective methods of health training.

Conclusion

It can be concluded that education based on VARK learning style does not reduce BP more effectively in patients with HTN compared to the conventional teaching method of lecturing, but nurses and health care professionals can use this training method as an effective way to educate patients with HTN, so that they can take a useful step to control BP and improve their health.

Conflict of Interests

Authors have no conflict of interests.

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