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Differences in Glucose Control of Diabetic Patients with Family Care Support Interventions

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ABSTRACT

Introduction: Patients with diabetes mellitus need support from their families to control their glucose needs because family plays a very important role in reducing risk factors. This study aims to analyze differences in glucose control before and after implementing family care support interventions. **Methods:** This study employed a quasi-experiment and involved 123 samples of diabetes mellitus patients and their families. These samples were selected using a random sampling technique. The measuring instrument employed an HbA1c blood sugar examination carried out twice. Meanwhile, bivariate statistical analysis employed the significance level of an alpha value <0.05 with a paired *t*-test. **Results:** Statistical tests have revealed some changes before and after the intervention in both groups. The mean glucose of the intervention group is 9.463 + 7.000, and that of the control group is 9.469 + 8.262. The results are $p = 0.001$ in the intervention group and $p = 0.062$ in the control group. **Conclusion:** The statistical tests have proven significantly different glucose control in DM patients before and after the intervention. Based on the findings, this study recommends that a nurse provide nursing interventions for diabetes mellitus patients by involving family participation. As a result, the client and family could provide care on their own.

Keywords: Type 2 Diabetes Mellitus; Family Care Support; Glucose Control

INTRODUCTION

Diabetes mellitus (DM) is serious worldwide problem because presently 143 million people suffer from this disease. This number is predicted to increase by 2045 (Andriyanto *et al.*, 2022) and continue to increase until it reaches 578 million sufferers in 2030 and 700 million sufferers in 2045 (Ministry of Health of the Republic of Indonesia, 2020). The prevalence of DM according to the results of blood sugar examination has increased from 6.9% in 2013 to 8.5% in 2018 (Riskesdas, 2018). DM cases will increase if preventive behavior is absent. DM has risk factors that contribute to the incidence of the disease. Efforts to control risk factors can prevent DM and its complications (Vural *et al.*, 2018). The family should play a role in suppressing the factor risk for DM so that the disease will not get worse (Thirsk & Schick-Makaroff, 2021). Previous research involving family intervention has found that a family has a full role in regulating diet, monitoring regular medication-taking, and controlling health; however, the family has not fully played a role in the physical activities of DM patients (Hao *et al.*, 2022).

The family's ability to provide care for family members who suffer from DM has increased by using supportive group therapy interventions (Shama *et al.*, 2020). Another study conducted a diabetes education program without involving the family for six months; the study revealed positive changes in the respondents' diet plans, glucose monitoring, regular medication-taking, physical activities, and stress levels (Andriyanto *et al.*, 2019). Other researchers have demonstrated glycemic control through effective self-management education (DSME) (Abdulah *et al.*, 2018).

DSME is a concept adopted from the theory postulating that every patient should be involved in self-management. Diabetes self-management could change by involving a strategy that considers the client's condition. This statement has

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been challenged by a previous study questioning whether the care interventions consider the client's needs (Kav *et al.*, 2017). Health services also play a role in comprehensively managing DM by involving the family. In this case, the intervention can be done through the family care and support (FCS) approach. The family as a support system, must provide support for a sick family member, care for him, and maintain his health status (Luthfa & Ardian, 2019). Family who does not understand how to take care of DM sufferers will perceive this condition as a burden of care. Therefore, it is necessary to provide family guidance (caregiver) to support the needs of DM patients at home. Family should participate in motivating DM sufferers to carry out routine health checks at the nearest health service place (Jeong & Yu, 2018). The role of nurses is still needed because, as health workers, they can choose community-based nursing intervention strategies focusing on interventions to change people's behavior and create a healthy life (Nies & McEwen, 2019).

A person's healthy living behavior depends on good self-management. Pender and Andriyanto *et al.,* (2022) propose a concept of self-management known as health promotion and evidence-based research that emphasizes collaboration between patients, families, and health professionals to early detect risk factors and provide better disease treatment. Educational interventions that pay attention to the concept of diabetes self-management could positively change the behavior of adults with DM (Nejhaddadgar *et al.*, 2018). A previous study offered a nursing intervention for disease management that followed the management pillars (Andriyanto *et al.*, 2019). Another study has proven an effective intervention using community participation models and the FCS approach to create communities that successfully change behavior (Azar *et al.*, 2018). This study aims to analyze differences in glucose control in DM patients before and after the FCS intervention.

METHODOLOGY

This study was conducted using a quasi-experiment in Mojokerto Regency. This research site was selected because it is the second-highest contributor to DM cases in East Java Province, Indonesia. A sample of 123 respondents was randomly selected based on the calculation of the hypothesis test for different sample proportions. The population was obtained randomly by considering the criteria. The inclusion criteria were clients with a medical diagnosis of DM and adult clients aged 28-59 years. Meanwhile, the exclusion criteria are clients experiencing diabetic foot, gangrene, or hypoglycemia, and respondents not attending the sessions more than twice. Therefore, this research involved 116 respondents divided into two groups. Group A was the intervention group and consisting of 58 respondents. Meanwhile, group B is the control group and consisted of 58 respondents.

The activity started by pre-testing 116 respondents. The next step was the FCS intervention, according to the group. The intervention group was scheduled for the first session. In this group, eight respondents dropped out in the first session, and three more dropped out in the second session. Meanwhile, in the control group, four respondents dropped out in the first session, and two dropped out in the second session. The respondent left the study due to several reasons due to several reasons: having sick family members, not being at home (traveling), having a task to complete, and working. After the intervention had been completed for 8 sessions, the researchers selected the respondents' attendance list for at least 6 sessions. The final respondents in the intervention group were 47, and those in the control group were 52; these respondents would be involved in collect post-test data.

The measuring instrument employed an HbA1c blood sugar examination conducted twice. The intervention with the family care support approach was given in eight sessions over three months. Respondents from both groups were divided into six groups. After conducting the intervention, DM sufferers were observed to learn independently for two weeks with four follow-ups. Afterward, the internalization phase was carried out. The control group received the individual nursing intervention without the FCS approach.

Statistical tests for all of the above conditions were analyzed with a significance alpha (<0.05). The bivariate statistical analysis employed the significance level of an alpha value < 0.05 with the type of numeric data using a paired *t*-test.

Ethical Consideration

The researchers conducted an ethical test on the research ethics committee of the Faculty of Nursing (FIK-UI) on March 28, 2018 with no. 62/UN2.F12.D/HKP.02.04/2018.

RESULTS

The characteristics of the respondents are presented in Table 1. The majority of the respondents are female, have a diploma education, and have never received information about DM from anyone. These findings indicate significant differences in glucose control in DM patients before and after the FCS intervention. These differences are summarized in Table 2.

Table 1: Characteristics of Respondents

Characteristics of respondents	Intervention (FCS), n = 47		Control (non-FCS), n = 52		*p*-values
	f	%	f	%	
Age Mean (SD)	50.66 ± 5.457		48.16 ± 5.426		0.741
Sex					
Man	14	29.8	16	30.8	0.809
Woman	33	70.2	36	69.2	
Education					
Elementary school	7	14.9	9	17.3	0.584
Diploma	39	83.0	40	76.3	
Undergraduate	1	2.1	2	3.8	
Sources of information					
Health workers	9	19.1	11	21.2	0.524
Family / Friends	13	27.7	14	26.9	
Media	11	23.4	12	23.1	
No information	14	29.8	15	28.8	
Income					
< 252.32 USD	42	89.4	43	82.7	0.519
≥ 252.32 USD	5	10.6	9	17.3	

Table 2: Diabetic Glucose Control

Group	Before Mean ± SD	After Mean ± SD	df	*p*-values
HbA1c				
Intervention	9.463±2.375	7.000±2.021	46	0.001
Control	9.469±2.491	8.262±2.202	51	0.062

DISCUSSION

There is a significant difference in glucose control in DM patients before and after the FCS approach. Family support in glucose control for people with DM will provide an understanding of what is recommended by health workers, especially for families who are carrying out treatment, by reminding each other and motivating each other; thus, people with DM are motivated to maintain blood glucose within normal limits (Fan & Sidani, 2018). The family should also participate in addressing DM risk factors so that severe disease does not occur. Regulation of diet and physical activities can be done by people with DM and their families to prevent risk factors and care for a sick family member (Sandholm & Groop, 2018). The provision of the DSME intervention aims to control blood sugar (Fan *et al.*, 2018).

Another study has found that DM patients whose blood glucose is monitored do not have better glycemic control than patients whose blood glucose is not monitored (Alhaidar *et al.*, 2020). Another study has found that the intervention and control groups of DM patients show different blood sugar levels and psychological status before and after receiving DSME (Chai *et al*., 2018). Another study has revealed that blood sugar content and HbA1c decrease (Bakara & Kurniyati,

2022). Recent research on DSME involving family members may improve outcomes for people with DM. Family members in the care program urgently need a facility to actively involve family members (Felix *et al.*, 2020).

Educational activities refer to prevention efforts and an intervention strategy to manage DM; these activities should be done (Stanhope & Lancaster, 2016). For example, the FCS approach involves the family in supporting DM patients to control glucose under normal conditions. Involving the family as the closest source of care is included in the FCS intervention. Good self-management of people with diabetes will be well described by the most effective family support (Cho & Kim, 2021). Family members must participate in every care activity to actively manage DM risk factors experienced by another family member (Vinsalia & Handajani, 2021). A supportive family program could impact the adherence to medication regimens in high blood pressure patients (Pangandaman *et al.,* 2021). Efforts to prevent DM complications require the application of good self-management behavior.

This current study adopted FCS from a previous study which revealed a change in HbA1c (Bakara & Kurniyati, 2022). A previous study reported that the family is the most effective care support system in DM management. This current study provides an intervention adopted from a development program to handle non-communicable diseases run by the Indonesian government (Andriyanto *et al.*, 2022; Higuchi, 2021). The program is formed through the integrated development command post activities for non-communicable diseases (PTM). This program consists of an activity and involves community participation to early detect and monitor risk factors conducted on a regular basis. Due to COVID-19, PTM activities are not carried out according to the schedule. Therefore, the intervention delivery method requires a combination of network methods (Andriyanto & Hidayati, 2018).

The network method of providing intervention is carried out by distributing educational videos and questions via chat simultaneously. These techniques allow respondents to actively ask and give opinions. This current research employed various media and learning methods in the form of learning modules, workbooks, leaflets, educational videos, game methods, and mentoring; these methods were conducted during the intervention (Bailey *et al.*, 2017). This current study employs media adapted from previous research, which develops media modules in the form of a guidebook for health workers to provide interventions, and has revealed a positive reaction (Andriyanto & Hidayati, 2018). This current research has several limitations. First, intervention activities are carried out in a combined manner outside and within the internet network so that some respondents could not punctually participate in activities. Second, assessing the respondents' verbal and nonverbal responses is difficult. Third, active family participation when giving interventions is still insufficiently monitored.

CONCLUSION

DM patients show a significant difference in glucose control before and after the intervention using the FCS approach. The FCS was implemented for three months and has significantly affected glucose control in DM patients.

Conflict of Interest

The authors declare that they have no conflict of interests.

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