

A Study of Effect of Educational Intervention Based on PRECEDE-PROCEED Model on Diabetes and Blood Pressure Preventive Behaviors in Patients Referred to Selected Comprehensive Health Centers

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ABSTRACT:

Introduction: Today, chronic non-communicable diseases such as blood pressure and diabetes mellitus are considered among the most important causes of health problems and mortality round the globe. The PRECEDE-PROCEED model is known as a suitable method for preventing high-risk behaviors in individuals. The present study is an attempt to determine the effect of the educational intervention based on the PRECEDE-PROCEED model on the diabetes and blood pressure preventive behaviors in patients referred to the selected comprehensive health centers in Shiraz City.

Method: This study was conducted as a clinical trial with intervention and control groups (pre-test and post-test) from the second half of 2019 to the first half of 2020. First, 4 comprehensive health centers were selected using the cluster sampling technique and then 2 centers were selected as the intervention group and 2 centers were selected as the control group using the simple random sampling technique. In each center, 30 individuals (a total of 120) were included in the study using the purposive sampling technique. The intervention group received three 45-minute training sessions once a week within three consecutive weeks. Data was collected using a questionnaire completed three times before, after, and one month after the educational intervention by both the intervention and control groups. Data was analyzed in SPSS version 22.

Findings: Most of the participants in this study were female (57.8%) and married (94.2%), and had an education level below high school diploma (70.0%), and all of them lived in the city. The results also indicated that the mean scores of the participants after the intervention in all dimensions except for the attitude dimension were significantly improved after the intervention, showing the effect of the PRECEDE-PROCEED model. There was also no statistically significant relationship between the demographic variables and dimensions of the PRECEDE-PROCEED model ($p < 0.05$).

Conclusion: In sum, the results of this study indicated that the use of the PRECEDE-PROCEED model positively affects the diabetes and blood pressure preventive behaviors. The PRECEDE-PROCEED model in this study improved all components except for the attitude dimension. Given the great effect of this model on the diabetes and blood pressure preventive behaviors, it is suggested to use this program in the long run through the face-to-face and virtual training methods for the individuals at risk.

Keywords:

educational intervention, PRECEDE-PROCEED model, preventive behavior, diabetes mellitus, blood pressure

INTRODUCTION

Today, chronic non-communicable diseases such as blood pressure and diabetes mellitus are considered

among the most important causes of health problems and mortality in the world [1-3]. Hypertension is also among the important health challenges round the globe

[4]. Hypertension refers to an increase in systolic blood pressure above 140 mmHg and diastolic blood pressure above 90 mmHg. Hypertension is classified into two types, namely primary and secondary. Most patients suffering from hypertension have primary hypertension, the cause of which is not exactly known, and approximately 5% suffer from secondary hypertension [5]. Resistant blood pressure is also a challenge faced by the primary care providers [4]. Resistant blood pressure refers to a type of blood pressure that is not within the 90-140 mmHg range despite taking 3 drugs simultaneously or despite taking 4 blood pressure lowering drugs [6]. High blood pressure increases the risk of diseases such as heart attack, stroke, and heart and kidney failure [4]. The rate of hypertension also varies from 5.2% to 55.3% in different populations [7]. According to the studies, the likelihood of hypertension increases with age [8], and this rate among the elderly is 2 to 4 times higher than the youth [9]. As reported by Arani et al. (2017), the prevalence of diabetes mellitus in Iran is 17.3% [7]. The increase in the incidence of hypertension in Iran can be attributed to the lifestyle changes, the sedentary lifestyle, the prevalence of urbanization, and population aging [10].

Hypertension is linked to diabetes and these two diseases are among the important complications of each other [11, 12]. Diabetes may also arise from genetic, behavioral and environmental factors [13]. In 2010, the World Health Organization reported a prevalence of 6.4 percent for diabetes in the 20-79 years age group, which included 285 million people per year. Moreover, it is predicted that this figure will grow to 7.7 percent in 2030, which is equal to 439 million people a year. According to the estimates, this rate will increase by 20% and 69% from 2010 and 2030 in developed and developing countries such as Iran, respectively [14]. Blood pressure is one of the highly common diseases in diabetic patients. The prevalence of blood pressure in patients with diabetes is determined by the duration of the disease, age, gender, race, and the presence of other problems such as kidney diseases [15]. The comorbidity of diabetes and blood pressure can cause disorders in the body and can inflict damage on the organs. As a result, the coexistence of these two risk factors in the individuals leads to a six-fold increase in the likelihood of incidence of cardiovascular diseases [12].

Self-care in patients with hypertension and diabetes can be effective in improving their life quality [16, 17]. Therefore, education plays an important and effective role in controlling these chronic diseases [18]. Health control and promotion education based on health theories or models can systematically show the behavior and the effect on future behavior [19]. Models also have a leading role in educational programs and interventions [20] and can result in changes in the harmful behavior imposed on society [21]. Among the existing health models, the PRECEDE-PROCEED model takes into

account the health and health promotion educational needs along with behavioral changes while it also attempts to predict the probable outcomes of educational programs [22]. This model is widely used on various levels [23] and designs a structure for senior decision-makers of the health system [24]. The PRECEDE-PROCEED health education model has a process-based foundation with the ability to evaluate and stress patient participation. This model is used in various areas such as “increasing community participation, needs assessment, implementation of health and prevention programs in the workplace and schools, and self-care improvement” [25]. The different stages of this model include 1) social diagnosis, 2) epidemiological diagnosis, 3) educational and ecological diagnosis (predisposing, reinforcing and enabling factors), 4) administrative diagnosis, 5) implementation, 6) process evaluation, 7) impact evaluation, and 8) results evaluation [19]. In this model, a group of factors including awareness, knowledge, and perception that motivate behavior is known as the group of predisposing factors. Another group of factors that cause changes in the environment and behavior is called the enabling factors, which include the availability of resources and skills. Besides, there is another group of factors known as the reinforcing factors that can reinforce a behavior or may undermine the power of a behavior. Examples of these factors include the impact of the family and friends, and such [26]. As stated, given that a considerable fraction of the population is exposed to chronic non-communicable diseases such as diabetes and hypertension, which can cause irreversible personal, family and social complications, education about the prevention and control of such diseases is essential. In this regard, community-based nurses play a major role. Hence, this study was conducted to determine the effect of the educational intervention based on the PRECEDE-PROCEED model on the diabetes and blood pressure preventive behaviors in patients referred to the selected comprehensive health centers in Shiraz City.

Materials and Methods

The study is a clinical trial with control and intervention groups (pre-test and post-test). The study population included all patients referred to the selected comprehensive health centers in Shiraz City. A total of 4 comprehensive health centers were selected from the comprehensive health centers using the cluster sampling technique and then 2 centers were selected as the intervention centers and two centers were selected as the control centers using the random sampling technique and by drawing lots. Based on a similar study by Hosseini et al. (27) and considering $\alpha = .05$ and a test power of 90%, 53 individuals were selected for each group (intervention and control). Finally, considering a 10% drop in this number, at least 60 participants were

allocated to each group and were included in the study. A total of 60 patients were selected using the convenience sampling method and were included in the study.

Data was collected using a researcher-made questionnaire that was completed three times before, after, and one month after the educational intervention by both the intervention and control groups. The questionnaire was a bipartite scale: the first part questioned demographic information including age, gender, marital status, and the number of children. The second part consisted of 37 questions formulated based on the constructs of the PRECEDE-PROCEED model: 6 questions about social evaluation, 5 questions about life quality, 9 questions about awareness, 6 questions about attitude, 5 questions about self-efficacy, 2 questions about the enabling factors, and 4 questions about the reinforcing factors. All questions were ranked based on the 5-point Likert scale from 1 (highly undesirable), 2 (undesirable), 3 (moderate), 4 (desirable), 5 (highly desirable). The maximum total score of the questionnaire is 170 and the minimum score is 53. A higher score on this questionnaire shows the greater effect of the PRECEDE-PROCEED model. To assess the validity of the questionnaire based on the opinions of 10 faculty members of Shiraz University of Medical Sciences, the face validity of the scale was assessed quantitatively using the Impact Score criterion to evaluate the importance of each statement. The impact factor of all items varied from 1 to 1.5 and the face validity was adequate. Moreover, the questionnaire was presented to 10 faculty members of Hazrat Fatemeh (PBUH) School of Nursing and Midwifery in Shiraz City to determine the content validity. After reading the questionnaire, the faculty members expressed their opinions on the compliance of the questions with the objectives, the impact factor of the questions, the appropriateness and relevance of the questions, and the clarity, eloquence, and necessity of the questions of the questionnaire. The content validity (CVR) after ruling out the unnecessary questions was 0.7 and the CVI was 0.8. In this study, the internal consistency method (Cronbach's alpha coefficient) was used to assess the reliability of the scale. The Cronbach's alpha coefficient was also 0.9. In sum, the questionnaire had adequate validity and reliability.

After obtaining the informed consent of all the samples and completing the pre-test, the intervention group participated in three 45-minute training sessions held once a week within three consecutive weeks. The first

session was held for the participants using various educational tools linked to methods of preventing hypertension and coping with it. The second session was held to review the information provided in the previous session about diabetes and to teach the methods of understanding and preventing it. In the last session, a review and summary of the information provided in the previous sessions were provided along with the necessary education about the blood pressure and diabetes preventive behaviors. The questionnaires were once again completed by the members of both groups at the end of the intervention and one month after the intervention.

For blinding purposes, the distribution and collection of the questionnaires were carried out by individuals that were unaware of the distribution of the samples in groups. Moreover, all samples completed the informed consent form in writing. They were assured that their information was remaining confidential by the researcher and it was going to be used only in line with the research objectives. Moreover, the training provided was presented in the form of a pamphlet to the control group at the end of the study in accordance with the ethical rules and principles.

Data was analyzed in SPSS version 20. For data analysis, given the normality of data, descriptive statistics (mean, standard deviation, frequency, and frequency percentage) and inferential statistics including the t-test, Chi-squared and repeated measures test were used.

Findings

The findings from this study revealed that most study participants were female (57.8%) and married (94.2%), and had an education degree below high school diploma (0.70%), and all lived in the city. Besides, the mean age, height, and weight of the participants were 39.58 ± 11.26 years, 71.54 ± 15.23 kg, and 164.28 ± 8.68 cm, respectively.

The Kolmogorov-Smirnov test was used to analyze the normality of data. The results of this test revealed that data had a normal distribution, and thus the parametric tests were used to analyze their relationship.

The t-test and Chi-squared test were used to compare the quantitative and qualitative demographic properties of the two groups. The results of these tests showed that there was no significant relationship between the demographic variables in the intervention and control groups ($p > 0.05$) (Table 1 and Table 2).

Table 1- The frequency distribution of demographic variables in the study units

Variable	Frequency	Frequency percentage	Group		p-value	
			Intervention	Control		
Gender	Male	29	24/2	9	20	0/19

	Female	91	75/8	51	40	
Marital status	Married	113	94/2	58	55	0/15
	Single	5	4/2	2	3	
	Widowed	2	1/7	0	2	
Education level	Below high school diploma	84	70/0	47	37	0/16
	High school diploma – Associate’s degree	20	16/7	9	11	
	Bachelor’s degree	14	11/7	4	10	
	Master’s degree	2	1/6	0	2	
Profession	Freelancer	21	17/5	7	14	0/51
	Government employee	15	12/5	7	8	
	Housewife	82	68/3	44	38	
	Unemployed	2	1/7	2	0	

Table 2- Quantitative variables in the study units

Variable		Frequency	M	SD	p-value
Age	Intervention	60	39/72	13/15	0/89
	Control	60	39/45	9/09	
Weight	Intervention	60	70/75	12/57	0/39
	Control	60	71/73	14/52	
Height	Intervention	60	162/55	8/14	0/23
	Control	60	161/55	8/93	

Table 3 compares the mean scores of the dimensions of diabetes and blood pressure preventive behaviors using the PRECEDE-PROCEED educational program in the periods before and after the intervention. According to

this table, the mean scores of the participants after the intervention in all dimensions except for the attitude dimension significantly increased (Table 3).

Precede-proceed dimensions	Time	Group	M±SD	p-value
Social evaluation	Pre-intervention	Intervention	15/8 ± 3/59	0/497
		Control	16/61 ± 3/04	
	Post-intervention	Intervention	20/73 ± 4/55	0/001<
		Control	18/15 ± 2/72	
Quality of life	Pre-intervention	Intervention	15/90 ± 4/35	0/14
		Control	16/88 ± 2/88	
	Post-intervention	Intervention	18/88 ± 3/95	0/001<
		Control	17/93 ± 3/60	
Educational evaluation)awareness(Pre-intervention	Intervention	33/93 ± 6/64	0/24
		Control	32/06 ± 5/69	
	Post-intervention	Intervention	37/03 ± 4/44	0/001<

Educational evaluation)attitude(Pre-intervention	Control	35/48 ± 3/88	
		Intervention	20/01 ± 3/87	0/18
	Post-intervention	Control	20/80 ± 2/37	
		Intervention	22/35 ± 3/58	0/25
Educational evaluation) self-efficacy(Pre-intervention	Control	23/06 ± 3/32	
		Intervention	14/75 ± 4/02	0/63
	Post-intervention	Control	13/46 ± 3/43	
		Intervention	17/51 ± 3/24	0/001<
Enabling factors	Pre-intervention	Control	14/31 ± 3/98	
		Intervention	6/28 ± 1/64	0/63
	Post-intervention	Control	6/81 ± 1/45	
		Intervention	9/63 ± 1/60	0/001<
Reinforcing factors	Pre-intervention	Control	6/73 ± 0/97	
		Intervention	13/25 ± 4/11	0/90
	Post-intervention	Control	13/16 ± 3/81	
		Intervention	15/53 ± 3/42	0/001<
		Control	13/70 ± 3/31	

Discussion

The present study was conducted to determine the effect of the educational intervention based on the PRECEDE-PROCEED model on the diabetes and blood pressure preventive behaviors in individuals referred to the selected comprehensive health centers in Shiraz City. The results of this study indicated that prior to the intervention, there was no significant relationship between the two intervention and control groups with regard to all dimensions of preventive behaviors. However, the implementation of the PRECEDE-PROCEED educational program improved all aspects of the diabetes and blood pressure preventive behaviors except for the attitude dimension in the patients referred to the comprehensive health centers. The results also indicated that after the educational intervention, different dimensions of the preventive behaviors improved significantly in the participants and there was a significant difference between the intervention and control groups.

The results of the present study showed that following the intervention based on the PRECEDE-PROCEED model, the quality of life of the participants increased. Besides, the mean score of life quality in the intervention group was significantly higher than the control group following the intervention. These results are in line with the studies by Azar et al. (2017) and Torabizadeh et al. (2018) on diabetic patients [18, 28], the research by Chabok Savar et al. (2020) on patients with blood pressure [29], and the study by Mazlumi et al. (2014) on the elderly [19]. These studies revealed that the PRECEDE-PROCEED model improves the quality of life of patients with different diseases.

The research results showed that following the intervention, self-efficacy in the intervention group was significantly higher than the control group. The results of the study by Azar et al. (2018) on patients with type 2 diabetes indicated that the use of the PRECEDE-PROCEED model improves self-efficacy in these patients [30]. Self-efficacy is known as an important factor in determining individuals' behavior and it can reduce the incidence of high-risk behaviors in patients [31]. Moreover, self-efficacy is one of the important and key components of improving the self-management skill of diabetic patients [32]. In fact, according to the results of this study, self-efficacy can be considered an important factor in the preventive behaviors of patients with diabetes and blood pressure.

Another factor that was improved by the PRECEDE-PROCEED model in the patients was the level of patients' awareness of the diabetes and blood pressure preventive behaviors. According to the results of this study, the participants' awareness of the preventive behaviors significantly increased after the intervention in the intervention group and there was a significant difference between the two groups. The individuals' knowledge is known as one of the most important factors in any field. Having adequate and accurate awareness of a specific subject matter can set the scene for proper performance [33]. Raising individuals' awareness about diabetes and blood pressure prevention solutions can increase the exhibition of preventive behaviors and improve people's health. The study by Mooshaki et al. (2016), which was conducted to determine the effect of the PRECEDE-PROCEED model on the preventive behaviors of diabetes mellitus, indicated that this model raises awareness about the preventive behaviors in the individuals [34] and is in line with the present study.

In the present study, despite the effect of the PRECEDE-PROCEED model on different dimensions of diabetes and blood pressure preventive behaviors, this model did not affect the attitude of the individuals after the intervention. In other words, the mean scores of the participants on the attitude dimension did not show a significant difference before and after the intervention. However, the results of several other studies, including the studies by Azar et al. (2018) and Lin et al. (2020) indicated that the PRECEDE-PROCEED model improves the attitude of patients and the medical personnel [30, 35]. Since affecting people's attitudes is more time-consuming than the other factors, it is necessary to conduct interventions within longer time periods in the research. Furthermore, the lack of a significant relationship in the present study could be attributed to the shorter duration of the intervention.

Conclusion

In sum, the results of this study indicated that the use of the PRECEDE-PROCEED model positively affects the diabetes and blood pressure preventive behaviors. The PRECEDE-PROCEED model in this study improved the social evaluation, quality of life, awareness, self-efficacy, enabling factors, and reinforcing factors components. However, it did not affect the individuals' attitudes towards the diabetes and blood pressure preventive behaviors. Given the great effect of this model on the diabetes and blood pressure preventive behaviors, it is suggested to use this program in the long run through the face-to-face and virtual training methods for people at risk.

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Conflict of interests

The authors declare that they have no conflicts of interest.

Authorship statement

All authors had substantial contribution to design of literature search, drafting the article and reviewing. All the authors have approval of the version to be published and responsible for the content of the article.

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