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The effect of educational intervention in the prevention of cardiovascular diseases in patients with hypertension with application of health belief model: A quasi-experimental study

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Abstract

Background: The best methods for preventing and controlling cardiovascular diseases are preventive behaviours.
Aim: The purpose of the current study is to ascertain how educational intervention affects cardiovascular disease prevention.
Methods: The current investigation is a quasi-experimental study conducted in Shiraz, Iran, in the year 2022, focusing on 200 hypertension patients (by sample random sampling) that were divided into two groups: a control group consisting of 100 participants (63 males and 37 females) and an intervention group also consisting of 100 participants (58 males and 42 females). The data collection instrument comprises inquiries pertaining to demographic factors as well as constructs of the health belief model (HBM) and preventive behaviours for cardiovascular diseases. The participants in both groups completed the questionnaire prior to and three months after the intervention. The intervention group underwent a total of six training sessions, each lasting 55 min.
Results: The results showed that after the intervention, the intervention group showed a significant increase in all cues of the HBM model except for the perceived barriers. Following a period of three months subsequent to the educational intervention, the experimental group also exhibited a notable reduction in blood pressure in comparison to the control group.
Conclusion: The findings of the study indicate that the utilisation of the HBM demonstrated positive outcomes in facilitating the promotion of cardiovascular disease prevention among patients diagnosed with hypertension. The promotion of health among individuals with high blood pressure can be both beneficial and feasible. Moreover, this particular model can be utilised as a comprehensive framework for the development, execution, and evaluation of advantageous and effective healthcare initiatives.

Keywords

Educational intervention, prevention, cardiovascular diseases, patients with hypertension, health belief model

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Key message

The educational intervention based on the HBM showed a significant increase in all cues of the model except for the perceived barriers.

The brief methods to explain how you gathered the evidence for review

In this study, in order to collect evidence related to the study, the sites of Google Scholar, PubMed, MEDLINE and ProQuest were searched using related keywords (Educational Intervention, Prevention, Cardiovascular Diseases, Patients with Hypertension, Health Belief Model).

Introduction

Cardiovascular diseases (CVDs) account for most noncommunicable disease (NCD) deaths.[1] CVDs are the leading cause of death globally, taking an estimated 17.9 million lives each year. More than four out of five cardiovascular deaths are due to heart attacks and strokes, and one third of these deaths occur prematurely in people under 70 years of age.[2] According to estimates, around 34% of deaths caused by NCDs in the Eastern Mediterranean Region are due to CVDs.[3] The mean 10-year risk of developing CVD in Iran was 16.4%, and 28.3% of the participants had a risk of more than 20% (47.8% of the men and 14.9% of the women).[4] Non-modifiable risk factors include age, gender, genetics, and family history; modifiable risk factors include smoking, diet, alcohol consumption, and physical inactivity.[5]

Hypertension is well recognised as a global health issue. Additionally, it constitutes a significant risk factor for the development of CVDs. The lack of effective management of elevated blood pressure can result in several adverse health outcomes. Furthermore, it is noteworthy that this phenomenon places a considerable economic strain on society, particularly in nations with lower and intermediate income levels. Individuals have the capacity to mitigate the potential hazards associated with elevated blood pressure levels through the adoption of certain measures, such as reducing sodium intake, adhering to a well-balanced dietary regimen, engaging in consistent physical exercise, refraining from smoking, and abstaining from alcohol use.[6]

The avoidance of cardiovascular events in the future can have a major impact on the overall health of individuals, as evidenced by the reported reduction in cardiovascular risk factors following health educational interventions.[7] Nevertheless, a considerable portion of the population may lack knowledge regarding the methods of actively participating in and sustaining the behaviours associated with advantages for their well-being.[8] Numerous theoretical frameworks serve as the foundation for effective health education activities. The utilisation of a comprehensive model has the potential to assist researchers in the formulation of an educational intervention that is specifically designed to enhance knowledge, attitudes, and the frequency of health behaviours among targeted populations, such as individuals with CVD.[9,10]

The Health Belief Model (HBM) is regarded as one of the pioneering models for elucidating the dynamics of health behaviour modification and the underlying psychological mechanisms. It consists of planned modifications for behavioural change.[9] Given the significance of preventive measures in mitigating CVDs, particularly among hypertensive individuals, and the influential role of theories in educational interventions, specifically the HBM, our research aims to examine the impact of an educational intervention on the prevention of CVDs in hypertensive individuals. This study will employ the HBM as a framework for investigation within the context of Shiraz City.

Materials and methods

Study design

The present investigation is a quasi-experimental study that was carried out on individuals diagnosed with hypertension in the year 2022. This research took a total of six months (January to June). The study sample consisted of hypertensive individuals who were referred to health centres in Shiraz. Multi-stage random sampling method was performed among individuals with blood pressure conditions who sought medical assistance at these selected centres. The selection of these centres was carried out by simple random sampling, with two centres chosen from the health centres in Shiraz. Additionally, the sampling process specifically targeted patients with existing family records. The participants in both experimental and control groups completed the questionnaire prior to the implementation of the educational intervention, as well as three months following its completion.

Sample size calculation

The sample size of the study was determined based on a previous study,[11] with a confidence level of 95% and a power of 80%. The observed drop rate was 1.2 percent. A total of 200 samples were included in the study, with 100 samples allocated to each group. The formula for calculating the sample volume is as follows:

$$n = \frac{(s_1^2 + s_2^2)(z_{1-(\alpha/2)} + z_{1-\beta})^2}{(\bar{x}_1 - \bar{x}_2)^2}$$

Inclusion and exclusion criteria

The inclusion criteria for participation in the study encompass individuals who meet the following conditions: a diagnosis of hypertension, age over 40 years, and no prior

involvement in blood pressure management or CVD prevention training programmes. According to guidelines, patients having systolic blood pressure higher than 140 mm Hg and/or diastolic blood pressure higher than 90 mm Hg based on the average of two or more readings is considered as hypertension.[11]

The exclusion criteria encompass three factors: non-attendance at two training sessions, illness resulting in the participant's inability to continue the study, and the participant's lack of willingness to attend and sustain involvement in the research.

Measurements

The data collection methodology employed in previous studies[11–15] involved the design of a questionnaire, which its validity was confirmed. The survey encompasses demographic variables such as age, gender, income, marital status, level of education, history of chronic diseases other than hypertension, duration of hypertension, family history of hypertension, and BMI. Additionally, it measures patients' knowledge regarding the prevention of CVDs. The rest of the questionnaire was designed based on the framework of HBM and preventive behaviours associated with CVDs.

The HBM encompasses various structures, each consisting of a specific number of questions. These structures include the perceived sensitivity structure (8 questions), perceived severity (7 questions), perceived benefits (8 questions), perceived barriers (8 questions), perceived self-efficacy (7 questions), and cues to action (7 questions). All questions were measured on a Likert scale with five response options ranging from "completely disagree" to "completely agree." Scores for each question ranged from 1 to 5. Additionally, there were eight questions related to preventive behaviours for CVDs. A correct answer was assigned a score of 1, while an incorrect answer received a score of zero.

The researchers assessed the systolic and diastolic blood pressures of the participants both prior to and three months following the implementation of the educational intervention. The measurements in both the test and control groups were conducted by a researcher using a consistent blood pressure monitoring instrument.

Intervention

The educational intervention implemented for the experimental group was formulated in accordance with the results of the pre-test. It consisted of a series of six training sessions, each lasting 55 min. The instructional methods employed during these sessions encompassed small group discussions, question-and-answer sessions, and practical demonstrations. Additionally, multimedia tools such as videos, PowerPoint presentations, and informative pamphlets were utilised to enhance the learning experience. The training programme was executed by a team consisting of a doctorate holder in health education and health promotion as well as a medical professional specialising in cardiology. During these sessions, various subjects were addressed, including the implications of high blood pressure and its associated difficulties, the significance of diet and weight management, appropriate physical activity, mental well-being and stress management, adopting a healthy lifestyle, and engaging in preventative measures against cardiovascular illnesses, among others. A weekly meeting was conducted. Training sessions were conducted for five cohorts, each including 20 individuals, resulting in a total of 100 participants in the experimental group. During one of the meetings, a family member was in attendance.

In each training session, participants were assessed clinically (blood pressure, heart rate). Also, educational booklets related to educational items were provided to the research subjects. In addition, in order to create a motivational educational atmosphere, people presented videos on how to measure blood pressure and educational information on obesity, diabetes, risk factors for CVD, a healthy lifestyle, physical activity, and proper nutrition. To facilitate the continuation of activities, a monthly educational session was conducted for the patients. Additionally, a WhatsApp group was established to facilitate the exchange of information among the patients. Furthermore, a minimum of five instructional and motivational messages were disseminated to the patients on a weekly basis.

Both the experimental (58 male, 42 female) and control (63 male, 37 female) groups were actively engaged in the study from its inception to its conclusion, with no individuals being barred from participation. The control group was not provided with any educational intervention and was solely invited to participate in a dedicated session for completing the questionnaire. In adherence to ethical guidelines, a training session was conducted for the control group upon the conclusion of the study.

Statistical analysis

The data underwent analysis through the utilisation of SPSS24 software, employing paired t-tests, independent t-tests, and chi-square tests. A significance level of 0.05 was utilised.

Results

This study examined 200 individuals diagnosed with hypertension. The mean age of the experimental group was 51.63 $\pm$ 7.76 years, while the control group had a mean age of 52.43 $\pm$ 7.28 years. The mean duration of hypertension in the experimental group was 13.58 $\pm$ 5.85 years, while in the control group, it was 12.80 $\pm$ 6.04 years (Table 1).

The results showed that after the intervention, the intervention group showed a significant increase in all variables except for the perceived barriers (Table 2).

Table 1. Demographic characteristics of participants in the experimental and control groups.

Variable		Experimental		Control		*P*-value
		n	%	n	%	
Gender	Male	58	58	63	63	0.254
	Female	42	42	37	37	
Marital status	Single	6	6	4	4	0.247
	Married	84	84	81	81	
	Divorced	4	4	8	8	
	Widowed	6	6	7	7	
Education	Illiterate	4	4	2	2	0.238
	Primary school	10	10	8	8	
	Secondary school	22	22	30	30	
	High school	46	46	44	44	
	University	18	18	16	16	
Monthly income	Under 50 million Rial (low)	40	40	34	34	0.183
	50–100 million Rial (medium)	42	42	52	52	
	More than 100 million Rial (high)	18	18	14	14	
History of chronic disease	Yes	49	49	55	55	0.207
	No	51	51	45	45	
Family history of high blood pressure	Yes	62	62	60	60	0.308
	No	38	38	40	40	
BMI	Under 25	21	21	24	24	0.222
	25–29/9	70	70	66	66	
	Above 30	9	9	10	10	

Table 2. The comparison of the mean scores of knowledge, HBM model constructs, and preventive behaviours of cardiovascular diseases in the experimental and control groups before and after the intervention.

Variable	Group	Before intervention M ± SD	3 months after the intervention M ± SD	*P*-value
Perceived sensitivity	Experimental	14.16 ± 2.58	26.70 ± 2.48	0.001
	Control	15.00 ± 2.25	15.95 ± 2.36	0.202
	P-value	0.247	0.001	
Perceived severity	Experimental	15.05 ± 2.42	26.14 ± 2.13	0.001
	Control	14.86 ± 2.68	15.78 ± 2.20	0.198
	P-value	0.271	0.001	
Perceived benefits	Experimental	18.82 ± 3.64	35.59 ± 3.73	0.001
	Control	19.90 ± 3.71	21.16 ± 3.66	0.154
	P-value	0.169	0.001	
Perceived barriers	Experimental	22.78 ± 3.08	10.08 ± 3.32	0.001
	Control	24.65 ± 2.89	22.70 ± 3.06	0.147
	P-value	0.155	0.001	
Perceived self-efficacy	Experimental	19.47 ± 3.46	34.53 ± 3.07	0.001
	Control	19.08 ± 3.54	22.38 ± 3.60	0.136
	P-value	0.218	0.001	
Cues to action	Experimental	12.18 ± 2.16	21.33 ± 2.13	0.001
	Control	13.24 ± 2.22	13.85 ± 2.24	0.216
	P-value	0.175	0.001	
Preventive behaviours of cardiovascular diseases	Experimental	4.20 ± 0.28	10.18 ± 0.40	0.001
	Control	4.36 ± 0.36	4.48 ± 0.35	0.312
	P-value	0.258	0.001	

Table 3. Comparison of arterial blood pressure in the experimental and control groups before and three months after the educational intervention.

Variable	Group	Before intervention M ± SD	3 months after the intervention M ± SD	*P*-value
Systolic blood pressure	Experimental	154.52 ± 16.14	146.35 ± 12.38	0.001
	Control	152.68 ± 14.36	152.96 ± 14.40	0.276
	P-value	0.328	0.001	
Diastolic blood pressure	Experimental	92.38 ± 8.04	88.30 ± 6.69	0.001
	Control	92.76 ± 7.28	93.78 ± 5.64	0.325
	P-value	0.434	0.001	

The findings indicate that, following a period of three months subsequent to the educational intervention, the experimental group exhibited a notable reduction in blood pressure in comparison to the control group (Table 3).

Discussion

This study examines the impact of an educational intervention on the prevention of CVDs in individuals with hypertension. The intervention involves implementing an educational programme that is grounded in the HBM. By comparing the average scores of the HBM constructs before and after the intervention, a significant difference is observed between the average scores of the intervention and control groups. These findings align with previous studies conducted by Khodaveisi et al. and Muhini et al.[16–17] The results of these studies demonstrate the effectiveness of the HBM-based educational interventions in enhancing CVDs preventive behaviours. This study implemented a distinctive and specialised academic educational programme that utilised a model-based educational package that led to a significant difference in the HBM constructs.

The findings of the current investigation demonstrate a statistically significant rise in the sensitivity values of the experimental group, aligning with the results reported by Tadesse et al., Shojaei et al., Saffari et al., and Salem et al.,[19–21] showing the impact of education grounded in the HBM on enhancing sensitivity.

The findings of the current study indicate a statistically significant rise in the perceived intensity variable values within the experimental group. These results align with previous studies conducted by Karimzadeh Shirazi et al., Muhihi et al., and Kahnooji et al.[17,22–23] The current study involved educational sessions focused on hypertension and its complications. These sessions emphasised the significance of nutrition and weight management, suitable physical activities, mental well-being and stress management, adopting a healthy lifestyle, and engaging in preventive behaviours against CVDs. As a result of these interventions, the participants in the experimental group exhibited an increase in their perception of the severity of hypertension and its associated risks.

The findings of the current study indicate a considerable rise in the perceived benefits among the experimental group, aligning with the results reported by Nooriani et al., Kheiri et al., and Shao et al.[15,24,25] In the current investigation, the educational sessions focused on high blood pressure and its associated consequences. The workshops emphasised the significance of diet and weight management, proper physical activities, mental well-being and stress management, adopting a healthy lifestyle, and engaging in preventative measures against cardiovascular illnesses, among other topics. Conclusively, the experimental group experienced an increase in the variable of perceived benefits.

The findings of the current study indicate a notable reduction in the perceived barriers among the participants in the experimental group. This observation aligns with the outcomes reported by Shen et al.[26] This study examines the effectiveness of offering training on preventative practices for cardiovascular illnesses, as well as distributing informational booklets, in enhancing perceived advantages and overcoming hurdles. Hence, the aforementioned model can serve as a viable approach to mitigating the perceived barriers associated with engaging in preventative activities for cardiovascular illnesses.

The findings of the current study indicate a significant rise in the variable values of self-efficacy within the experimental group. These findings align with the results reported in the studies conducted by Tadesse et al.[18] The notion that hypertensive individuals possess confidence in their capacity to adopt and execute suitable health-related practices aimed at averting cardiovascular ailments has the potential to positively impact their self-efficacy. The concept of self-efficacy exhibits a significant correlation with the manifestation of a particular behaviour. Indeed, the underlying factor contributing to a particular conduct warrants careful consideration. The implementation of an intervention grounded in the HBM has the potential to enhance self-efficacy and facilitate the adoption of beneficial self-care practices. In the current investigation, individuals curated instructional videos pertaining to blood pressure measurement as well as educational materials addressing topics such as obesity, diabetes, risk factors for CVD, healthy

lifestyle choices, physical exercise, and appropriate dietary practices. Therefore, it is recommended to employ suitable educational interventions alongside behavioural models and theories, such as the HBM, to enhance self-care practices and promote better health outcomes in hypertensive patients.

The findings of the current study indicate a statistically significant rise in the values of the cues to action variable within the experimental group. This aligns with the findings of previous studies conducted by Saffari et al. and Khodaveisi et al.[16,20] These studies also demonstrated the positive impact of educational interventions based on the HBM on enhancing the cues to action variable.

The findings indicated that prior to the implementation of the educational intervention, there was no statistically significant distinction observed between the experimental and control groups in relation to behaviour. However, following a period of three months subsequent to the educational intervention, the behaviour variable of the experimental group exhibited a noticeable increase in comparison to the control group. These outcomes align with the findings reported in the studies conducted by Muhihi et al.[17] The current study suggests that the efficacy of education in promoting various components of the HBM has led to an increase in the adoption of preventive behaviours against CVD among individuals diagnosed with hypertension.

Limitations

Limitations of the present study include reliance on self-report measures for assessing health behaviours, as well as a lack of generalizability to different age and demographic cohorts. Hence, it is recommended to do additional studies on other participant cohorts for future investigations. Additional limitations of the study include the influence of demographic parameters on preventative behaviours related to cardiovascular illnesses in individuals with high blood pressure, which were beyond the researcher's control.

The study had several notable qualities, including its focus on vulnerable populations within society that have a documented history of chronic hypertension. Additionally, the study adopted a problem-oriented approach and employed a behavioural model to facilitate behavioural change among individuals with hypertension. An additional advantage of the current study is its examination of the clinical impact of the intervention on the participants' blood pressure.

Conclusion

The application of the HBM in promoting the prevention of CVDs among individuals with hypertension has demonstrated utility and efficacy. This model has proven to be effective and practical in enhancing the health outcomes of hypertensive individuals. Consequently, it can be employed as a comprehensive framework for the design and implementation of interventions targeting this population. The monitoring of health-treatment programmes is both advantageous and valuable. Hence, it is imperative for community health authorities to implement educational programmes rooted in theoretical frameworks in order to foster and enhance preventative behaviours pertaining to cardiovascular illnesses among individuals diagnosed with hypertension.

The media has the potential to serve as a valuable platform for disseminating knowledge and information regarding the significance of preventive measures for CVDs among individuals with high blood pressure. By reaching a broader audience, the media can effectively convey health messages and contribute to enhancing public health outcomes. The utilisation of theory-based educational materials within the Ministry of Health and Medicine's education programme has the potential to be beneficial in enhancing preventative behaviours related to cardiovascular illnesses among hypertension patients.

Abbreviations

HBM health belief model

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Author's contributions

FM, ASh, FR, PAH and AKHJ assisted in conceptualisation and design of the study, oversaw data collection, conducted data analysis and drafted the manuscript. FM, FR and AKHJ conceptualised and designed the study, assisted in data analysis and reviewed the manuscript. FM, ASh, FR, PAH and AKHJ assisted in study conceptualization and reviewed the manuscript. All authors read and approved the final manuscript.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not Applicable.

Data availability statement

All the data provided in our manuscript and any underlying research materials related to our paper (for example data, samples, or additional information) can be accessed when needed.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Guarantor

AKHJ.

Ethical approval and consent to participate

Ethical approval was obtained from the Human Research Ethics Committee at the Medical University of Shiraz (IR.SUMS.SCHEANUT.REC.1400.048). Informed consent was taken from all the participants. For participants involved, informed consent was obtained in the study. All methods were carried out in accordance the declarations of Helsinki. There was an emphasis on maintaining privacy in keeping and delivering the information accurately without mentioning the names of the participants. The participants were given the right to leave the interview at any time, and they were promised to have access to the study results.

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References

1. Call for Innovative Health Technologies for Low-resource Settings. Focusing on non-communicable diseases, world health organization, https://www.who.int/news-room/articles-detail/call-for-submissions (accessed 31 October 2023).
2. Cardiovascular Diseases. World health organization, https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1 (accessed 6 October 2023).
3. Cardiovascular Diseases. World health organization, https://www.emro.who.int/health-topics/cardiovascular-diseases/index.html (accessed 6 October 2023).
4. Emamian MH, Hashemi H and Fotouhi A. Predicted 10-year risk of cardiovascular disease in the Islamic Republic of Iran and the body mass index paradox. *East Mediterr Health J* 2020; 26: 1465–1472.
5. Amraei SG, Malekshahi F, Goudarzi F, et al. Using an educational program based on health belief model to improve the preventive behaviors of nurses against cardiovascular diseases. *J Edu Health Promot* 2020; 9: 100.
6. Ramezanhkani A, Ghaffari M, Etemad K, et al. Effect of the health belief model based education on hypertension reduction among elderly women affiliated with shahid beheshti university of medical sciences-2018. *J Health Field* 2019; 6: 6–12.
7. Jeemon P, Harikrishnan S, Ganapathi S, et al. Efficacy of a family-based cardiovascular risk reduction intervention in individuals with a family history of premature coronary heart disease in India (PROLIFIC): an open-label, single-centre, cluster randomised controlled trial. *The Lancet Global Health* 2021; 9: 1442–1450.
8. Health Education. World Health Organization, https://www.who.int/topics/health_education/en/ (accessed 7 July 2020).
9. Sharma M and Romas JA. *Theoretical foundations of health education and health promotion*. London: Jones & Bartlett Learning, 2012, pp.145–148.
10. Kokubo Y. Prevention of hypertension and cardiovascular diseases: a comparison of lifestyle factors in westerners and east Asians. *Hypertension* 2014; 63: 655–660.
11. Mohamadian H, Bazarghani A, Latifi SM, et al. Effect of motivational interviewing on hypertension, self-care and quality of life of rural aged people: application of health belief model. *J J Educ Community Health* 2019; 6: 95–101.
12. Rahimi T, Shojaei S, Mousavi Miyandashti Z, et al. Promotion of preventive behaviors of cardiovascular diseases using health belief model in women referring to health centers in Qom, Iran. *J Qom Univ Med Sci* 2017; 10: 35–44.
13. Sadeghi R, Mohseni M and Khanjani N. The effect of an educational intervention according to hygienic belief model in improving care and controlling among patients with hypertension. *J RafsanjanUniv Med Sci* 2014; 13: 383–394.
14. Khani Jeihooni A, Jormand H, Saadat N, et al. The application of the theory of planned behavior to nutritional behaviors related to cardiovascular disease among the women. *BMC Cardiovasc Disord* 2021; 21: 589.
15. Kheiri M, Jeihooni AK, Alkamel A, et al. The effect of educational intervention based on the health belief model on the promotion of cardiovascular disease (CVD) preventive behaviors among subjects referred to health centers in Fasa city (Fars province, Iran). *Kontakt* 2019; 21: 206–213.
16. Khodaveisi M, Azizpour B, Jadidi A, et al. Education based on the health belief model to improve the level of physical activity. *Phys Act Nutr* 2021; 25: 17.
17. Muhihi AJ, Urassa DP, Mpemben RN, et al. Effect of training community health workers and their interventions on cardiovascular disease risk factors among adults in Morogoro, Tanzania: study protocol for a cluster randomized controlled trial. *Trials* 2018; 19: 1–12.
18. Tadesse T, Alemu T, Amogne G, et al. Predictors of coronavirus disease 2019 (COVID-19) prevention practices using health belief model among employees in Addis Ababa, Ethiopia, 2020. *Infect Drug Resist* 2020; 13: 3751.
19. Shojaei S, Farhadloo R, Aein A, et al. Effects of the health belief model (HBM)-based educational program on the nutritional knowledge and behaviors of CABG patients. *J Tehran Univ. Heart Center* 2016; 11: 181.
20. Saffari M, Sanaeinasab H, Jafarzadeh H, et al. Educational intervention based on the health belief model to modify risk factors of cardiovascular disease in police officers in Iran: a quasi-experimental study. *J Prev Med Pub Health* 2020; 53: 275.
21. Salem GM and Said RM. Effect of health belief model based nutrition education on dietary habits of secondary school adolescent girls in Sharkia governorate. *Egypt J Commun Med* 2018; 36: 35–47.
22. Karimzadeh Shirazi K, Davoodi S and Akbartabar Toori M. Effect of educational intervention based on the health belief model to promote metabolic syndrome preventive behaviors in premenopausal women over 40. *J Clin Care Skills* 2020; 1: 181–187.
23. Kahnooji Z, Mirzaei T, Asadpour M, et al. Effect of educational intervention based on health belief model to promote cardiovascular disease preventive behaviors. *Community Health J* 2021; 14: 1–12.
24. Shao C, Wang J, Liu J, et al. Effect of a health belief model-based education program on patients' belief, physical activity, and serum uric acid: a randomized controlled trial. *Patient Prefer Adherence* 2018; 12: 1239.

25. Nooriani N, Mohammadi V, Feizi A, et al. The effect of nutritional education based on health belief model on nutritional knowledge, health belief model constructs, and dietary intake in hemodialysis patients. *Iran J Nurs Midwifery Res* 2019; 24: 372.

26. Shen Y, Wang TT, Gao M, et al. Effectiveness evaluation of health belief model-based health education intervention for patients with hypertension in community settings. *Zhonghua yu fang yi xue za zhi [Chin J Prev Med]* 2020; 54: 155–159.