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An educational intervention to improve health and nutrition literacy in hypertensive patients in Greece

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Abstract:

BACKGROUND: Suboptimal control of blood pressure (BP) is a public health challenge in Greece. This educational intervention attempts to improve health literacy (HL) and nutrition literacy (NL) in primary healthcare (PHC) patients with hypertension (HTN).

MATERIALS AND METHODS: This was a proof-of-concept (PoC) educational intervention. Twenty-four patients with HTN and low or medium levels of HL agreed to participate in this 6-week educational intervention. The program was delivered by a general practitioner (GP) in group A and by a qualified nurse in group B. Group C was the control group. The levels of HL of NL, adherence to the Mediterranean diet, and perceived stress were assessed using the European Health Literacy Survey Questionnaire 16 (HLS_EU_Q16) and part B (reading a medication label) of the High Blood Pressure–Health Literacy Scale (HBP–HLS), the Nutrition Literacy Scale-Greek (NLS-Gr), the Mediterranean Diet Adherence Screener (MEDAS), and the Perceived Stress Scale (PSS-14), respectively, together with certain socioeconomic, dietary, and lifestyle characteristics. The Kruskal–Wallis and Wilcoxon nonparametric, the Chi-square, and the McNemar–Bowker tests were used. The analysis was done with the STATA software, version 14 (MP & Associates, Sparta, Greece).

RESULTS: No statistically significant differences were found in the total score of HL and NL before and after the intervention; however, the results indicate a slight improvement in HL and NL levels in the two intervention groups, together with small improvements in knowledge and behaviors related to HTN and dietary salt. A trend of improvement in the MEDAS levels in the GP’s group and the HBP–HLS levels in the nurse’s group was also reported.

CONCLUSION: A slight improvement in HL and NL levels in the two intervention groups has been reported, and the changes, however, were not statistically significant.

Keywords:

Eating behavior, educational program, Greece, health literacy, hypertension nutrition literacy

Introduction

High blood pressure (BP) is a key preventable risk factor for premature death and ill-health, worldwide.^[1] With respect to Greece, hypertension (HTN) prevalence is estimated at about 40% in adults, with one-third of them being undiagnosed and only 30% achieving adequate HTN control with treatment and lifestyle modifications.^[2] Patients

with chronic diseases such as HTN often deal with many barriers in their effort to adequately manage their disease, related to the patient himself or herself and/or the healthcare system.^[3] Lack of knowledge regarding HTN,^[4] disease awareness and certain misconceptions, mistrust of medical treatments and overestimation of the adverse effects,^[5] lack of awareness of the importance of lifestyle modifications in managing the disease, and subsequent failure to adopt them^[6] seem to be

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associated with poorer management of the disease. Other reported reasons for poor management of the disease include the high cost of a healthy diet, the lack of time for preparing healthy meals or engaging in physical activity, the lack of access to places for physical activity, the lack of family support,^[5] and negative primary care experiences.^[4]

The concept of health literacy (HL) focuses on empowering people to live a healthier life, and it incorporates cognitive and social skills, which determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain health.^[7] Nutrition literacy (NL) is also an increasingly important concept in the health promotion sector,^[8] and it seems to be an important contributor to healthy eating behaviors.^[9] NL is defined as “the degree to which individuals can obtain, process, and understand basic nutrition information and nutrition services they need, to make appropriate nutritional decisions.”^[10] It is important to note that increased levels of HL and NL are crucial in the management of HTN since HTN knowledge, self-efficacy, adherence to taking recommended drugs, self-care management, and certain diet and lifestyle modifications are essential to successfully control the condition.

A number of studies have demonstrated that higher HL is usually associated with better BP control, better HTN knowledge, better medication adherence, and higher levels of health-related quality of life of the participants.^[11-13] With respect to NL, it is important to note that a recent study conducted in Greece showed that apparently healthy individuals had significantly higher HL and NL levels compared with participants with chronic disease, including patients with HTN.^[14] These findings together with the fact that a primary healthcare (PHC) reform is under implementation in Greece indicate the need for new evidence-based research that could guide the design of HL- and NL-based interventions, in the Greek healthcare system.

This study aimed to create, apply, and evaluate a specially designed educational program for improving HL and NL in PHC hypertensive patients, in an urban area of Greece. The hypothesis is that such an educational intervention delivered by PHC medical and nursing staff, aimed at patients with HTN, is feasible and could lead to a possible improvement in the HL and NL levels of the participants. To the best of our knowledge, this is the first study in Greece conducted in an urban area, whose findings could be implemented in new interventions, aiming to improve the prevention and control of high BP, in Greece.

Material and Methods

Study design and setting

The design, application, and evaluation of certain public health interventions are often undermined by problems, which could have been identified and therefore avoided, at the start, reducing costs, saving time, and minimizing potential problems affecting the application of the intervention. This is a proof-of-concept (PoC) educational intervention study aiming at improving HL and NL in patients with HTN.

Study participants and sampling

Twenty-four hypertensive patients met the inclusion criteria and consented to participate in the study. Inclusion criteria were as follows: participants of all sexes, >40 years of age, systolic BP >140 mmHg, diastolic BP >90 mmHg, and HL score <13. Exclusion criteria included comorbidity, serious complications caused by HTN, including cardiovascular disease, kidney disease, retinal disease, and stroke, and inability to write and read in Greek.

Hypertensive patients who visited the 1st Local Health Unit of Nea Philadelphia, Attica, Greece, were informed about the aim and the procedure of the study. Those who wanted to participate and were eligible completed a written informed consent. Afterward, they were randomly allocated into three groups of eight participants each, either one of the two intervention groups (groups A and B) or the control group (group C), using random numbers generated by an online generator (www.randomizer.org). In group A, the educational program was delivered by a general practitioner (GP); in group B, the educational program was delivered by a health professional (nurse); and in group C, the control group did not participate in the program, but followed the usual advice provided by the PHC practitioner. Randomization, baseline, and final measurements were not blinded. Levels of HL and NL and elements of HTN HL, together with levels of perceived stress and certain socioeconomic, dietary, and lifestyle characteristics, were also assessed at the beginning and the end of the intervention. All participants evaluated the program with the use of a specially designed self-reported questionnaire, at the end of the educational intervention.

Educational intervention

The HL and NL intervention [Figure 1] was created by a team with expertise in health, nutrition, and HL and NL fields and in creating effective experiential educational activities for adults with chronic diseases. For the intervention, a specifically designed experiential educational material was developed, based on the results of a previous qualitative focus group study where

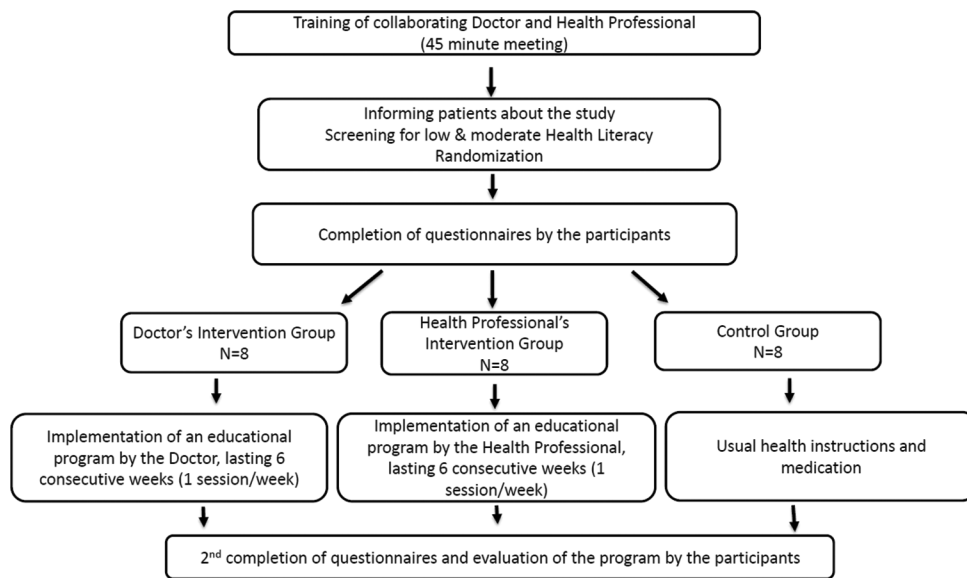


Figure 1: Study design

hypertensive patients discussed experiences and barriers to manage HTN and provided suggestions to improve healthcare delivery.^[15]

The intervention consisted of six consecutive weekly educational sessions, which started on March 23, 2022, and was conducted in a classroom located in the Community Centre of Nea Philadelphia, Athens, Greece. Each session lasted about 1 hour for each group, and it was implemented by the medical practitioner in group A and the health professional (nurse) in group B. Before the start of the intervention, the participating GP and nurse attended a 45-minute training session, familiarizing themselves with the educational material and the nature of the educational activities.

The educational sessions included HL and NL skill training and HTN education and management, through experiential educational activities. The education material (booklet) consisted of six experiential educational activities, which were interactive and experiential in nature. The education material was created based on “hands-on” “learning through play,” and the activities were based on nutrition behavior change research.^[16,17] In each of the six activities, there were opportunities for the active involvement of the participants.

Three of the activities focused on HL training and HTN education and management, including the discussion of myths and truths about HTN, the management of medication by the patient along with the barriers encountered, and the role of the healthcare team. The aim was to help the patients improve their ability to process information, understand it, and apply it to increase medication adherence, including communication

techniques and discussion of the barriers they face in obtaining information concerning HTN. The next two activities focused on NL training aiming at familiarizing the participants with information about dietary salt and the dietary guidelines from the World Health Organization for HTN management. Moreover, they focused on food labels giving the participants all the appropriate information to learn how to read food labels with an emphasis on information regarding salt. In the last educational activity, participants had to discuss the clinical management of a case study involving a hypertensive patient. This activity allowed the participants to recall all the information from the previous weeks of the intervention and try to apply it in an appropriate manner.

Baseline and outcome measures

- Participants completed a specifically designed questionnaire, which was made for the study. The questionnaire consisted of the following measures.
- Socio-demographic characteristics and lifestyle factors
- All participants completed a questionnaire for socio-demographic characteristics including gender, age, marital status, educational status, physical activity, and questions relevant to their nutrition habits.
- Anthropometric characteristics
- All participants self-reported their height and body weight.
- Knowledge related to HTN

HTN-related knowledge was evaluated using a specifically designed questionnaire of 13 items. Six questions assessed participants’ knowledge related to which diseases are connected with increased salt intake,

and the seven residual questions assessed participants' knowledge about which lifestyle habits decrease the risk of HTN. The answers to these questions scored 0 for the wrong answer and 1 for the right one, and two different scores were calculated (score range from 0 to 6 and 0 to 7, respectively).

- European Health Literacy Survey Questionnaire 16 (HLS_EU_Q16)

HL was assessed via the HLS_EU_Q16.^[18] The tool is a shortened form of the HLS_EU_Q47, which has been validated in Greek.^[19] The total HL score is a sum score and ranges from 0 to 16. A score between 0 and 8 indicates inadequate HL levels; between 9 and 12, problematic HL levels; and between 13 and 16, sufficient HL levels.

- Nutrition Literacy Scale-Greek (NLS-Gr)

NL was assessed using the Greek-validated version of the NLS.^[20,21] The NLS assesses reading comprehension and measures an individual's ability to understand nutrition information. It consists of 29 sentences, in which one word is missing. Four options, of which only one is correct, are available to the participant. The total score results from the sum of the corrected answers, and a score lower than 8 shows inadequate NL, a score between 8 and 14 shows marginal NL, and a score higher than 15 shows adequate NL.

- High BL-Focused HL

A part of the HBP-Health Literacy Scale (HBP-HLS) was used to assess high BP-focused HL. Generally, HBP-HLS includes two subscales: the print literacy subscale with 30 items and the functional literacy subscale with 13 items. From these 13 items, seven numeracy items were adapted from the Test of Functional Health Literacy in Adults (TOFHLA) and six modified items from the New Vital Sign (NVS). More specifically, in this study seven numeracy items from the TOFHLA (reading HTN medication label) were translated into Greek and used. The items were scored as correct or incorrect, with total possible scores ranging from 0 to 7.^[22] A higher score indicates better higher HL focused on BP.

- Perceived Stress Scale (PSS-14)

Perceived stress was assessed using PSS-14. The tool concludes with 14 items, seven of which are positive and seven are negative. The highest possible score is 56. A higher score indicates higher levels of perceived stress during the past month.^[23] The scale has been validated in Greek.^[24,25]

- Intervention Evaluation Questionnaire

Two specially self-reported evaluation questionnaires were designed: one for the participants and one for the medical practitioner and the health professional. The questionnaire included nine closed-ended questions where the answers ranged from 1 to 4 (from absolute disagree to absolute agree) and two open-ended questions.

Ethical consideration

The study was approved by the Institutional Ethics Review Board of Harokopio University and the Scientific Council of Primary Health Care of the 1st Health District of Attica, Greece. The procedures followed were also in accordance with the Helsinki Declaration of 1975, as revised in 2000. Personal information and data collected were used only for the study, and the anonymity of the participants was maintained.

Statistical analysis

Data are presented as N (%) for qualitative variables and as mean (SD) for quantitative variables. The differences that were observed after the implementation of the educational program in the measurements were calculated. Due to the skewed distribution of the quantitative variables, the Kruskal-Wallis nonparametric test was used to evaluate differences between the three groups and the quantitative variables. The Chi-square test was used to evaluate differences between categorical variables. The McNemar-Bowker test was used to determine whether there were differences in dichotomous dependent variables pre- and post-intervention. In addition, the Wilcoxon nonparametric test was used to evaluate the differences within each group (pre-post-intervention) for the quantitative variables. The STATA software, version 14 (MP & Associates, Sparta, Greece), was used for all statistical analyses, and the level of significance was $P = 0.05$.

Results

Table 1 describes the socio-demographic characteristics of the participants. Participants were randomized into three groups. GP's group concluded with seven participants; the nurse's group, five participants; and the control group, six participants. No significant differences were observed between the three groups and participants' characteristics. In the two intervention groups, women were more and the median age was almost the same. The majority of the sample was married, divorced, or widowed with education up to high school. The median body mass index (BMI) classified the sample into the overweight category. Most of the participants attended four or more meetings.

Table 2 describes the selected lifestyle characteristics of the participants related to HTN before and

Table 1: Socio-demographic characteristics of participants (n=18)

	GP's group (n=7)	Nurse's group (total n=5)	Control group (total n=6)	P
Gender (n (%))				
- Men	3 (42.9)	2 (40)	4 (66.7)	0.604
- Women	4 (57.1)	3 (60)	2 (33.3)	
Age (median (IQR))	66 (15)	67 (9.5)	65.5 (29.25)	0.730
Marital status (n (%))				
- Unmarried	1 (14.3)	0 (0)	3 (50)	0.113
- Married/divorced/widowed	6 (85.7)	5 (100)	3 (50)	
Educational status (n (%))				
- Up to high school	4 (57.1)	3 (60)	5 (83.3)	0.567
- Higher education	3 (42.9)	2 (40)	1 (16.7)	
BMI (median (IQR))	29.75 (8.30)	28.25 (10.03)	25.94 (5.65)	0.781
Frequency of attending weekly meetings (n (%))				
- 2-3 meetings	1 (14.3)	2 (40)	-	0.364
- >=4 meetings	6 (85.7)	3 (60)	-	

IQR=interquartile range, BMI=body mass index, GP=general practitioner. χ^2 , Kruskal-Wallis, $P<0.05$

after the intervention, separate for the three study groups. Differences between the groups (pre- and post-intervention) and within the groups were checked. The only significant difference was observed in the quantity of salt addition in foods from the participants. Both before and after the intervention, there was a significant difference between the three study groups ($P = 0.029$ and $P = 0.017$, respectively). In the control group, more participants added salt in their foods compared with the other two groups. No other significant differences were observed.

Table 3 describes questions relevant to knowledge related to HTN of the participants before and after the intervention, separate for the three study groups. Differences between the groups (pre- and post-intervention) and within the groups were checked. Due to the small sample, no significant differences were observed.

Table 4 shows pre- and post-measurement for HL, NL, HBP-HLS, MEDAS, and PSS and the difference (post-pre) after the end of the intervention, separate for the three study groups. Differences between the groups (pre- and post-intervention) and within the groups were checked. Due to the small sample, no significant differences were observed, but a trend of improvement in HL and NL levels for the two intervention groups after the intervention is seen. In addition, a trend of improvement in MEDAS levels in the GP's group and HBP-HLS levels in the nurse's group is evident.

Finally, Figure 2 describes participants' distribution in HL categories pre- and post-intervention. Before the intervention, there were no individuals with sufficient HL levels in any group. Nevertheless, after the intervention in both the GP's and nurse's groups there were participants with sufficient HL levels although the differences were not statistically significant.

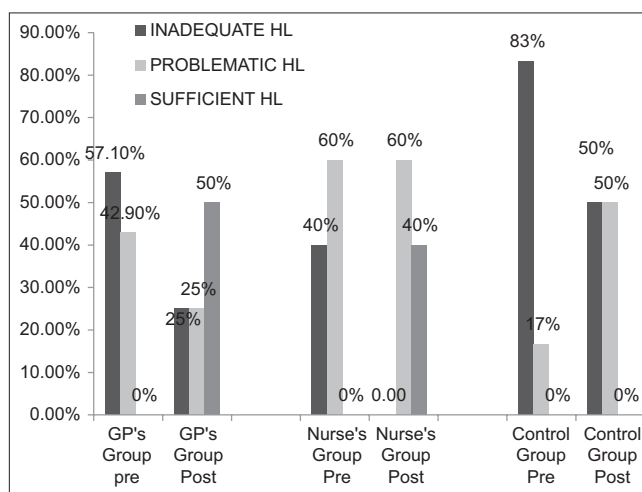


Figure 2: Participants' distribution in HL categories pre- and post-intervention

Discussion

Suboptimal control of BP is emerging as a common and serious public health challenge in Greece, a country that has recently experienced a PHC reform. This educational intervention attempted to improve HL and NL in patients with HTN who are managed in PHC.

It succeeded in preparing relevant educational material, and though no statistically significant differences were found in the total score of HL and NL of the participants before and after the intervention, a slight improvement in HL and NL levels for the two intervention groups is seen, together with small improvements in knowledge and behaviors related to HTN and dietary salt.

Similar studies were conducted in the past in different parts of the world, with varied results. A randomized controlled trial conducted in 2018 in Iran, with 118 elderly people with uncontrolled primary HTN and inadequate HL, showed that, after the intervention,

Table 2: Selected lifestyle characteristics of the participants related to hypertension before and after the intervention (n=18)

	Pre-intervention GP's group (total n=7)	Post-intervention GP's group (total n=4)	P ^a	Pre-intervention Nurse's group (total n=5)	Post-intervention Nurse's group (total n=5)	P ^a	Pre-intervention Control group (total n=6)	Post-intervention Control group (total n=6)	P ^b	P ^c
Physical exercise (n (%))										
- Yes	6 (85.7)	3 (75)	1.000	4 (80)	4 (80)	1.000	2 (33.3)	1 (33.3)	1.000	0.103
- No	1 (14.3)	1 (25)		1 (20)	1 (20)		4 (66.7)	2 (66.7)		0.363
Glasses of water (n (%))										
- 1-4 glasses	5 (71.4)	2 (50)	0.250	1 (20)	0 (0)	1.000	2 (33.3)	2 (33.3)	1.000	0.167
- >=5 glasses	2 (28.6)	2 (50)		4 (80)	5 (100)		4 (66.7)	4 (66.7)		0.216
Fruit consumption (n (%))										
- Up to 6 times per week	0 (0)	1 (25)	1.000	1 (20)	1 (20)	1.000	3 (50)	3 (50)	1.000	0.529
- 1 or more times per day	7 (100)	3 (75)		4 (80)	4 (80)		3 (50)	3 (50)		
Food consumption with salt (n (%))										
- <3 times per week	1 (14.3)	1 (25)	1.000	3 (60)	1 (20)	0.500	2 (33.3)	2 (33.3)	1.000	0.880
- >=3 times per week	6 (85.7)	3 (75)		2 (40)	4 (80)		4 (66.7)	4 (66.7)		
Salt addition in foods (n (%))										
- Never/rarely	4 (57.1)	3 (75)	1.000	2 (40)	3 (60)	1.000	1 (16.7)	1 (16.7)	1.000	0.328
- Sometimes/usually	3 (42.9)	1 (25)		3 (60)	2 (40)		5 (83.3)	5 (83.3)		0.148
Quantity of salt addition in foods (n (%))										
- None/small/moderate	6 (85.7)	4 (100)	1.000	5 (100)	5 (100)	1.000	2 (33.3)	2 (33.3)	1.000	0.029
- Enough	1 (14.3)	0 (0)		0 (0)	0 (0)		4 (66.7)	4 (66.7)		0.017
Quantity of salt addition in foods (n (%))										
- None	2 (28.6)	0 (0)	1.000	0 (0)	0 (0)	1.000	0 (0)	0 (0)	1.000	0.318
- Small	3 (42.9)	0 (0)		3 (60)	2 (40)		1 (16.7)	1 (16.7)		
- Moderate	1 (14.3)	4 (100)		2 (40)	3 (60)		1 (16.7)	1 (16.7)		
- Enough	1 (14.3)	0 (0)		0 (0)	0 (0)		4 (66.7)	4 (66.7)		
Check of food labels (n (%))										
- Rarely/sometimes	5 (71.4)	3 (75)	1.000	3 (60)	3 (60)	1.000	4 (66.7)	4 (66.7)	1.000	0.918
- Usually/always	2 (28.6)	1 (25)		2 (40)	2 (40)		2 (33.3)	2 (33.3)		0.096
Salt content control (n (%))										
- Rarely/sometimes	6 (85.7)	2 (50)	0.250	4 (80)	3 (60)	1.000	6 (100)	6 (100)	1.000	0.543
- Usually/always	1 (14.3)	2 (50)		1 (20)	2 (40)		0 (0)	0 (0)		1.000
Salt-based food selection (n (%))										
- Rarely/sometimes	7 (100)	3 (75)	1.000	4 (80)	4 (80)	1.000	6 (100)	6 (100)	1.000	0.252
- Usually/always	0 (0)	1 (25)		1 (20)	1 (20)		0 (0)	0 (0)		0.153

GP=general practitioner. X², McNemar-Bowker, *P<0.05. P^a=differences within the group. P^b=differences between the groups pre-intervention. P^c=differences between the groups post-intervention

Table 3: Knowledge related to hypertension of the participants before and after the intervention (n=18)

	Pre-intervention GP's group (total n=7)	Post-intervention GP's group (total n=4)	P ^a	Pre-intervention Nurse's group (total n=5)	Post-intervention Nurse's group (total n=5)	P ^a	Pre-intervention Control group (total n=6)	Post-intervention Control group (total n=6)	P ^a	P ^b	P ^c
Knowledge of foods with salt (n (%))											
- Few/some	4 (57.1)	0 (0)	0.125	1 (20)	1 (20)	1.000	3 (50)	3 (50)	1.000	0.419	0.198
- Moderate/many	3 (42.9)	4 (100)		4 (80)	4 (80)		3 (50)	3 (50)			
Desired hypertension levels (n (%))											
- Right answer	6 (85.7)	4 (100)	0.500	2 (40)	3 (60)	1.000	2 (33.3)	2 (33.3)	1.000	0.118	0.108
- Wrong answer	1 (14.3)	0 (0)		3 (60)	2 (40)		4 (66.7)	4 (66.7)			
Knowledge related to which diseases are connected with increased salt intake? (median (IQR))	2 (1)	2 (1.5)	1.000	1 (0.5)	2 (1)	0.157	1.5 (1.5)	2 (1.5)	0.564	0.411	0.726
Does the risk of hypertension decreased by adopting certain lifestyle habits? (median (IQR))	5 (3)	6 (2.5)	0.655	7 (4)	7 (2.5)	0.180	6 (4.5)	4.5 (3.75)	0.317	0.826	0.336

IQR=interquartile range, GP=general practitioner. X², McNemar-Bowker, *P<0.05. P^a=differences within the group. P^b=differences between the groups pre-intervention. P^c=differences between the groups post-intervention

Table 4: Baseline measurement and change after the intervention (n=18)

	Pre-measurement Median (IQR)			Post-measurement Median (IQR)			P ^a	Δ (post-pre) Median (IQR)				
	GP's group (n=7)	Nurse's group (n=5)	Control group (n=6)	GP's group (n=7)	Nurse's group (n=5)	Control group (n=6)		GP's group (n=7)	Nurse's group (n=5)	Control group (n=6)		
HL	7 (5)	10 (5.5)	7 (4)	0.802	12 (4.5)	8.5 (3.75)	0.189	0.109, 0.141, 0.066	2 (8)	5 (7.5)	1 (3)	0.767
NL	24 (9)	16 (15.75)	19 (8)	0.340	20 (16.5)	19.5 (9.5)	0.084	0.102, 0.257, 0.705	1 (0.42)	-1 (2.25)	0.75	0.119
HBP-HLS	6 (2)	0.5 (2.5)	4 (5)	0.047	5 (2)	4 (4)	0.992	1.000, 0.157	0 (0)	0 (0)	0 (1)	0.497
MEDAS	9 (3)	9 (4)	7 (2.25)	0.027	11 (4.5)	7.5 (2)	0.439	1.000, 0.683, 0.705	1 (5.75)	1 (4.5)	0 (2.5)	0.913
PSS	28 (13)	28 (16.5)	26.5 (18.75)	0.496	29 (17.25)	27 (18)	0.522	0.194, 0.414, 0.713	-6 (10)	3 (10)	0 (2.75)	0.439

IQR=interquartile range, GP=general practitioner, HL=health literacy, HLS=high blood pressure-health literacy, NL=nutrition literacy, HBP-HLS=High Blood Pressure-Health Literacy Scale, MEDAS=Mediterranean Diet Adherence Screener, PSS=Perceived Stress Scale. Wilcoxon, Kruskal-Wallis *P<0.05. P^a=differences between the groups pre- and post-intervention. P^b=differences within the groups

the rates of uncontrolled systolic and diastolic BPs decreased.^[11] Another study, conducted on 52 hypertensive patients in North Carolina, USA, aimed to pilot test the acceptability and feasibility of a brief HL intervention (a 2-hour evidence-based class and a telephone follow-up survey 1 month later) focused on HTN self-care. The results showed that participants significantly improved all self-care measures on diet adherence and weight management activities.^[13] In addition, another study that took place in the USA aimed to test the acceptability and efficacy of HL-focused high BP intervention in 11 Spanish-speaking Latinos with uncontrolled BP. The results showed improvement in BP, numeracy, and psychological outcomes.^[12] Moreover, in a cross-sectional survey conducted in Iran with 164 patients with HTN, findings highlighted the necessity of tailoring and implementing interventions based on a transtheoretical model using appropriate strategies to promote the quality of the HTN management approach in nutritional knowledge, illness perceptions, and dietary adherence.^[26]

It is important to note that in this study, even though no statistically significant changes were observed, mainly due to the small number of participants, all hypertensive patients reported that they thoroughly enjoyed the program and felt more knowledgeable with respect to HTN management and more empowered to better control the disease. Interactive and experiential educational activities were also identified by the participants (both the patients and the educators or health professionals) as attractive and easy to follow. Patients also reported that they truly appreciated that the program was delivered directly by a medical doctor and a nurse, who work at PHC and who they know and trust. Finally, both the GP and the nurse who participated as educators in the intervention declared that they felt that the program was very useful and rewarding and that they had the opportunity to better know and understand the needs of their patients.

Strengths and limitations

The main limitations of the study included the relatively small number of participants and a large number of absenteeism, mainly because the intervention was conducted during the 4th wave of the coronavirus disease 2019 (COVID-19) pandemic, in Greece.

Implications for theory, policy, and/or practice

The program was well received by the participants, and a slight improvement in HL and NL levels in the two intervention groups was reported; the changes, however, were not statistically significant. These findings indicate the need for new evidence-based research that could guide the design of HL- and NL-based interventions, in the Greek healthcare system.

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Conflicts of interest

There are no conflicts of interest.

References

1. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in blood pressure from 1975 to 2015: A pooled analysis of 1479 population-based measurement studies with 19.1 million participants. *Lancet* (London, England) 2017;389:37–55.
2. Stergiou GS, Menti A, Kalpourtzi N, Gavana M, Vantarakis A, Chlouverakis G, *et al.* Prevalence, awareness, treatment and control of hypertension in Greece: EMENO national epidemiological study. *J Hypertens* 2021;39:1034–9.
3. Nieuwlaat R, Schwalm JD, Khatib R, Yusuf S. Why are we failing to implement effective therapies in cardiovascular disease?. *Eur Heart J* 2013;34:1262–9.
4. Heinert S, Escobar-Schulz S, Jackson M, Del Rios M, Kim S, Kahkejian J, *et al.* Barriers and facilitators to hypertension control following participation in a church-based hypertension intervention study. *Am J Health Promot* 2020;34:52–8.
5. Belizan M, Alonso JP, Nejamis A, Caporale J, Copo MG, Sánchez M, *et al.* Barriers to hypertension and diabetes management in primary health care in Argentina: Qualitative research based on a behavioral economics approach. *Transl Behav Med* 2020;10:741–50.
6. Okwuonu CG, Ojimaodu NE, Okaka EI, Akemokwe FM. Patient-related barriers to hypertension control in a Nigerian population. *Int J Gen Med* 2014;7:345–53.
7. Nutbeam D. Health promotion glossary. *Health Promot Int* 1999;13:349–64.
8. Rosenbaum DL, Clark MH, Convertino AD, Call CC, Forman EM, Butryn ML. Examination of nutrition literacy and quality of self-monitoring in behavioral weight loss. *Ann Behav Med* 2018;52:809–16.
9. Gibbs HD, Ellerbeck EF, Gajewski B, Zhang C, Sullivan DK. The nutrition literacy assessment instrument is a valid and reliable measure of nutrition literacy in adults with chronic disease. *J Nutr Educ Behav* 2018;50:247–57.
10. Silk KJ, Sherry J, Winn B, Keesecker N, Horodyski MA, Sayir A. Increasing nutrition literacy: Testing the effectiveness of print, web site, and game modalities. *J Nutr Educ Behav* 2008;40:3–10.
11. 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;103:336–42.
12. Han HR, Delva S, Greeno RV, Negoita S, Cajita M, Will W. A health literacy-focused intervention for Latinos with hypertension. *Health Lit Res Pract* 2018;2:e21–5.

13. Warren-Findlow J, Coffman MJ, Thomas EV, Krinner LM. ECHO: A pilot health literacy intervention to improve hypertension self-care. *Health Lit Res Pract* 2019;3:e259–67.
14. Michou M, Panagiotakos DB, Lionis C, Petelos E, Costarelli V. Health and nutrition literacy levels in Greek adults with chronic disease. *Public Health Panorama* 2019;5:271-9.
15. Michou M, Mourouti N, Lionis C, Kalagia P, Ioannidis AG, Kaloeidas M, *et al.* A qualitative exploration of patients' experiences and barriers to adequately controlling hypertension in Greece. *Int J Home Econ* 2022;15:23-32.
16. Michie S, West R, Sheals K, Godinho CA. Evaluating the effectiveness of behavior change techniques in health-related behavior: A scoping review of methods used. *Transl Behav Med* 2018;8:212–24.
17. Rigby RR, Mitchell LJ, Hamilton K, Williams LT. The use of behavior change theories in dietetics practice in primary health care: A systematic review of randomized controlled trials *J Acad Nutr Diet* 2020;120:1172–97.
18. Pelikan JM, Ganahl K. Measuring Health Literacy in General Populations: Primary Findings from the HLS-EU Consortium's Health Literacy Assessment Effort. *Stud Health Technol Inform* 2017;240:34-59.
19. Michou M, Costarelli V. Validity and reliability of the European health literacy survey questionnaire (HLS EU Q16) in the Greek language. *Mediterr J Nutr Metab* 2022;15:285–94.
20. Diamond JJ. Development of a reliable and construct valid measure of nutritional literacy in adults. *Nutr J* 2007;6:5.
21. Michou M, Panagiotakos DB, Costarelli V. Development and validation of the greek version of the nutrition literacy scale. *Mediterr J Nutr Metab* 2018;12:61–7.
22. Kim MT, Song HJ, Han HR, Song Y, Nam S, Nguyen TH, *et al.* Development and validation of the high blood pressure-focused health literacy scale. *Patient Educ Couns* 2012;87:165–70.
23. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983;24:385–96.
24. Andreou E, Alexopoulos EC, Lionis C, Varvogli L, Gnardellis C, Chrousos GP, *et al.* Perceived stress scale: Reliability and validity study in Greece. *Int J Environ Res Public Health* 2011;8:3287–98.
25. Katsarou A, Panagiotakos D, Zafeiropoulou A, Vryonis M, Skoularigis I, Tryposkiadis F, *et al.* Validation of a Greek version of PSS-14; A global measure of perceived stress. *Cent Eur J Public Health* 2012;20:104–9.
26. Mohebbi B, Tafaghodi B, Sadeghi R, Tol A, Yekanenejad M. Factors predicting nutritional knowledge, illness perceptions, and dietary adherence among hypertensive middle-aged women: Application of transtheoretical model. *J Educ Health Promot* 2021;10:212.