Original Research

The Effect Of Training Based On Extended Parallel Process Model On Adherence To Medication Regimen Among Diabetic Elderly

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Abstract:

Background: Diabetes is a common chronic disease in old age. Adherence to medication regimen is one of the principles of diabetes control. The use of health theories plays an important role in the adherence to treatment. Therefore, this study was conducted with the aim of investigating the effect of training based on extended parallel process model on adherence to medication regimen among diabetic elderly.

Methods: This quasi-experimental study was conducted on 60 diabetic elderly people who had been selected by non-random sampling method and divided into two intervention and control groups. In the intervention group, 6 training sessions were conducted based on the extended parallel process model and each session lasted about 45-60 minutes. Data collection tool was the Morisky Medication Adherence Scale (MMAS-8). Data analysis was done by SPSS-19 software, using inferential test (paired t-test, independent t-test, ANCOVA test).

Results: ANCOVA test by removing the effect of pre-test showed that the training based on extended parallel process model increased the diabetic elderly's adherence to medication regimen (Eta = 0.21, $p < 0.01$).

Conclusion: Education increases adherence to medication regimen. The use of health theories plays an important role in increasing awareness and creating behavioral sensitivities. The use of health theory and model, as an effective and low-cost health education method, has a significant role in increasing the adherence to drug treatment among diabetic patients.

Keywords: Extended Parallel Process Model, Adherence to Medication Regimen, Elderly, Diabetic

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Introduction

Diabetes is a chronic disease and the most common endocrine disorder (1). According to the report of World Health Organization, diabetes is considered a silent epidemic in the world (2). Type 2 diabetes is the most common type of diabetes (3). According to the report of World Health Organization, by 2025, the number of diabetic people in the world will reach to 380 million (4). Diabetes is one of the common diseases of old age (5). The prevalence of diabetes in Iran is 24.6% of the country's population (6). In Iran, more than 40 billion Rials from the budget of Ministry of Health are spent to control diabetes (7). In the world, 174 million US dollars are spent on the treatment of diabetes annually (8, 9). For this reason, diabetes is one of the most important health challenges of current era (10). Adherence to drug regimen is one of the main principles of diabetes control (11). Non-adherence to treatment recommendations is considered as the main cause of treatment failure (6).

The World Health Organization emphasizes on the term “adherence to treatment” in chronic diseases, especially diabetes (12).

Because non-adherence to drug regimen in diabetic patients is associated with frequent hospitalizations, failure of treatment, high medical expenses and frequent GP visits (13, 14). According to the report of World Health Organization, adherence to treatment can reduce 75% of mortality in chronic patients (15). For this reason, continuous adherence to treatment is considered an important factor in disease control (14, 16).

Studies show that educational programs that are based on theories have an important role in changing behaviors (17). The extended parallel process model (EPPM) is one of the models used in recent years to prepare health messages and prevent diseases and risky behaviors (18, 19). This model, which was presented by Kim White in 1992, is a theory of fear motivation (20, 21). The extended parallel process model includes four constructs of perceived sensitivity, perceived severity of risk, perceived effectiveness of existing solutions to prevent risk, and perceived self-efficacy to deal with existing threats (6).

According to this model, if people do not believe that they are at risk and also if the perceived threat assessment (the sum of perceived sensitivity and perceived severity) is low, they will ignore the health message and not respond to it, because they are not motivated enough to deal with the threat (21). Thus, the advantage of extended parallel process model compared to other health education models is that, this model is based on motivational theory (17).

Method

This semi-experimental study was conducted on 60 people who had been allocated in two intervention and control groups. The environment of this study was the nursing consultation center and samples of this study included patients referred to diabetes polyclinic in Gorgan city in 2022. Inclusion criteria were; being over 60 years old and having at least 2 years history of type 2 diabetes diagnosed by an internist or an endocrinologist. All participants were aware of time and place, and had the ability to communicate. Exclusion criteria included not willing to participate in the study. The sample size was calculated to be 60 people (n=30 in each group) based on the study of Zamani et al. (2020), considering the effect size of 0.66, test power of 80% and confidence interval of 95% at the significant level of 0.05. Non-random and convenience sampling method was used in this study. The researcher allocated the first 30 people in the control group and the next 30 people in the intervention group. Data collection tools included a demographic information questionnaire (age, sex, history of illness, marriage, literacy) and Morisky Medication Adherence Scale

(MMAS-8). Morisky scale contains 8 questions, and its scoring method is based on yes or no answer, with "yes" getting a score of 0 and "no" getting a score of 1. Last question in this scale is based on 3-option Likert scale, so that the option "never" gets the score of 1 and options "sometimes" and "always" get the score of 0. The minimum and maximum scores in this scale are 0 and 8, respectively. In this scale, score of 8 indicates high level of adherence, score of 6-8 indicates moderate level of adherence and score of 0-5 indicates low level of adherence (11, 22). The validity of this scale was confirmed in similar articles and also in this study by 10 faculty members of Islamic Azad University. The reliability of this scale was also confirmed (0.85) by the retest method. After approving the project by research council, obtaining the code of ethics from the bioethics committee (IR.IAU.AK.REC.1401.002), and receiving the clinical trial code, the researcher attended the study setting and introduced himself to the polyclinic officials. All participants were assured about the safety of study and maintaining anonymity. They were also informed that, they can withdraw from the study at any time, and then written informed consent was obtained from them. At the beginning of this study, the researcher first helped the participants in both groups to complete the demographic information form and the Morisky scale. Then, routine diabetic care was implemented for patients in the control group. Patients in the intervention group however, received 6 training sessions based on the constructs of extended parallel process model (30-45 minutes each) once a week for 6 weeks (Box 1). At the end, the Morisky scale was completed again by patients in both groups. Data were analyzed by SPSS-19 statistical software, using descriptive statistics (table, mean, standard deviation) and inferential tests (paired t-test, independent t-test, ANCOVA test) at a significance level of 0.05.

Results

Comparison of demographic characteristics between the two intervention and control groups showed that, the mean age of patients in the intervention group was 67.83 ± 4.37 years and in the control group was 68.3 + 19.92 years, while the result of independent t-test did not show any significant difference between the two groups in this regard (P=0.75). The mean duration of diabetes in the intervention group was 15.37 + 6.8 years and in the control group was 16.8 ± 6.34 years, while the result of independent t-test did not show any significant difference between the two groups in this regard (P=0.54). Chi-square test showed no significant difference between the intervention and control groups in terms of gender (P=0.39). Fisher's exact test did not show a significant difference between the two groups in terms of education (P=0.22). Chi-square test also did not show any significant difference between the two groups in terms of occupation (P=0.66).

The mean score of adherence to medication regimen before the intervention was 5.43± 1.47 in the intervention group and 5.26 ± 1.2 in the control group, and in this regard the result of independent t-test did not show a significant difference between the two groups before the intervention (p=0.06). The mean score of adherence to medication regimen after the intervention was 6.79 ± 0.86 in the intervention group and 5.63±1.4 in the control group, and in this regard the result of independent t-test showed a significant difference between the two groups (P=0.004). The paired t-test showed a significant difference between the mean scores of adherence to medication regimen in the intervention group before and after the intervention (P< 0.01). However, the paired t-test did not show a significant difference between the mean scores of adherence to medication regimen in the control group before

and after the intervention (P = 0.84), (Table 1). The ANCOVA test by removing the effect of pre-test showed that, the training increased the level of adherence to medication regimen (Eta= 0.21), (P < 0.01), (Table 2).

Discussion

Results of this study showed that the level of adherence to medication regimen among diabetic elderly patients was at moderate level. The results also showed that training based on extended parallel process model increased adherence to medication regimen among diabetic patients.

Based on the results of this study and similar studies, it can be said that education and continuous care increases adherence to dietary regimen in diabetic patients (10). Zamani et al. (2020) showed that the use of extended parallel process model increases self-efficacy in diabetic patients (19). Parsaei (2019) argued that training based on expended parallel process model increases adherence to treatment in diabetic elderly (6). Tabarsa et al. (2022) in their study concluded that the use of extended parallel process model reduces risky behaviors (17). In their study, Farahmand et al. (2016) showed the positive effects of health belief model-based training on the self-care of diabetic patients, so that the training improved diet, regular medication use, blood sugar control, and weight loss (23). Sadat-Razavi (2015) in a study showed that cognitive models, by increasing patients' awareness and information, increase understanding and adherence to diet and treatment (24). When people deal with a disease or a life-threatening factor, they create a general image and a specific belief about the disease and its treatment in their minds, which is called disease perception. The disease perception has a great impact on one's behavior, his adaptation to the disease, his control of the disease, and the overall outcome of the disease. On the other hand, wrong disease perception plays an important role in non-adherence to treatment. Therefore, the use of cognitive models leads to a correct perception of disease, complications of disease and importance of disease prevention (25).

Studies show that there is a significant difference between perceived sensitivity in people with high-risk behaviors and people without high-risk behaviors. This difference is often seen in people who have high-risk behaviors but less awareness (26). Therefore, it can be said that increasing awareness and creating sensitivity can play an important role in controlling behaviors (27).

Therefore, the key to success in the treatment of chronic diseases such as diabetes is to increase the awareness of patients and participate them in the treatment process (28). By increasing knowledge and awareness, we can increase the level of literacy and adherence to treatment among diabetic elderly (29), because education plays an important role in increasing adherence to treatment and quality of care (30-32). Given that health care providers play an important role in reducing the concerns of chronic patients, training and follow-up by them increases adherence to treatment (33), which in turn increases the quality of life and reduces the disease complications (34). One of the limitations of this study was the non-random method used for sampling. It is suggested to investigate other variables in chronic patients selected by simple random sampling method in future studies.

Conclusion

The results of this study showed that training based on extended parallel process model was able to increases adherence to medicinal regimen in diabetic elderly. Therefore, the design and implementation of educational program based on extended parallel process model can play an important role in the adherence of diabetic elderly to treatment. It seems that this theory can effectively change

behavior and maintain it for a long time. Therefore, this model while sensitizing patients towards non-adherence to medication regimen and increasing their awareness about disease complications, increases the patients' motivation for treatment and follow-up. It also increases self-care in patients and reduces complications and treatment costs. Therefore, health care providers are recommended to use this model in designing and implementing educational programs for diabetic elderly at different levels of service provision, such as care homes, treatment centers, diabetes clinics, etc.

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Conflict and interest

No conflict of interest was observed in this study.

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Tables

Box 1: Content of training sessions in the intervention group

Session	Construct	Session's objectives	Session's content
1	Perceived sensitivity	Getting to know the patient and checking the risk factors for diabetes	Introduction of the researcher and the patients, talking about the purpose of training. Discussing the onset of the disease, history of the disease, history of hospitalization, and hereditary history.
2	Perceived sensitivity	Identification of sensitivities and patient's understanding of the condition	Definition of diabetes and its types, causes of diabetes, and related factors. Questions about normal blood sugar level, ways to control blood sugar and complications and symptoms of the disease with the aim of discovering educational needs.
2	Perceived severity	Training based on patient understanding, familiarizing patient with the symptoms, and sensitizing the patient	Training based on diabetes risk factors. Weight control, cholesterol control and blood sugar control training. Familiarizing patients with the symptoms of high blood sugar.
3	Self-efficacy assessment	Examining the patient's level of awareness to provide training	The researcher evaluates the patient's level of interest and ability, and determines whether the patient has the knowledge, attitude and understanding of education.
4	Sensitivity Perceived severity	Getting familiar with permitted and prohibited dietary supplements and diets	The patient knows the effect of diet in treatment. The patient should be informed about the complications of non-adherence to diet regimen. The patient should be familiar with the complications of increasing and decreasing blood sugar. The patient should be introduced to permitted foods.
5	Self-efficacy assessment	Evaluation of knowledge and training given during the sessions	The patient expressed the importance of following the diet. The patient expressed the effect and types of permitted and non-permitted foods and snacks.
5	Self-efficacy assessment	Getting familiar with diabetic complications	The patient while getting familiar with the neurological/vascular/visual complications, explained the diabetic foot complications and ways to deal with the progression of diabetic foot. The patient was introduced to the nursing care of diabetic foot
6	Patient self-efficacy	The purpose of determining the effectiveness of training	Questions and answers with patients and their families. Decreased blood sugar of the patient. The patient should be able to wash his feet properly and follow the food pyramid.

Table 1: Comparison of adherence to medication regimen in the two intervention and control groups before and after the intervention

Time / Group	Before intervention	After intervention	P-value
Intervention	5.43 ± 1.27	6.79 ± 0.86	P < 0.01
Control	5.36 ± 1.2	5.63 ± 1.4	P = 0.84
P-value	P = 0.06	P = 0.004	

Table 2: The effect of training based on extended parallel process model on adherence to medication regimen among diabetic elderly

Source of variance	Sum of squares	Degree of freedom	Mean of squares	F-value	Level of significant	Eta
Modified model	50.31	2	25.15	35	P <0.01	0.55
Post-test separator	26.81	1	26.8	37.9	P <0.01	0.4
Group	38.16	1	11.07	15.68	P <0.01	0.21
Error	40.27	57	0.7			
Sum	2311	60				
Total	90.58	59				