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### RESEARCH ARTICLE

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## Endurance Diabetes Foot Exercise Based on Family Centered Care (EDFE-BFCC) to Reduce Blood Sugar Levels Patients Diabetes Mellitus Type 2

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### ABSTRACT

Patients diabetes mellitus type 2 have the potential to suffer from various complications, both acute and chronic complications. The family in addition to providing support also has an important role in the process of preventing these complications. So the purpose of this study was to determine the effectiveness of endurance diabetes foot exercise based on family centered care (EDFE-BFCC) in reducing blood sugar levels patients diabetes mellitus type 2 in the work area of Bengkuring Public Health Center, Samarinda. This study used a pre-experimental research design with a pre and post test research design without a control group. Researchers only intervened in one group without a comparison. The population in this study were all patients with Type 2 Diabetes Mellitus in the working area of Bengkuring Public Health Center, Samarinda. The sample used was 13 people by taking all members of the population according to the inclusion criteria. Diabetic foot exercise is modified with endurance movement, which is then through family empowerment to train family members with diabetes mellitus type 2. The effectiveness of the treatment was assessed by comparing the value of blood sugar levels during pre and post intervention. The results showed that  $p$  value = 0.001. Endurance diabetes foot exercise based on family centered care (EDFE-BFCC) is effective in lowering blood sugar levels during patients diabetes mellitus type 2.

**Keywords:** diabetes foot exercise; endurance; family centered care; diabetes mellitus type 2

### INTRODUCTION

Diabetes is a chronic metabolic disease characterized by elevated blood sugar levels. Diabetes mellitus type 2, which generally occurs in adults, has a condition when the body is resistant to insulin or does not make enough insulin which over time can cause complications in the heart, blood vessels, eyes, kidneys and nerves<sup>(1)</sup>.

Successful management of Diabetes mellitus requires disease education, treatment plans, monitoring of complications, both for patients and close relatives to participate in the patient's treatment program. Family support is very important for managing chronic conditions but is often neglected when planning interventions related to behavior change in patients with diabetes mellitus, especially type 2. It is increasingly clear that the social environment of people with diabetes and their interactions with their families affects the patient's self-management<sup>(2)</sup>.

The International Diabetes Federation (IDF) estimates that there are at least 463 million people aged 20-79 years in the world suffering from diabetes in 2019 or equivalent to a prevalence rate of 9.3% of the total population at the same age. This trend also occurs in Indonesia, according to Basic Health Research data (2018), the prevalence of diabetes mellitus diagnosed by doctors in Indonesia is 2.0% and the highest prevalence of the disease is in DKI Jakarta 3.4% and East Kalimantan is ranked second 3.0%<sup>(3,4)</sup>.

Diabetes Mellitus is a disease that requires good self-management. The large number of cases of diabetes mellitus that occurs if not managed properly can cause various complications. Diabetic foot ulcers are the most

common complication. The incidence of patients with UKD (Diabetic Foot Ulcers) in Indonesia is 15% of DM patients. Even the mortality and amputation rates are still high at 32.5% and 23.5%<sup>(5, 6)</sup>.

There are five pillars of diabetes management, namely education, medical nutrition therapy, physical exercise, pharmacological intervention and blood glucose control. For feet that are still normal or have neuropathic or neuroischemic disorders but there are no injuries, management is more focused on early detection<sup>(6,7)</sup>.

Successful management of diabetes mellitus requires disease education, treatment plans, monitoring of complications, both for patients and close relatives to participate in the patient's treatment program. Family support is very important for managing chronic conditions but is often neglected when planning interventions related to behavior change in patients with diabetes mellitus, especially type 2<sup>(8)</sup>. The support received by people with type 2 Diabetes mellitus from their families and the role of this support is a family effort in implementing diabetes management practices. It is increasingly clear that the social environment of DM sufferers and their interactions with their families affects the patient's self-management<sup>(9, 10)</sup>.

A good family role can affect a person's satisfaction in living daily life, as well as family duties in caring for sick family members. The role of the family is very important in every aspect of family health care, from strategy to rehabilitation phase.

## METHODS

The study was carried out in May to June 2019 in the area of the Bengkuring Public Health Center, Samarinda. The study was conducted for 3 weeks with the intervention 2 times a week. The type of research used was a pre-experimental research design with pre and post test without control group. Researchers only intervened in one group without a comparison. In this study, families were trained to do diabetes endurance foot exercises, which were then taught to patients with type 2 diabetes mellitus and observed during the study.

The population in this study was 463 people. The sample of this study totaled 13 people by using a research method to take all the samples of the population that fit the criteria of inclusion. The independent variable in this study Endurance Diabetes Foot Exercise Based on Family Centered Care (EDFE-BFCC), while the dependent variable was a decrease in blood sugar levels at the time. The instrument used in data collected in this study is the observation sheet. The data have been collected and analyzed by using a statistical test wilcoxon with significant level  $p \leq 0,05$ ; then  $H_0$  is rejected and  $H_a$  accepted.

## RESULTS

### Characteristics of Respondents

Table 1. Distribution of characteristics of respondents

Characteristics of respondents	Frequency	Percentage
Gender		
Man	5	38.5
Woman	8	61.5
Age		
45-59	2	15.4
60-74	11	84.6
Last Education		
Elementary School	3	23.0
Junior High School	9	69.2
Senior High School	1	7.8

### Blood Sugar Levels

Table 2. Analysis of random blood sugar levels

Random blood sugar levels	Median (mg/dL)	p
Before intervention	199	0.001
After intervention	175	

The results of the Wilcoxon test showed that the median value after being given the intervention was smaller than the value before the intervention was given, namely  $175 < 199$  with a p value  $< 0.05$ . Based on the result, it can be concluded that endurance diabetic foot exercises based on family centered care is effective in reducing blood sugar levels when patients with type 2 diabetes mellitus.

## DISCUSSION

Characteristics of respondents based on gender, most of which are women as much as 61.5%. The characteristics of respondents based on age are mostly 60-74 years old as much as 84.6%. Meanwhile, the characteristics of respondents based on their latest education are mostly junior high schools with 69.2%.

Analysis blood sugar levels while shows a decrease in the median value of blood sugar levels after being given the diabetes endurance foot exercise intervention based on family centered care with a frequency of 2 times a week for 3 weeks. From the test results, the median value after the intervention was smaller than the median value before the intervention, namely 175 < 199 with a difference of 24.

Blood glucose levels in patients with type 2 diabetes mellitus before the intervention had a high measurement result, with an interpretation of the median value of 199. The high blood sugar during the respondent was caused by heredity, lifestyle, gender and age which were factors in the occurrence of type 2 diabetes mellitus<sup>(11,12)</sup>. Meanwhile, the respondent's sugar level after being given the intervention decreased with the interpretation of the median value of 175. The results showed that family-based resistance modification diabetes foot exercises increased blood sugar levels in type 2 diabetes mellitus patients.

Well-managed diabetes uses five main pillars: diet, exercise, monitoring, therapy and education<sup>(6)</sup>. Adherence to fulfilling a series of lifelong self-care routines is a great challenge and is not easy for people with type 2 diabetes mellitus to carry out. Boredom and fatigue can occur at any time which causes sufferers to tire of practicing self-care, especially in exercise.

The decrease in blood sugar levels in patients with type 2 diabetes mellitus after being given the intervention was due to endurance modified diabetes foot exercises based on family centered care, helping to improve blood circulation and also strengthen the small muscles of the feet and prevent foot deformities. In addition, leg exercises can also increase strength in the thigh, calf muscles and also overcome limitations in joint movement<sup>(13-15)</sup>.

The effect of diabetic foot exercise on changes in blood sugar levels, namely in actively moving muscles can increase contraction so that the permeability of cell membranes to increased glucose, insulin resistance decreases and insulin sensitivity increases. So that the circulation in the blood increases and within 30 minutes after doing this diabetic foot exercise can reduce the GDA of people with diabetes mellitus at intervals of 5-10 mg/dl<sup>(13-16)</sup>.

Empowerment factors from the family can be done, apart from observing but also providing support including training. The results of research conducted by Suyanto & Sulistyowati, showed that group support can increase the self-efficacy of people with diabetes mellitus in preventing diabetic foot<sup>(17)</sup>.

Diabetes endurance foot exercise is one of the preventive measures that requires motivation to run it. So that the family becomes the main role in addition to teaching, it also provides support to increase motivation.

Developing diabetes interventions by doing diabetes endurance foot exercises based on family support is an integral part of efforts to maintain self-management behavior and improve health outcomes for type 2 Diabetes Mellitus patients. Family support has a positive impact on a healthy diet, increased perception support, greater self-efficacy, height, increased psychological well-being and better glycemic control<sup>(8)</sup>.

Family social support has a very important role for type 2 Diabetes Mellitus patients. Social support contributes to health outcomes is not fully understood<sup>(18)</sup>. However, research shows that social support can benefit patients' health by reducing stress, changing affective states, improving quality of life, and influencing changes in health behavior<sup>(2,19,20)</sup>.

The role of family support in medication adherence and blood sugar control has implications for family life, resource requirements and diabetes care. Family dynamics is an integral component of factors that maintain optimal health in the management of diabetes mellitus, especially in the outpatient care process. Poor blood sugar control is not only a life-threatening condition for diabetic patients; However, it also affects their quality of life and that of their family members and friends as a whole<sup>(10)</sup>.

Researchers assume that the higher the role and activity of the family, especially in providing diabetes intervention by doing diabetes endurance foot exercises based on family support, the more influential it is in decreasing and stabilizing blood sugar levels, which means reducing the acceleration of complications in patients with type 2 diabetes mellitus.

## CONCLUSION

Based on the results of research on "Diabetes Endurance Foot Exercises Based on Family Centered Care (EDFE-BFCC) in Lowering Blood Sugar Levels in Type 2 Diabetes Mellitus Patients" the researchers concluded that: There was a significant decrease in blood sugar levels after being given the intervention of Diabetes Endurance Foot Exercises Based on Family Centered Care (EDFE-BFCC). The study proved effective on people with type 2 diabetes mellitus, and the suggestion for researchers next was to increase the number of samples by using control groups to find out the difference in intervention-before and after.

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