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ORIGINAL RESEARCH

Self-Instructional Training Application on Diabetic Patients' Self-Care Behaviors

Sri Wahyuni[1], Christina Dewi Prasetyowati[1], Wahyu Nur Pratiwi[2], Khalid Alfiadi[2]

[1]*Nurse Profession Program, Faculty of Health, Institut Ilmu Kesehatan Bhakti Wiyata Kediri, Indonesia*
[2]*Bachelor of Nursing Program, Faculty of Health, Institut Ilmu Kesehatan Bhakti Wiyata Kediri, Indonesia*

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Corresponding Author:
Sri Wahyuni
Nurse Profession Program, Faculty of Health, Institut Ilmu Kesehatan Bhakti Wiyata Kediri, Indonesia
Email: sri.wahyuni@iik.ac.id

Abstract

Background: Diabetes mellitus cases have significantly increased in Indonesia over recent years. Health education for patients has often been carried out; however, education using self-instructional methods, which provided self-learning to solve problems by adjusting the patient's ability to improve self-care behaviors, has not been widely used.
Purpose: This study aimed to analyze the self-care behaviors of diabetes mellitus patients with the application of self-instructional training.
Methods: This research was a quasi-experimental study with a non-equivalent pretest-posttest with a control group design. The participants were 73 diabetic patients in the out-patient units selected by a purposive sampling technique and divided into two groups: the intervention group (n=37), and the control group (n=36). The intervention group received a self-instructional training program, which was carried out in 2 sessions using a booklet; each session lasted for 45 minutes. The Summary of Diabetes Self-Care Activities (SDSCA) questionnaire was used to collect diabetic patients' self-care behavior data. Wilcoxon and Mann-Whitney tests were employed for data analysis.
Results: Self-care behaviors of patients with diabetes mellitus increased before and after the training in both groups (p=0.000). However, the increase in the intervention group was higher than that in the control group, from 46.46±5.014 to 58.03±7.320, and from 47.78±4.929 to 51.64±6.406, respectively. There was also a significant difference in the self-care behaviors of diabetes mellitus patients between the intervention group and the control group (p=0.000).
Conclusion: Self-instructional training significantly improves self-care behaviors of diabetes patients. Therefore, self-instructional training can be considered to apply in the clinical setting for improving self-care behaviors of diabetic patients to prevent complications, and for enhancing nursing care of diabetes mellitus.

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1. Introduction

Diabetes mellitus is a non-contagious chronic disease due to carbohydrate, fat, and protein metabolism disruption caused by the damage of pancreatic beta cells, insulin secretion, or tissue's inability of insulin utilization, which increases blood sugar levels (Grossmann, 2014). Many factors like obesity, low activity, high carbohydrate consumption, and genetic factors have contributed to the increased prevalence of diabetes mellitus (Zheng et al., 2017). Therefore, diabetes self-care behaviors need to be applied continuously to prevent further complications of the disease (Sharoni et al., 2016). In Indonesia, diabetes mellitus prevention and management programs have existed since 1993. Although there are many health education methods taken to improve patient self-care behaviors, such as diabetes self-management interventions and diabetes education through pattern management, the number of diabetes cases continues to increase (Soelistijo et al., 2015).

The International Diabetes Federation (IDF) shows that the global prevalence of diabetes in adults has been increasing over recent decades. There are 415 million people diagnosed with diabetes mellitus in the world in 2015, and the organization predicts that the disease will increase to 642 million in 2040 (International Diabetes Federation, 2015). The prevalence of diabetes mellitus around the world in 2014 was 8.3% or 387 million cases. In 2013, Indonesia ranked 7th as the largest number country of diabetes incidence with 5.8% of cases or around 8.5 million cases, which were dominated by women with 4.9 million cases and men with 3.6 million

cases (American Diabetes Association, 2014). The Indonesian health profile shows that the prevalence of diabetes mellitus in East Java is 2.6%. East Java is in the fifth rank of the highest number of diabetes mellitus in Indonesia (Ministry of Health Republic of Indonesia, 2018). Particularly for Kediri, there were 769 cases of diabetes mellitus from all Public Health Centers in Kediri in 2017 (Kediri City Health Office, 2017).

Diabetes mellitus is a lifelong disease condition that cannot be cured but can be controlled using drugs and managing lifestyle. Managing a healthy lifestyle for fulfilling social, emotional, and psychological needs and long-term care for patients are needed to prevent further disease complications (Lee et al., 2016). Diabetes mellitus with complications can be a cause of patient stress, social isolation, hopelessness, loss of self-esteem, decreased self-image, and lack of confidence. Therefore, diabetes mellitus with complications has become a big challenge, especially in developing countries (Fenwick et al., 2012). Hyperglycemia in diabetes will trigger both microvascular and macrovascular complications. Microvascular complications include retinopathy, neuropathy, and nephropathy, whereas macrovascular complications are coronary artery diseases (CAD), cerebrovascular diseases (CVA), and peripheral vascular diseases (PVD). Those microvascular and macrovascular complications will cause organ damage if they are improperly treated (Ghandour et al., 2018; Khan et al., 2010).

Patients with diabetes mellitus may have problems with self-care behaviors (Borhaninejada et al., 2016). The self-care behaviors of patients with diabetes mellitus consist of nutritional management, physical exercise, anti-diabetic drug therapy, education and blood sugar monitoring (Soelistijo et al., 2015). Patients with diabetes have limited management of emotions, belief abilities, diet, physical activity, blood sugar control, medication, and foot care (Nuari, 2017). Complications that occur in diabetes mellitus patients can affect all aspects of life and can be life-threatening if they do not immediately obtain proper treatments or monitoring. Nursing interventions are needed to increase self-reliance efforts in diabetes management procedures in everyday life (McNamara et al., 2010).

Research showed that the diabetes self-management education and support (DSMES) program had a positive impact on diabetes patients' ability to do self-care (Moses & Olenik, 2019). Furthermore, Ghoreishi et al. (2019) found that interventions of social cognitive theory-based education have a positive effect on diabetes self-care. Nursing interventions that focused on the pillars of diabetes mellitus management were absolutely needed. Therefore, nurses need to create some innovations in health education programs to improve diabetes self-care behaviors for better illness management and patients' health quality (Andriyanto et al., 2019).

Cognitive behavior therapy became one of the methods that can be used as an intervention to improve patients' self-care. Self-instructional training has become one approach of cognitive behavior therapy. Self-instructional training is an educational method with a learning approach to solve problems by adjusting to the patient's abilities. The aim of this intervention is to make patients learn about their self-care. It will increase their learning potency by reflecting on past experiences and concluding the best applicable self-care behavior (Hamdan et al., 2019). A previous study showed that the self-instructional training method decreased blood sugar in diabetes mellitus patients. Nevertheless, this self-instructional training method was not specific for diabetes mellitus self-care behavior improvement (Nuari, 2017). A preliminary study conducted by the researchers in one of the public health centers in Kediri showed that the self-care behaviors of diabetes mellitus patients were still suboptimal. Many researchers have carried out studies about the effect of education on improving self-management and knowledge, and decreasing blood sugar. However, research on self-instructional methods to improve diabetic self-care behaviors is still rarely conducted. Therefore, this study aimed to analyze the self-care behaviors of diabetes mellitus patients with the application of self-instructional training.

2. Methods

2.1 Research design

This research was a quasi-experimental study with a non-equivalent pretest-posttest design and with a control group.

2.2 Setting and samples

This study was conducted in a public health center in Kediri, Indonesia. There were 73 diabetic patients in the out-patient unit of this public health center. A purposive sampling technique was used to recruit the patients as the research subjects. These 73 samples matched with the inclusion criteria, including: 36-70 years old and able to read, and also matched with the exclusion criteria, namely patients with diabetic foot ulcer complications, visual impairment, and dementia. The samples were divided into two groups: the intervention group with 37 respondents, and the control group with 36 respondents.

2.3 Intervention

Self-instructional training is a training program that is carried out to change cognition by providing education so that a person is able to control or give instructions to himself. Learning objectives set for all respondents were evaluated at the end of the training program by a follow-up interview session. The self-instructional training program consisted of two main components: cognitive modeling and rehearsal self-instructional, which were carried out in two sessions. The education of the program was carried out by members of the research team who had received debriefing from the chief researcher prior to the data collection. Each respondent also conducted five sessions of independent learnings to implement the knowledge from the educational sessions. The intervention activities are presented in Table 1.

2.4 Measurement and data collection

In this study, the researchers modified the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. The SDSCA questionnaire was created by Toobert et al. (2000) and developed by Choi et al. (2011), consisting of 9 items with a Cronbach's alpha of 0.69. From those 9 items, the researchers developed the questionnaire to 14 questions items which scored 0-7 for each item. This questionnaire contains the self-care ability of patients with diabetes mellitus, including diet (3 items), physical activity (3 items), foot care (5 items), treatment (1 item), and blood sugar control (2 items). The total score ranges from 0-84. The scoring system of the questionnaire consists of three categories: low (score 0-46), moderate (47-63), and high (64-84). The validity and reliability tests were carried out on 20 diabetes mellitus patients excluding from the research subjects. There was one invalid item out of 14 items to be excluded. Therefore, there were only 13 items in this questionnaire. The result of the validity and reliability test showed a value of sig r of <0.05 (item correlations >0.444) and r alpha value of 0.783, respectively.

The data were collected from August to December 2018, as follows: (1) selecting research subjects according to the inclusion criteria; (2) providing research information clearly to research subjects; (3) requesting respondents' consents to be the research subjects by providing an informed consent sheet; (4) determining the group of research subjects into two groups; (5) filling out the pre-test questionnaire to all respondents; (6) measuring the post-test after seven days of completing the self-instructional training method, which consisted of two training sessions with the researchers and five self-learning sessions through self-care observation guideline followed by an interview at the end of the training for the intervention group; and (7) measuring the post-test after seven days of receiving standard care for the control group. Standard care meant that the patients received education from the public health center, which was delivered verbally and there was no self-instructional training method. After the research was done, the control group were given the self-instructional training method. The procedures to collect data in this study are presented in Figure 1.

2.5 Data analysis

Data analysis was carried out through some stages: (1) editing to check the completeness of the data, (2) coding, (3) entry, and (4) tabulating (inserting data into tables). Univariate analysis was carried out on categorical variables such as age, gender, level of education, and jobs which were presented on proportion. The homogeneity was tested using the Chi-square test. Bivariate analysis was carried out for data processing using computer software statistical tests. The data normality of self-care behavior by the Shapiro Wilk test showed that the data were not normally distributed. The Wilcoxon test was used to analyze the data before and after the intervention, while the Mann-Whitney test was used to compare the intervention and the control groups.

Table 1. The activities of the self-instructional training program

Session	Activities	Media	Description
Day 1 (session 1)	*Cognitive modeling (45 minutes)*	Booklet	- Researchers identified the knowledge, abilities, and self-confidence for self-care of diabetes patients. - Researchers and respondents made agreements for learning and changing negative thoughts to positive thoughts. - Researchers provided the respondents with education including definition, symptoms, complications, and diabetes mellitus management.
Day 2			- Respondents learned independently.
Day 3 (session 2)	*Cognitive and behavioral rehearsal of self-instruction (40 minutes)*	Booklet	- Researchers provided foot care education, prevention of acute complications, and foot exercises by demonstrating directly, which were followed by respondents. - Researchers and respondents formulated goals and follow-up plans to treat their diabetes. - Respondents were able to determine solution options to overcome the problems they experienced while suffering from diabetes mellitus. - Respondents stated they would carry out self-care behaviors that they had learned according to their needs.
Day 4-7		Self-care observation guideline	- Respondents learned independently
Day 7	*(20 minutes)*	Self-care observation guideline	- Researchers conducted follow-ups on respondents about their knowledge and abilities in self-care - Researchers provided self-reinforcement to respondents who did self-care and successfully overcome problems during their diabetes treatment.

2.6 Ethical considerations

This research protocol had been approved by the Health Research Ethics Committee of Institut Ilmu Kesehatan Bhakti Wiyata Kediri (reference number of 705/PP2M-KE/VIII/2018). Before conducting the study, the researchers explained the purpose of the study, the procedures for data collection, and the benefits of participation to the potential subjects. The participants were offered an opportunity to ask any questions, and were assured that they could withdraw from the study at any time. All participants signed a written informed consent form to participate in the study. Their personal information was kept confidential.

3. Results

3.1 Characteristics of respondents

The respondents' characteristics in this study, including age, gender, education, and work profession were not statistically different between the two groups (p>0.05). Table 2 shows that the majority of the respondents in both groups were at the age of 46-65 years old, female, having low education, and not working or retiring.

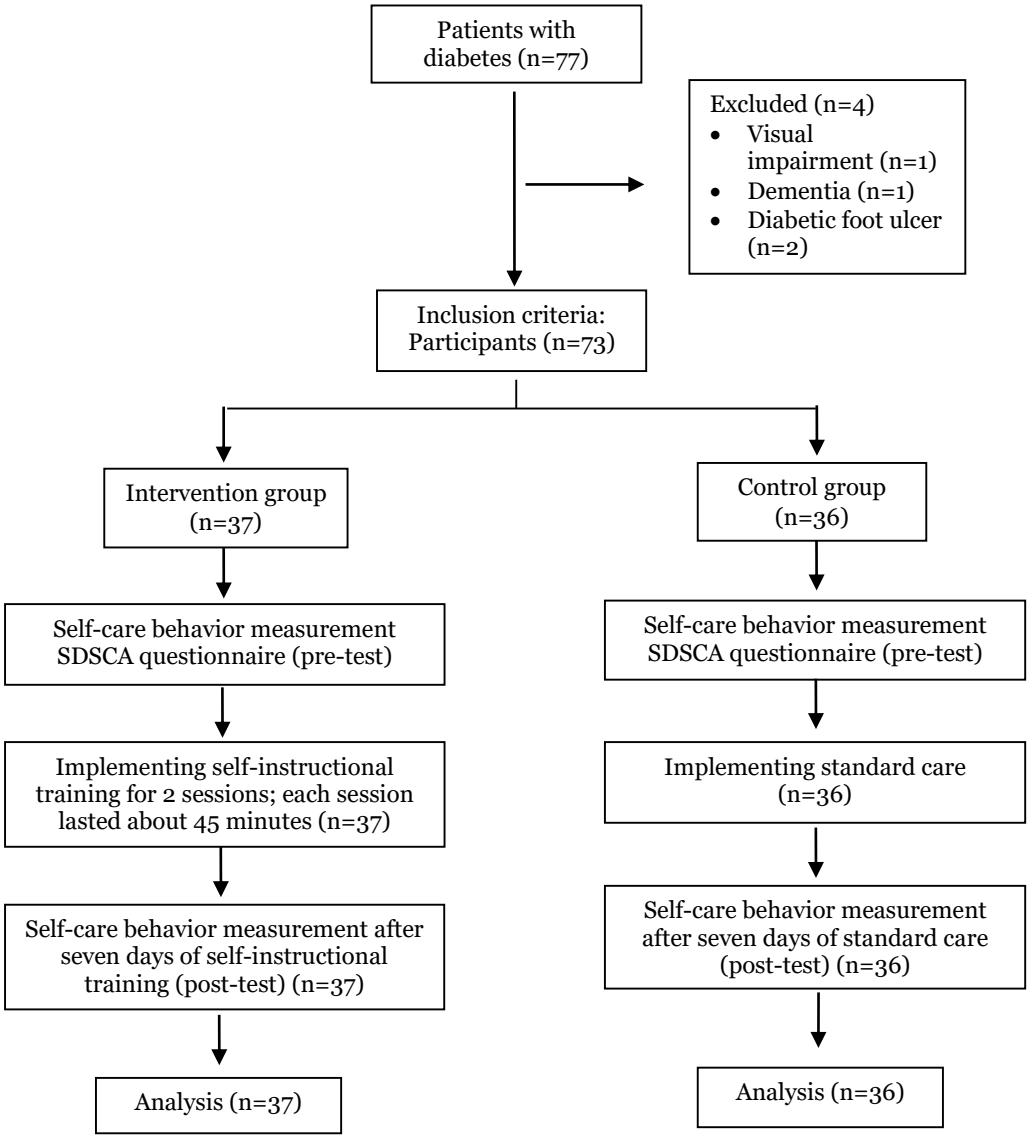

Figure 1. Flowchart of the study

The characteristics of the respondents is presented in Table 2, as follows:

Table 2. Characteristics of respondents (n=73)

Variables	Intervention Group (n=37)		Control group (n=36)		*p*
	f	%	f	%	
Age (years)					
26-45	6	16.2	7	19.5	0.926*
46-65	23	62.2	21	58.3	
>65	8	21.6	8	22.2	
Gender					
Male	11	29.7	10	27.8	0.854*
Female	26	70.3	26	72.2	
Education					
Low (≤ junior high school)	28	77.8	29	80.6	0.614*
High (senior high school or more)	9	22.2	7	19.4	

*Chi-square test

Table 2. Continued

Variables	Intervention Group (n=37)		Control group (n=36)		*p*
	f	%	f	%	
Job					
Not working or retiring	27	75	24	66.7	0.739*
Working	10	25	12	33.3	

*Chi-square test

3.2 Comparisons of self-care behaviors

The self-care behaviors of diabetes mellitus patients before the self-instructional training were mainly low in both groups, with a higher proportion in the intervention group (64.9%) rather than in the control group (61.1%). The self-care behaviors of the patients after the self-instructional training were mostly in the moderate category (48.7%) in the intervention group compared to the control group, which were mostly in the low category (50 %). There were significant differences in self-care behaviors before and after the intervention in both groups (*p*=0.000) (Table 3).

Table 3. Comparisons of self-care behaviors before and after the self-instructional training within groups (n=73)

Self-care Category	Intervention (n=37)		*p*	Control (n=36)		*p*
	Before f (%)	After f (%)		Before f (%)	After f (%)	
Low	24 (64.9)	4 (10.8)	0.000*	22 (61.1)	18 (50)	0.000*
Moderate	13 (35.1)	18 (48.7)		14 (38.9)	16 (44.4)	
High		15 (40.5)			2 (5.6)	

* Wilcoxon test

The self-care behaviors of patients with diabetes mellitus increased before and after the training in both groups (*p*=0.000); however, the increase in the intervention group was higher than that in the control group, from 46.46±5.014 to 58.03±7.320 and from 47.78±4.929 to 51.64±6.406, respectively. There was a significant difference in the self-care behaviors after the training between the intervention and control groups (*p*=0.000). It can be concluded that there was an effect on self-care behaviors of patients with diabetes mellitus with an application of self-instructional training (Table 4).

Table 4. The differences in self-care behaviors between intervention and control group (n=73)

Variable	Intervention (n=37)	Control (n=36)	*p*
	Mean±SD	Mean±SD	
Self-care behaviors before self-instructional training	46.46 ± 5.014	47.78 ± 4.929	0.306*
Self-care behaviors after self-instructional training	58.03 ± 7.320	51.64 ± 6.406	0.000*

*Mann-Whitney test

4. Discussion

The purpose of this study was to evaluate the effect of a self-instructional training method on improving the self-care behaviors of patients with diabetes mellitus. The finding of this study indicated that the self-instructional method affected the increased self-care behaviors of diabetes mellitus patients. This finding is similar to a previous study reporting that the provision of health education with self-instructional modules could improve the knowledge of type 2 diabetes patients (Oktorina et al., 2019). The finding is also supported by some studies stating

that self-instructional training can reduce blood sugar levels in patients with type 2 diabetes mellitus, and improve patient understanding of learning about self-care (Miljkovic et al., 2015; Nuari, 2017). The self-instructional training strengthens the understanding of patients with diabetes mellitus, in which this understanding can improve self-care behaviors in order to solve their problems and guide patients to live healthy for their better quality of life (Rivera-Flores, 2015).

Increasing knowledge in patients with diabetes mellitus is expected to form positive behaviors by doing a self-teaching method so that self-care can be improved. Diabetes self-care behaviors that can be applied by diabetic patients include the easy exercises of physical activity, dieting, controlling blood glucose levels, behavior treatment, and prevention of complications. Doing self-care well and regularly has a positive impact on the quality of life because there are efforts to control blood glucose levels and prevent complications (Amelia et al., 2018). According to the Orem's theory, self-care behavior is an implementation of activities carried out by individuals themselves to meet their needs that can sustain life and health (Alligood, 2014).

Self-instructional training could increase the self-care behaviors of patients and improve their physical and mental health. Patients with diabetes mellitus who perform self-care can reduce the incidence of diabetes complications. Therefore, it is expected to motivate patients to perform diabetes self-care (Ghoreishi et al., 2019). Moreover, the self-instructional training method can enhance patient awareness by changing negative into positive thoughts that can increase discipline in the implementation of self-care (Mahatmaharti et al., 2019). The results of research on the development of enhanced models of empowerment and quality of life of patients with type-2 diabetes showed that self-instructional training could improve the self-empowerment and quality of life of patients with type-2 diabetes mellitus. The self-instructional method can be used by nurses in providing health education to the patients to increase their self-control ability. So, patients are able to choose healthy alternatives in the management of diabetes mellitus, and finally could also improve their quality of life (Nuari, 2016).

The self-instructional method was developed by Meichenbaum (1997). It is a training method that is carried out to change one's cognition by providing education so that a person will be able to control or instruct oneself to change behaviors (Nawantara, 2018). Increased self-care behaviors of diabetes mellitus patients can occur because of the improved level of understanding of how to implement self-care after the self-instructional method. Knowledge improvement is expected to contribute to the management of patients with diabetes mellitus (Patel et al., 2015).

5. Implication and limitation

This study provides insights into how self-instructional training affects diabetes mellitus self-care behaviors. As a result, health care providers for diabetes mellitus in the clinical setting are able to adopt self-instructional training in order to improve daily living self-care behaviors. The improvement in self-care behaviors is expected to decrease patient's long-term complications due to improper self-care behaviors.

This study has some limitations. First, the education with self-instructional methods varied among respondents because it was adjusted to the abilities and knowledge of each respondent. However, the same learning objectives were set to all respondents for evaluation in the follow-up interview and the use of observation guideline sheets were done to minimize the bias due to various behaviors during the intervention. Second, the self-instructional method was carried out for 7 days, including both assisted-learning sessions by different facilitators and independent learning sessions by the respondents, requiring big efforts and laborious time to complete the data collection. This may result in different knowledge and abilities in self-care behaviors among respondents. However, follow-up sessions for evaluation were held at the end of the self-instructional training program to ensure that all respondents had the same knowledge and abilities according to the learning objectives.

6. Conclusion

Although the self-care behaviors of diabetes mellitus patients increased in both groups, the increase in the intervention group was higher than that in the control group. Self-instructional training improves diabetes mellitus patient's self-care behaviors; therefore, it is recommended for the health care providers, especially nurses in the clinical setting to apply this training

method. For further research, educational sessions on self-instructional methods may be added to optimize the intervention.

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Author contribution

SW: Study design, conceptualization, data collection, data analysis, manuscript writing; CDP: study design, data collection; WNP: study design, manuscript writing; KA: data collection.

Conflict of interest

The authors declare no conflict of interest in this study.

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