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Group-Based Education Program on Self-Care toward Reduction of Diabetic Foot Risk on Type-2 Diabetes Mellitus Patients

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Abstract

Diabetes mellitus patients are at risk of 15% having diabetic foot complications during their lifetime and 70% recurrence within 5 years. Studies show that educational programs can help improve self-care and reduce the risk of diabetic foot. Educational approach that is considered effective and efficient is education in groups. This study aims to determine the effect of group-based educational programs on self-care towards diabetic foot risk score in patients with type 2 diabetes mellitus. Design of quasi experiment research utilized the pre-test and post-test with control group. The intervention and control group was determined through cluster sampling on Garuda Central Healthcare Public area in Bandung City. Respondents were taken by purposive sampling as much as 68 respondents, which is intervention group (n = 33) and control group (n = 35). Data were collected using self-care questionnaires and diabetic foot risk screening. Data were analyzed by paired t test and independent t test. The result showed that there was difference of diabetic foot risk score between groups (p value 0.001). Self-care activities were also found to differ in the intervention group (p value 0.000) and control group (p value 0.001). Group-based education programs on self-care have an effect on decreasing the risk of diabetic foot. This program can be applied in public health care activities (*Perkesmas*) by improving self-care monitoring and diabetic foot risk in patients with diabetes mellitus.

Keyword: *Diabetes mellitus, group-based education, self-care, diabetic foot risk.*

Introduction

Diabetes mellitus is one of chronic diseases with increasing numbers of patients throughout the globe. The International Diabetes Federation proclaims in 2015 that 415 million adults worldwide were diagnosed with diabetes mellitus and this number will go up to 642 million in 2040[1]. Indonesia places the 7th in the world for the highest diabetes prevalence after China, India, America, Brazil, Russia and Mexico[1]. Based on the *Riskesdas* (Basic Health Research) (2013) West Java, an increase occurs from 1.4% prevalence in 2007 to 2% in 2013, along with the highest number of people (225.000) with diabetes mellitus but were left unchecked[2].

Public Health Centre (*Puskesmas*) Garuda is one of the community health centers with the highest number of diabetes mellitus patients in Bandung. This disease places the 10 most suffered disease and the highest number of deaths in Case Fatality Rate (CFR) (5.7%). The disobedience of diabetes mellitus patients in performing self-care could both worsen their conditions and trigger more complications[4]. One of the chronic complications occurs on their foot, or more commonly known as diabetic foot. It is a set of wounds on foot related to neuropathic damages and bloodstream disorder due to high glucose level[3]. Type-2 diabetes mellitus patients have a 15% risk of diabetic foot ulcer in their life and 70% risk of recurrence in 5 years[5].

The International Working Group on the Diabetic Foot claimed that 1 of 6 diabetes mellitus patients died due to this and each year 4 million people in the world are diagnosed with foot ulcer which can lead to amputation[6]. Foot screening check has come to be necessary to identify the foot risk condition[7]. A research by Reid et.al (2006) found that 82% of diabetes mellitus patients have the average of 3 foot problems for each individual[8]. Besides, Leese et.al (2006) claimed that high-risk patients have

86 times higher chances to suffer from foot ulcer while the moderate-risk ones have 6 times[9]. On the other hand, those who are in a low-risk group show 99.7% chance exempt from wounds for 2.5 years .

Previous study found that there is a relation between the patient's obedience in diet patterns, glucose level control, activity and foot treatment with diabetic ulcer phenomenon (p value = 0.000)[10]. In contrast, the disobedient patients have a 34 time higher chance to suffer from diabetic ulcer. Therefore, it is required that any prevention effort be done to reduce the risk of diabetic foot through independent self-care effort promotion[11].

A research by Kafaiae et.al (2012) found that education programs are impactful in the improvement of foot lesion (84%) and nails (62.8%)[12]. This corresponds to the result of systematic study that the health education program by foot checking, verbal and written instructions as well as discussions, prove effective in healing independent foot treatment and other pediatric problems such as neuropathy, disability, lesion, ulcer, *tineapedis* and callus[13].

The approaches used in various educational vary widely individually, group or family. Individual education requires more space and time for health workers to examine more in the patients specific needs, so this is seen as less effective and efficient[14]. Previous study found that educational interventions involving family can increase the knowledge, efficacy and behavior of patients in performing foot care (p value 0.000)[15]. But involving the family in the education process needs to pay attention to culture and family type.

Group-based education programs are an interactively designed and cost-effective strategy, through which the members of the group are allowed to discuss, communicate and exchange experiences in solving problems. Besides, each member of the group can actively participate during the process[16]. This research aims at identifying the impact of group-based education program about self-care on the risk of diabetic foot for type-2 diabetes mellitus patients in Public Health Centre of Garuda Bandung.

Material and Method

The design used in this research was that of "quasi experiment" with pre-post test with control group. The determination of intervention and control group used cluster sampling technique in Public Health Centre of Garuda Bandung. On the other hand, the respondents in each urban village were taken using purposive sampling technique. Through the numeric analytical research samples, along with Z_{β} 0.84; SD 1.8 and 0.9 minimum margin and 20% drop-out estimation, 37 respondents on each group were finally selected.

The variable in this research includes group-based education program and the risk of diabetic foot. The instrument used is Inlow's Screening Tools 60-Second Diabetic Foot from Canadian Association of Wound Care, as many as 5 indicators. On the other hand, the activity of self-care is measured using the Summary of Diabetes Mellitus Self Care Activities instrument[17].

The validity and reliability of Inlow's 60-second Diabetic Foot Screening Tool instrument have been tested by Murphy et.al (2012)[18]. Using *Kappa* test, the analysis result has found no different perception between tester 1 and 2 to the observed aspect (p value 0.000). For SDSCA instrument, it is obtained that r measured > r table (0.361) and the result of reliability analysis using *alpha Cronbach* is 0.76. Both results show that the instruments are valid and reliable[19]. The analysis done in this research included *t paired* and *independent test* with the trust score of 95% on the self-care scores and diabetic foot risks.

This research was done in hamlets by making educational groups consisting of 5 to 7 people each. Before intervention, each respondent is given questionnaires to be filled and screening for diabetic foot risk by 2 testers. The group-based educational intervention consists of 4 sessions each week (1 session/week). This educational program was conducted in 2 sessions for 60-90 minutes each through lectures and demonstration and using AVA and modules as the media.

At the end of each education activity, respondents are asked to set goal setting as follow up plan at home and record their self care activities on self report sheet each day. In the 3rd and 4th sessions in the interference group, sharing and discussion were also done by exchanging experiences, identifying the problems and looking for solution together. On the fifth week, an evaluation was done on self-care and diabetic foot for both groups.

Findings: From 74 chosen respondents, six of whom were not present during the research activity. Therefore, 68 respondents in total were divided into 33 people were in the intervention group and 35 in control group.

Table 1 shows the average age of intervention group of 61.85 and control group of 59.4. The majority of respondents are women in the intervention group (81.8%) and group control (82.9%). The education level are elementary school graduates in the intervention group (60.6%) and control (48.6%). Most of the respondents have suffered from diabetes mellitus for 1 – 5 years in the intervention group (48.5%) and control (45.7%). Based on the result of homogeneity test it is obtained that all data from both groups are not significantly different in terms of statistics (p>0.05).

Table 1: Frequency Distribution of Respondents Characteristics and Result of Homogeneity Test on Intervention and Control Group (N=68)

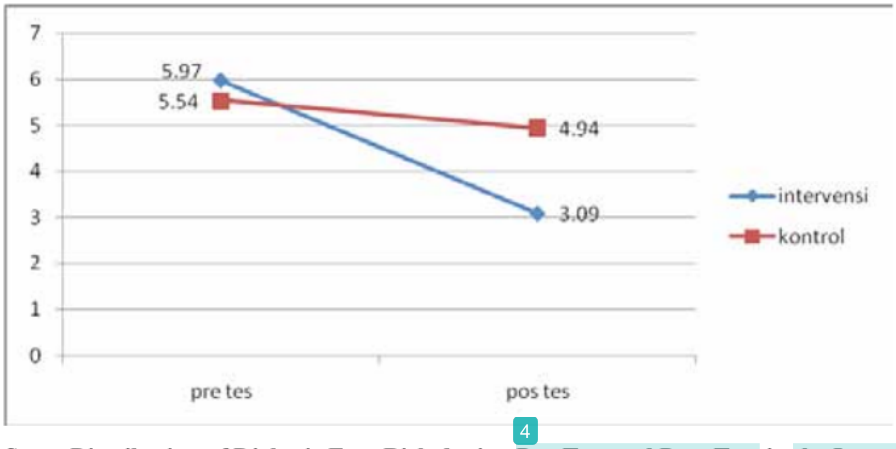
Characteristics	Intervention Group (n=33)		Control Group (n=35)		p value
	f	%	f	%	
Age	Mean 61.85 Min-Max 50-80		Mean 59.40 Min-Max 38-74		0.48a
Gender					
Male	6	18.2	6	17.1	0.56b
Female	27	81.8	29	82.9	
Education					
Elementary School	20	60.6	17	48.6	
Middle School	8	24.2	6	17.1	0.56c
High School	5	15.2	10	28.6	
University	0	0	2	5.7	
Sickness Period					
< 1 year	4	12.1	2	5.7	
1-5 year	16	48.5	16	45.7	0.99c
6-10 year	4	12.1	6	17.1	
> 10 year	9	27.3	11	31.4	

Homogeneity Test: a=Independent Test, b=*Fisher Exact*, c=*Kolomogorov Smirnov*

Table 2. Indicator Value Comparison of Pre-Test and Post-Test Self-Care Activity on Intervention and Control Group (N=68).

Activity Self-Care	Intervention Group (n=33)		Control Group (n=35)	
	Pre Test	Post Test	Pre Test	Post Test
	Mean	Mean	Mean	Mean
Eating Pattern	3.29	5.34	3.40	4.39
Physical Activity	2.59	5.26	2.19	2.47
Glucose Control	0.45	0.85	0.31	1.01
Treatment	5.52	6.21	5.80	6.09
Foot Care	1.36	5.62	0.84	1.61

Based on Table 2, we could see the average margin of eating activity from pre-test to post-test is 2.05, bigger than the control group, 0.99. In terms of physical activity, the average margin reaches 2.67 on the intervention and 0.28 on the control group. This corresponds to the foot care aspect, a significant increase occurs in the intervention group with average margin 4.26 and 0.77 in the control. Meanwhile, in terms of treatment and glucose control, a relatively similar increase applies on both groups.



Graphic 1. Score Distribution of Diabetic Foot Risk during Pre-Test and Post-Test in the Intervention and Control Group (N=68).

Based on Graphic 1, we could see that the average value for diabetic foot risk in the intervention (5.97) and control group (5.54) are relatively similar. A nosedive occurs to the average score of diabetic foot risk in the intervention group (2.88), while in control, the margin is only 0.6.

Table 3: Analysis of Average Score Difference of Diabetic Foot Risk during Pre-Test and Post-Test on the Intervention and Control Group.

Score of Diabetic Foot Risk		Pre Test (P1)	Post Test (P2)	Difference (P3)	Test	
		Mean±SD	Mean±SD	Mean±SD	t	P
Intervention Group		5.97±1.53	3.09±1.86	2.88±1.71	9.67 [a]	0.001
Control Group		5.54±1.80	4.94±2.32	0.6±1.66	2.13[a]	0.040
Uji	t	1.049[b]	3.61[b]	5.56[b]		
	P	0.290	0.001	0.001		

df (intervention)=32, df (control)=34, a=*Paired t test*, b= *Independent t Test*

Based on Table 3, the result of statistics *Independent t test* shows significant difference occurs on both group with p value 0.001. This result responds to the hypothesis saying that the impact of group-based education program exists on the average score of diabetic foot risk.

Discussion

In this research found that the group-based education program of self-care has given impacts on the decline of score for diabetic foot risk for type-2 diabetes mellitus patients in Public Health Centre of Garuda Bandung (p value 0.001). Although each group has score decline of diabetic foot risk with p value < 0.05, the decline is bigger on the group that has undergone the program, with 2.88±1.71 margin. In contrast, the control group remains on 0.6±1.66 margin. However, these facts correspond to previous researches showed that education can reduce the risk of diabetic ulcer (p value < 0.001)[11].

Diabetes mellitus patients, entail the risk to suffer from complications of diabetic foot during his life. However, this can be prevented by providing proper education[20]. This is done because education can change their behavior in undergoing independent treatment of diabetes mellitus. Supplying information for patients might be a stimulus that can improve their knowledge and raise their awareness to behave as expected. The

practice of good self-care has had relation with the glucose control and its prevention from complication, one of which is diabetic foot[21].

The group-based education program is part of the interventional strategy of the communal nurses. It aims at providing knowledge and skill, identifying setbacks and facilitating problem-solving process. This is more effective and more powerful to ensure behavioral changes for each individual[22]. Communal approaches offer forum for diabetic patients to gather and learn. Furthermore, it can also provide a conducive learning environment and create a supportive atmosphere.

The increase of the average self-care activities in the intervention and control group is in line with the decline of the average score of diabetic foot risk for both groups. The program in fact can improve the patient's knowledge and skills for independent self-care. Although insignificant, a decrease occurs on the average score of diabetic foot risk in the control group. This is because they need to submit a report every week. The self-report was not only useful to see the patient's weekly progress on the self-care activities. It could also be a grip and reminder for respondents to do the cycle in case they were off-track[16]. None the less, in the control group, the self-report was not evaluated weekly, hence the self-care activity tended to remain stagnant and progress lesser than the one on the intervention group.

Conclusion

Providing the small-group-based education program, modules, sharing and discussion, goal setting as well as good self-care monitoring and frequent foot screening, may affect the level of diabetic foot risk. Furthermore, the result of research also shows an increase of average total score on self-care activity including eating pattern, physical activity, treatment, glucose control and foot care for both groups.

Conflict of Interest Statement: The authors of this research declare that there is no conflict of interest related to this study.

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Ethical Clearance: This research has obtained ethical permission from the Committee of Ethics of Research Unit Faculty of Medicine in the Teaching Hospital Universitas Padjadjaran, Eijkman College Bandung with number "462/UN6.C10/PN/2017".

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